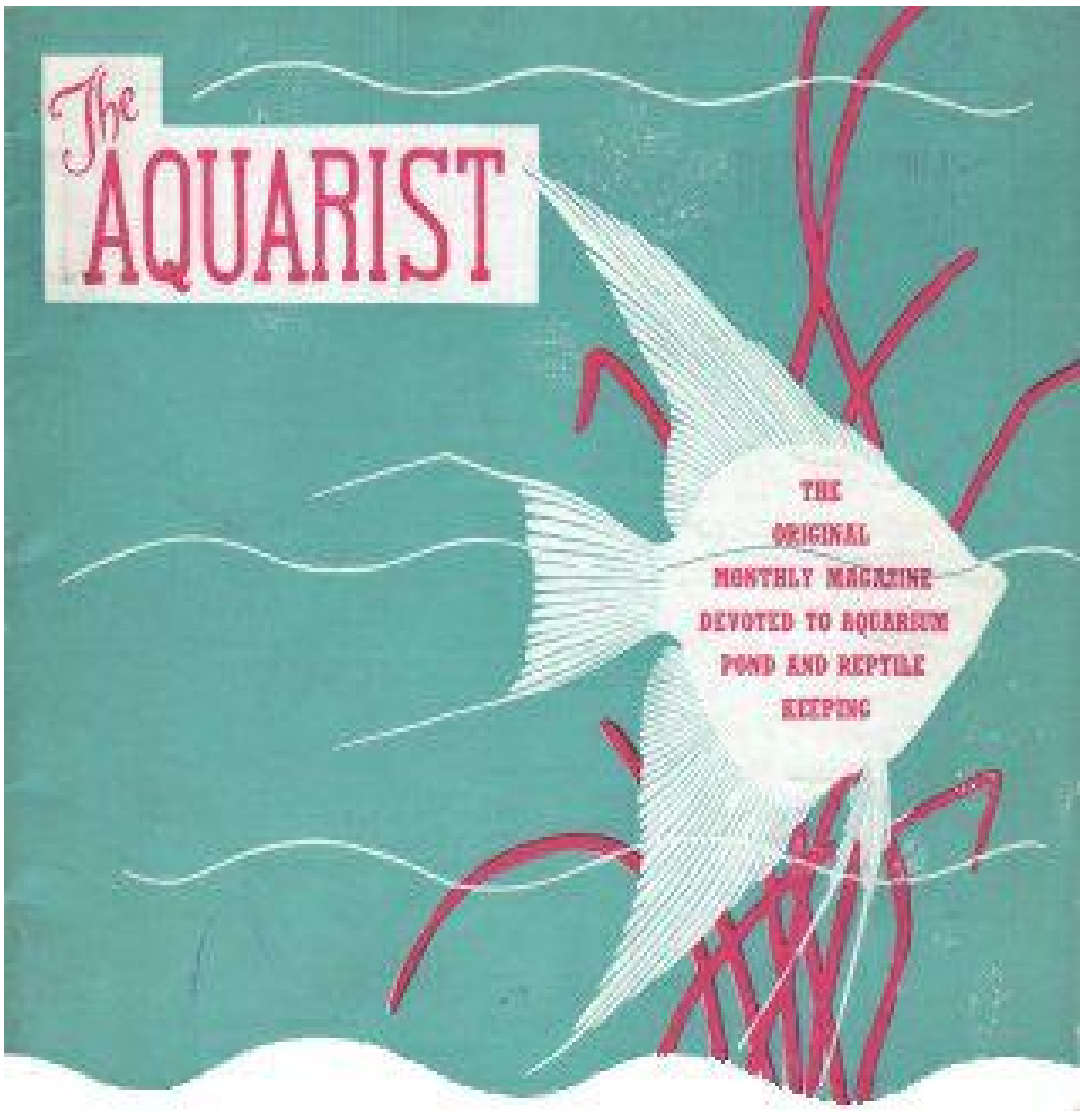


Volume XVI Number 1
April 1951

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# REPTILES

## EXPECTED THIS MONTH

GREEN LIZARDS, WALL LIZARDS, SAND LIZARDS, WHIP SNAKES, GRASS SNAKES, GREEN TREE FROGS, GREEK TORTOISES*

* Please Note—Hibernating Tortoises sold only in season. No winter trade here

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# The AQUARIST
## AND PONDKEEPER

*Founded in 1924 as "The Amateur Aquarist"*

THE BUTTS, HALF ACRE, BRENTFORD
MIDDLESEX

PUBLISHED MONTHLY

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Advisory Editor : A. FRASER-BRUNNER

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Photo: H. & V. Joel

*Harbingers of spring in the water-garden. A brave display of daffodils signals to the pondkeeper that busy days are fast approaching*


VOL. XVI No. 1 1951


# Editorial

IT was bound to happen. As our hobby has grown and expanded all kinds of ancillary activities have developed around it, providing this and that for fish-keepers, supplying the necessary and the unnecessary, the good and bad, so that slowly all the trimmings that have long blessed other hobbies and interests are becoming available to aquarists. And so, we repeat, the Tropical Fish of the Month Club was bound to happen.

True, this organisation is as yet confined to U.S.A. where the temptation to obtain something fresh, be it books, automobiles, shot-guns, card-games, carpets, cosmetics or flowers with each new moon is specially great, to judge from the number of Month Clubs that thrive there. The Fish of the Month Club is true to form. By merely sending off a membership slip the aquarist obtains his " First Free Bonus Fish "; further Free Bonus Fishes arrive for each new member he introduces to the Club.

So much for that. It or an imitator may try to make headway over here in time. We do not care to forecast the nature of its reception: this sort of thing defies prophecy. But what other 'greatest services to the hobby ever' can we expect to be offered in the future?

Well, perhaps our large stores will hold sales of fishes. " Slashed Prices " for neons will be announced and surplus lots of mixed torn-finned fishes will be offered most cheaply. Aquarists will queue up all night to secure these bargains and wrestle with one another at the counters to obtain large carp emblazoned with blue crosses.

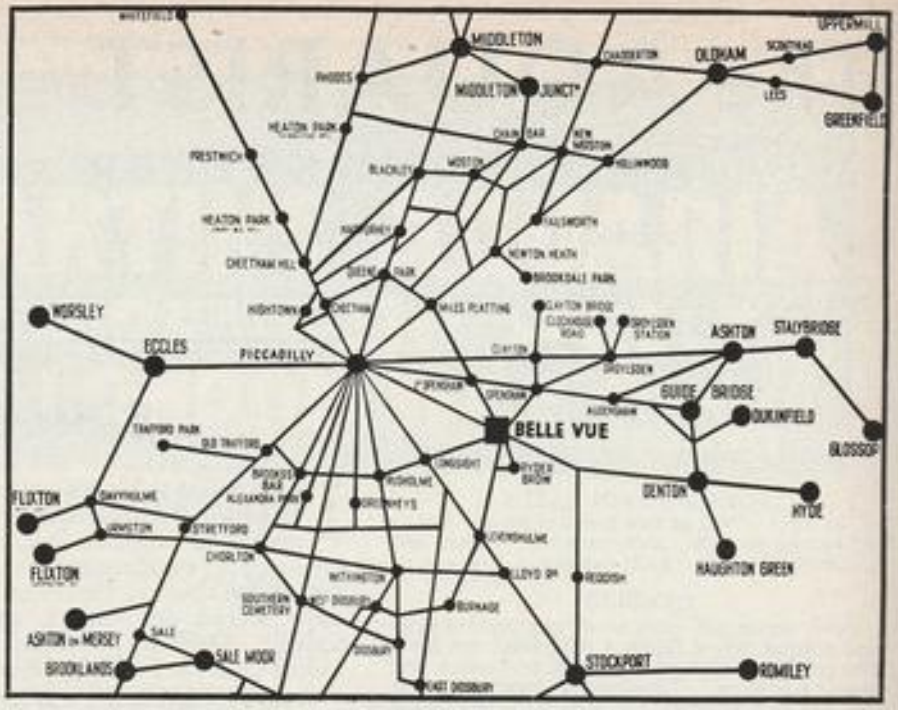
Or, perhaps, at our front door one day we may find a suave traveller complete with case of sample tropical fishes —specially trained ones of course, well prepared to withstand the severe tests he puts them to in his door-step demonstration. Maybe Eezy Assemblee Trops will offer handy tubes of fish ova and sperms for simple fish breeding at your leisure.

Many are the services that can yet be inflicted. To those casting around for ideas we offer the above gratis, and more are available. Perhaps it's up to us to form the Aquarists' Service Ideas Inc.?

# British Aquarists' Festival

## 2nd-5th May

*Routes to Belle Vue, Manchester*




Manchester suburban routes to Belle Vue, venue of the B.A.F.

The following times of trains to Manchester from main regions are chiefly for the guidance of exhibitors sending stocks on ahead by rail. Trains from London will be met at Manchester but trains from other parts will be met only when Mr. G. T. Iles, Belle Vue, Manchester, 12, has received notification from the exhibitor that fishes will be arriving at a definite time. Exhibitors should ensure with British Railways that fishes, particularly tropicals, will travel by the specified trains. (W.: weekday times; S.: Sunday times.)

| **Trains from London** | W. | S. |
|---|---|---|
| London (M'lebone) .. .. .. dep. | 10.00 a.m. | 9.50 a.m. |
| Leicester (Central) .. .. .. | 12.30 p.m. | 12.31 p.m. |
| Nottingham (Vict.) .. .. .. | 1.07 p.m. | 1.13 p.m. |
| MANCHESTER (Lond. Rd.) .. | 3.29 p.m. | 3.54 p.m. |
| London (Euston) .. .. .. | 8.35 a.m. | 10.30 a.m. |
| Rugby .. .. .. .. | 10.20 a.m. | 12.22 p.m. |
| Stafford .. .. .. .. | 11.21 a.m. | 1.27 p.m. |
| Crewe .. .. .. .. | 12.05 p.m. | 2.17 p.m. |
| MANCHESTER (Lond. Rd.) .. | 12.55 p.m. | 3.04 p.m. |
| London (St. Pancras) .. .. | 8.15 a.m. | 8.30 a.m. |
| Kettering .. .. .. | 9.52 a.m. | 10.25 a.m. |
| Leicester (L.R.) .. .. .. | 10.37 a.m. | 11.12 a.m. |
| Loughboro' .. .. .. .. | 10.55 a.m. | 11.30 a.m. |
| Derby (Mid.) .. .. .. .. | 11.30 a.m. | 12.13 p.m. |
| MANCHESTER (Central) .. | 1.13 p.m. | 2.08 p.m. |

| **London Return Arrangements** | Sunday, 6th May | | Monday, 7th May | |
|---|---|---|---|---|
| Manchester (Lond. Rd.) | 3.50 | 5.30 p.m. | 8.25 | 8.35 a.m. |
| Nottingham (Vict.) .. | 6.11 | — | 10.43 | — |
| Crewe .. .. .. .. | — | 6.22 p.m. | — | — |
| Leicester (Central) .. | 6.53 | — | 11.25 | — |
| Stafford .. .. .. | — | 6.56 p.m. | — | 10.09 a.m. |
| Rugby .. .. .. .. | — | 7.57 p.m. | — | 11.24 a.m. |
| LONDON (M'lebone) .. | 9.50 | — | 1.58 p.m. | — |
| (Euston) .. | — | 9.36 p.m. | — | 1.08 p.m. |
| Manchester (Central) .. | | — | 7.10 a.m. | |
| Derby (Mid.) .. .. | | — | 8.50 a.m. | |
| Loughboro' .. .. | | — | 9.18 a.m. | |
| Leicester .. .. | | — | 9.35 a.m. | |
| LONDON (St. Pancras) | | — | 11.45 a.m. | |

| **West Country Routes** | W. | S. |
|---|---|---|
| Bristol (Temple Meade) .. .. | 7.40 a.m. | No |
| Gloucester .. .. .. | 8.40 a.m. | suitable |
| Birmingham (New St.) .. .. | 10.12 a.m. | Sunday |
| Derby (Mid.) .. .. .. | 11.30 a.m. | train. |
| MANCHESTER (Central) .. .. | 1.13 p.m. | |

| **West Country Return Arrangements**, Monday, 7th May | |
|---|---|
| Manchester (Central) .. .. .. .. .. dep. | 7.24 a.m. |
| Derby (Mid.) .. .. .. .. .. | 10.01 a.m. |
| Birmingham (New St.) .. .. .. .. | 11.24 a.m. |
| Gloucester .. .. .. .. .. | 12.38 p.m. |
| BRISTOL (Temple Meade) .. .. .. .. | 1.33 p.m. |

| **Trains from Scotland** | W. | S. |
|---|---|---|
| Edinburgh (Princes St.) .. .. | 8.38 a.m. | — |
| Glasgow (Central) .. .. .. | 10.50 a.m. | 10.25 a.m. |
| Carlisle .. .. .. .. .. | 1.31 p.m. | 1.15 p.m. |
| Preston .. .. .. .. .. | 3.57 p.m. | 3.57 p.m. |
| MANCHESTER (Vict.) .. .. | 4.51 p.m. | 5.01 p.m. |

| **Scotland Return Arrangements**, Monday, 7th May | |
|---|---|
| Manchester (Vict.) .. .. .. .. .. dep. | 9.30 a.m. |
| Carlisle .. .. .. .. .. .. | 12.45 p.m. |
| Glasgow (Central) .. .. .. .. .. | 3.40 p.m. |
| EDINBURGH (Princes St.) .. .. .. .. | 5.48 p.m. |

| **Newcastle** | W. | S. |
|---|---|---|
| Newcastle .. .. .. .. | 9.55 a.m. | 9.45 a.m. |
| Sunderland .. .. .. .. | 10.17 a.m. | 8.55 a.m. |
| York .. .. .. .. .. | 12.15 p.m. | 12.05 p.m. |
| MANCHESTER (Exchange) .. | 2.22 p.m. | 2.11 p.m. |

| **Newcastle Return Arrangements**, Sunday 6th May | |
|---|---|
| Manchester (Exchange) .. .. .. .. | 5.00 p.m. |
| Leeds City .. .. .. .. .. | 6.39 p.m. |
| Harrogate .. .. .. .. .. | 7.32 p.m. |
| Sunderland .. .. .. .. .. | 10.50 p.m. |
| NEWCASTLE .. .. .. .. .. | 9.40 p.m. |

| **Cleethorpes** | W. | S. |
|---|---|---|
| Cleethorpes .. .. .. .. | 9.45 a.m. | 9.25 a.m. |
| Grimsby Town .. .. .. | 10.00 a.m. | 9.44 a.m. |
| Retford .. .. .. .. | 11.21 a.m. | 11.59 a.m. |
| Sheffield (Vict.) .. .. .. | 12.05 p.m. | 2.29 p.m. |
| MANCHESTER (London Rd.) .. | 1.18 p.m. | 3.54 p.m. |

| **Cleethorpes Return Arrangements**, Sunday, 6th May | |
|---|---|
| Manchester (Central) .. .. .. .. .. | 5.30 p.m. |
| Sheffield (Vict.) .. .. .. .. (transhipp) | 7.45 p.m. |
| Retford .. .. .. .. .. .. | 8.43 p.m. |
| Grimsby .. .. .. .. .. .. | 10.17 p.m. |
| CLEETHORPES .. .. .. .. .. | 10.32 p.m. |

# Rare and Beautiful Blue Gularis

*by* IAN HARMAN

THE blue gularis, *Aphyosemion coeruleum*, is one of the most colourful and desirable of tropicals—a real gem of a fish that any aquarist can feel proud to possess. It belongs to the family Cyprinodontidae, or "toothed-carps," and among its near relatives are such finny beauties as the *Nothobranchius*, and the better-known *Rivulus*.

These fishes are not common, and on the whole are definitely not subjects for the beginner, but are a challenge to the experienced aquarist, and it will take all his skill to achieve real success with these tricky species. Some aquarists are more successful than others with these rather delicate fish, and it may be that the difficulties popularly associated with their keeping and breeding have been exaggerated. Given the exact requirements, better luck with them may be expected, the difficulty being, of course, to determine exactly what is the best treatment, as in this respect opinions are apt to differ quite considerably.

### Cylindrical Body

The colour of the blue gularis is not at all easy to describe, since it not only varies a good deal, but its intensity or otherwise depends a lot on the psychological state of the fish at a given moment. The body is long and cylindrical, after the fashion of *Panchax*, the back being in the shape of a perfect bow from mouth to the base of the tail, the dorsal fin being set rather close to the anal fin. All the fins are elegantly shaped. The dorsal, anal, pelvic and pectoral fins are light green; the first is spotted with purple, the others have an irregular margin of the same colour. The tail is very striking in the male, being large and divided into three lobes, with the upper part blue, the middle bright orange, and the lower purple.

The ground-colour of the male is blue, varying in shade from almost green to light mauve. The ground-colour is rather deeper and more intense towards the head, where it is covered with a number of irregular shaped, conspicuous, markings of china blue colour. The lower lip is entirely of this hue, and is quite striking. The rest of the body is more or less heavily mottled with purple-brown spots and bars.

As is the case with so many high-coloured tropicals, the female lacks all the gay adornment of her mate and is a mottled reddish-brown all over, her fins being greenish with a few purple spots. Her tail is rounded and small compared with that of the male. She is, however, a smart-looking little fish for all her lack of flashing colours. The adult size is four to five inches.

### Aquarium Preferences

The blue gularis is a carnivorous species, and is not a suitable inhabitant of the community tank containing small fishes. It is, however, not really troublesome, and will not molest any fish too big for it to swallow.

But it is advisable to keep a pair of these fish in a tank by themselves, because it is a lover of peace and quiet, and does not stand up at all well to the bustling about it will experience when in a busy community tank. Another reason for this isolation is that the blue gularis requires rather specialised conditions.

It has a preference for a shady, well-planted tank, with plenty of floating aquatics to prevent direct glaring top light. It is also as well to screen off side light. Blue gularis are very sensitive to the composition of the water, and fresh tap-water, especially if it is hard and alkaline, does not suit their requirements at all. The best water is that which is old and matured, preferably very soft and very slightly acid.

Photo: B. & F.

*The female blue gularis lacks the brilliance of the male's coloration but possesses attractive and distinctive markings*

When it is necessary to use ordinary water, this should be first boiled to remove the temporary hardness, and then a little potassium chloride added, at the rate of about one teaspoonful to five gallons. If necessary, very dilute sulphuric acid may be added, just enough to bring the pH value down to 6.8.

The water should be quite shallow, with about 1 inch of sand on the bottom, and mulm should be allowed to accumulate on top of this. Regarding the size of the tank, a pair will do quite well in one of three to four gallons, but if you can it is well worth while devoting a large 12-gallon tank to them, as under such conditions they will do better and also grow more rapidly.

### Breeding Habits

An important point to bear in mind regarding blue gularis is that they are inveterate jumpers, and can escape out of holes which seem impossibly small. On one occasion a dealer left a number of them overnight in a tank which he thought well enough covered. Yet the next morning he found every fish on the floor, having jumped through a crack in the cover barely half an inch wide.

Blue gularis apparently become attached to each other, and they are nearly always kept in pairs. A single specimen, which has been used to companionship, may mope and go off its food if deprived of its mate.

For bringing into breeding condition, the fish should be separated from each other in their tank by a glass partition. It is essential to give abundant live food—whiteworms, bloodworms, *Tubifex*, and chopped small earthworms are all readily taken. As soon as the fish are in good condition, the partition can be removed, and courting should then begin without delay. The male is usually very persistent in his efforts to drive the female among the plants.

When he is successful in this, the two fish lie side by side, quivering. Then the eggs are laid a few at a time, and fertilised. They drop to the bottom, and are soon lost to sight in the mulm. As the parents will eat any of their own eggs they see, they should be removed to another tank after spawning.

The incubation period is very long, generally between forty to sixty days, and during this time the water in which the eggs lie should be kept at near 80° F. Normally, a temperature of about 75° F. is correct. There must not be any snails or water insects in the spawning tank. The fry, when they appear, will take newly hatched brine shrimps, and on these their progress is fairly rapid.

The young gularis are normally shy and retiring in their habits—a natural precaution against their many enemies—but after a while they grow more venturesome and come out from their hiding places in search of food. They should not be disturbed at all in their early days, and are best kept in a position shaded from direct sunlight.

When the fry are about three weeks old, they may be fed on *Daphnia* and crushed whiteworms, and this should form their main diet until they are several months old, when they will be about an inch in length. At this age a more varied diet of live food may be given. When three months or so old, the sexes can be distinguished, as the males begin to develop their characteristic colouring and shapely fins.

On the whole the blue gularis may be reckoned a difficult fish to breed, but from its scarcity and the high price which has always been asked for it—even pre-war—it is certainly well worth taking a lot of trouble over. The fish appear to spawn quite readily, but the long period of incubation is a big snag, as so much can happen to the eggs during this time. Aquarists abroad have been more successful than those in our own country in breeding the blue gularis, and most of the specimens seen over here before the war were imported ones which had been bred in the aquarium.

# A Splendid Fish for the Pond

*by* L. B. BURROW

I HAVE kept all kinds of fish in my time, and having lived alongside a river for a number of years I have become acquainted with the ways and doings of a good many different kinds of fish. Of all those I have known there is one that remains for ever a favourite with me,—a handsome little fellow, very hardy, lovely and sleek and well adapted by nature for the garden pool.

I refer to one of our best native fishes, the rudd, or as they call it in some parts of the country, "red eye." He is related to the roach and resembles him very much, save that the eye is a much brighter red. With his golden sheeny coat and crimson pelvic and anal fins he is a worthy match for all the importations of pond fishes: had he been a foreigner many aquarists would have tumbled over each other to possess him! The way he and his fellows in the shoal wheel and glisten in the sunlight, they stand out in the pool like the ornaments on the tray in a jeweller's window.

The rudd is well known down Devon way and round Norfolk, also in Ireland but strangely enough he is not known in Scottish waters. The anglers fish for him near the surface with light tackle but they must keep out of sight or he is off. I think he is far too nice a fish to bother about his sporting qualifications. Some aquarists have bred these fish for years and have developed rather a brassy-gold variety which contrasts well with the more vivid goldfishes in the community pool.

Of all the fishes in the pool rudd are sure to cause you the least trouble, providing you never let the water get too warm. Rudd seldom develop fungus because they love pond life and very slow moving rivers. This is very strange when you think of his relative the roach, for of all the fishes I know, the roach is easily the winner as far as catching fungus is concerned. I know too well for I tried hard one time to acclimatise a good many roach in a special pool I prepared. I think the roach is happier in the deeper parts and prefers more movement in the water. The rudd is in his element on the surface and welcomes the sun on his back in the early months of the year. His requirements are very modest, he likes a sunny open pool, with a few dense masses of underwater plants where he can hide himself for a time.

He is partial to a nibble now and again of the common *Elodea* and if he can implement this with a fly or a worm on occasions he will be quite satisfied to take your crushed biscuit and thrive on it. He is not half so fussy as the goldfish or shubunkin who are always on the look out for change and soon tire if they don't get it. Although a little on the shy side, rudd have a streak of curiosity that will send them scurrying back to anything new when they know the object will not pursue them. They have interesting ways of peeping from the weeds at things that have scared them; one a little more daring tries a quick rush forward followed by his pals at safe distance, egging him on to go further. Then, discovering the fuss was over nothing at all, they all swim away to see what the other fishes are doing.

Once they get to know you and they are never disturbed by being shifted about, they will become quite friendly. They like their food on the surface and go to the bottom only in the coldest weather, but even in winter on a day when the sun shines they will come to the surface when other fish will stay below. In the ideal pool they will grow to about a foot long and weigh somewhere about three quarters of a pound. They will breed in their second year but as they are partial to fish eggs and young fry if you want to rear any see that your pond is well planted.

For the householder who builds a new pool, and wants a good hardy fish that will not let him down, and one that is reasonable in price, I can confidently recommend the golden rudd.

# Aquascenery——a Practical Study

*by* ——————— A. FRASER-BRUNNER

A LARGE entry is to be expected in the furnished aquarium classes at the B.A.F., and we may well wonder what kind of design is most likely to win the approval of the judges. Will they set a premium upon originality, or will they prefer something that runs on orthodox lines ? I venture no predictions, but I think they will welcome a few new ideas provided these do not violate the rules of aquarium-keeping, of good taste, or of the show. It has been remarked, very rightly, that in recent years the tendency has been to imitate the design which took the prize at the previous show, with the result that there has been a sameness in the exhibits. On the other hand some of the revolutionary suggestions put forward would never win acceptance because, although anything is possible from an artistic point of view, we must not consider these classes to constitute only a display of works of art. Any artist will tell you that a simple leaf like that of a *Cryptocoryne* is a rather dull thing to draw when perfect, but presents far more possibilities pictorially when variegated by disease or with a few holes in it. But it will be inadvisable to place such imperfect specimens in a tank at the Festival, because the judges will be looking for evidence of good aquarium practice and knowledge as well as of good design.

Under the Federation recommendations, only one-fourth of the points are allocated for the design—that is to say the originality, basic aim and sense of design and colour evident in the finished product. One-fourth of the points are next allocated for the execution of the design—the choice of materials used and the care displayed in using them ; here the judges will look out for careless planting, the burying of the crowns of plants, or roots allowed to float above the sand, for cloudy water or a visible water-line, disagreement and intimidation among the fishes, and so forth. The third and fourth quarters of the points are allocated for the quality of the fishes and plants respectively—size, shape, condition and richness of colour.

Obviously it is implicit in those recommendations that a "balanced" aquarium is expected, and generally speaking this means an attempt to represent a natural setting. It has been stated, facetiously, that a natural setting would include old bottles and boots, which is often too true in Britain, but this is where the art comes in. It is the job of the artist to select, and to reject that which offends the eye ; but even an old bottle might conceivably be used if it had its place in a good design. The criticism hardly applies to tropical waters except near native villages, but even here I think a small oriental jar could be an attractive and logical adjunct to a tank containing *Badis badis* ; its introduction would at once display knowledge of the breeding habits of the species, and that is the kind of thing the judge wishes to see. In the same way the choice of fishes will show the aquarist's knowledge of their compatibility and perhaps of their geographical distribution. But it must not be supposed that it is wrong to place fishes from various countries in the same tank if by so doing a better result can be obtained ; one of the advantages of aquarium-keeping is that it transcends geographical barriers.

Nevertheless, restraint has proved its worth in the past. The judges want to see good fishes and plants, but they do not want to see them all in the same tank. A whirling medley of the brightest and most expensive fishes is less likely to attract attention than a well-chosen group of the commoner kind that is one with its surroundings. Similarly, it is a common mistake to introduce too many kinds of plants ; every aquarist of experience knows that in a small tank left to itself two or three kinds of plants are all that can maintain themselves side by side. A tank in a show, put up for only a few days, can maintain many more, but their introduction shows a lack of long-term knowledge or of artistic restraint—the selection which is true art.

A very important part of aquascenery (I dislike the word aquascape, a hybrid Latin × Dutch word, and suggest we say aquascene, which is Latin throughout and gives us the words aquascenic and aquascenery, parts of speech which cannot be derived from the other word) is its geological basis. Sand and rockwork must be carefully chosen. It is not essential to use rocks, but they do give an opportunity to escape from the level plain of sand, and I am surprised that so seldom do aquarists realise that the levels of the sand can be varied by this means. Too often the rocks are thought of as knobs standing about on the flat bed, but in nature of course the rocks are basic and the sand is superficial. An exception can be made in the case of Thames flints, which lie about on the river bed and are nothing to do with basic formations. These are usually in lovely, fantastic shapes and thoroughly water-worn, so they are very

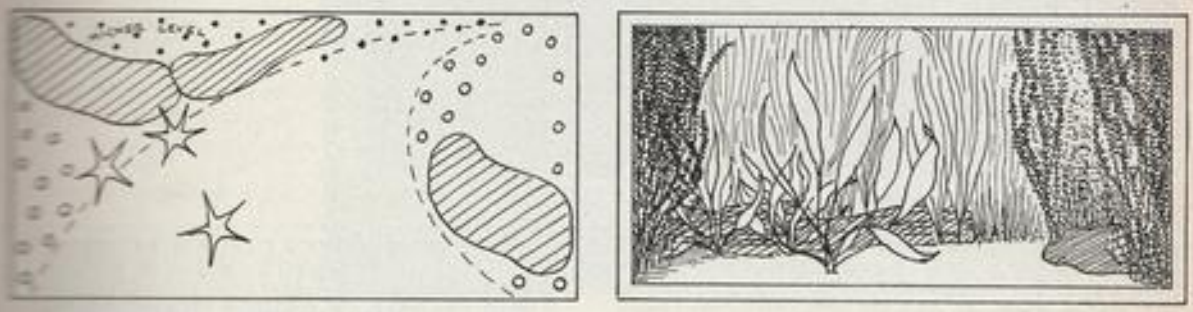


Fig. 1. *Careful arrangement of an aquarium can give an impression of spaciousness. One way of setting the aquascene to this end is illustrated above, in plan view (left) and view from the front (right)*

# Setting of the Aquascene

*The importance of an aquarium's surroundings, which although not detracting attention from the tank, must blend harmoniously with it and room furnishings, is shown in this picture of a Swedish aquarist's (Mr. N. Lindgren) aquarium. Here a very attractive corner to a hall has been made by the illuminated tropical tank and its tub-vine companion. The provision of a neat control panel for lighting and heating at one end enables electric wiring to be tucked away out of sight. A front close-up view of this aquarium is given on the opposite page*

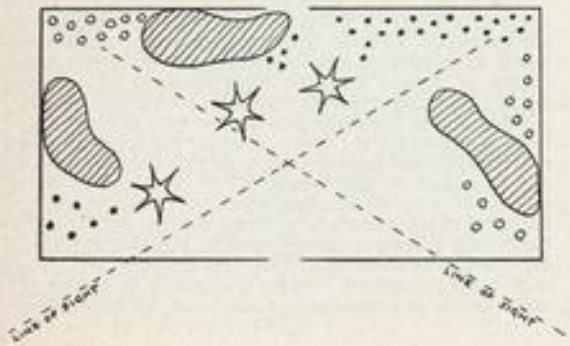
*Photo: Dr. Gert Aurell*

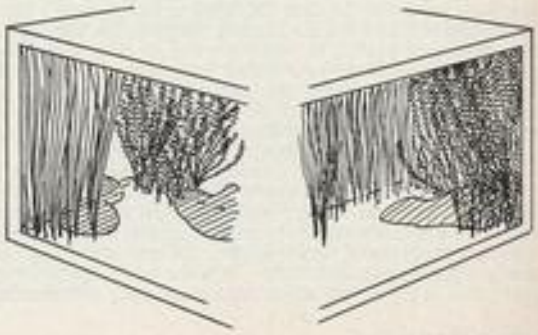
★

suitable for the aquarium, and they have the further advantage that they can be used logically with ordinary aquarium compost. By the nature of their contents most of our aquaria have to represent scenes in swamps or other quiet waters, where the sand has most likely been eroded from the local rocks. A choice of rock and sand which have some relation to each other is therefore to be desired. But it is not compulsory, because the artistic effect may be better achieved by a strong contrast in colour between rocks and sand ; this can happen in nature, when foreign matter is deposited by flood water. Rocks are often used dreadfully ; for example, a triangular slab of stratified rock is sometimes stood on edge, its flat face against the back glass of the tank ; this is presumably to suggest a crag in the background, but all it does is to draw attention to the limited extent of the scene. Stratified rocks can stand on end in nature in vast masses, but in small pieces they will almost certainly lie

(*Continued on opposite page*)

*Fig. 2. This group of figures shows another way of suggesting space in an aquarium. The front view of the aquarium above is synthesised from the views shown below along the diagonal sightlines (lower left plan). Back and corners are hidden*





flat. In general, the rocks should not be overdone; they should be an underlying feature, and should be felt rather than seen. It should be unnecessary to remind you that marble and other limey rocks are known to be harmful in a tank and therefore should not be used.

It is generally desirable to arrange the contents of the tank in such a way as to suggest that there is more of the scene than can be viewed through the front window—to achieve a sense of spaciousness. Here we start with a handicap because the water makes the back of the aquarium appear nearer than it is, and to counteract this we may find it necessary to make use of perspective; perhaps a larger stone should be in front of a smaller one, and all furnishing arranged on lines which converge towards the back. A useful idea is to design a "way through," which disappears round a rock or clump of plants, but for all we know may go on for miles (Fig. 1).

Needless to say, the upright supports in the far corners of the tank must be hidden, and so far as possible the termination of the sand against the back glass should be obscured.

Another way of suggesting space is to remember that the tank is not necessarily seen from the middle of the front glass, but can be viewed from the corners. Looking thus diagonally across the tank, we see that the side and back converge, giving us lines of perspective ready made (Fig. 2); we thus design these as two views, synthesising them in the middle (in the case of my sketch by means of three *Cryptocoryne*, which it will be noticed are graded in size from front to back). It is generally useful to have a few plants in the front corners to serve as "wings" to hide the sides of the tank from view. If heavy, deep-coloured plants are used towards the front, the paler and more delicately built ones at the back, perspective will be further helped.

These few suggestions are put forward not so much to be followed as to show the kind of thought which lies behind the furnishing of an aquarium; to them should be added the warning that I shall not be directly involved in the judging, and the judges may disagree with many of my ideas!

*Large-leaved water plants, species of Cryptocoryne and Nuphar, make the main display in this aquascene. An effect of the exotic is given by the very thick planting, but by skilful use of rock and dwarf and small plants in the centre front part of the tank adequate space for the fishes' movements to be watched has been preserved*

*Photo: Dr. Gert Aurell*

★

# Snails and the Aquarium *by* JACK HEMS

TO say that snails are good scavengers is one of the most dangerous pieces of advice that the skilled aquarium keeper can pass on to the newcomer to the hobby. For the novice is apt to form the idea that the introduction of a few snails into his newly set-up tank will relieve him of all cleaning duties.

Snails are not miracle workers. They are not even near-miracle workers. It is true that they convert quite a lot of uneaten fish food into rich, powdery, brown manure—one of the best possible nutrients for building up the tissues of the plants. It is also true that they help to keep the glass surfaces in contact with the water comparatively free from algæ.

But snails can no more keep the glass sides absolutely free from clouding growths than they can remedy the disastrous effects of over-feeding. The aquarist himself is the only person who can remedy these things—in the first instance, with a razor-blade inserted into one end of a cleft stick; in the second, by moving a siphon tube over the fishy bottom. (In those cases where the compost shows black along the glass it is time to spoon it out and replace it with fresh; for black sand kills the roots of the plants and quickly sends the water bad.)

It is as well for the novice aquarium keeper to know that snails do not get on too well with the majority of fish. For example, not many snails will last over a week-end in the company of paradise fish or cichlids. Small ones will be cracked open and swallowed whole. Large ones will be worried to death. The waving antennae of the *Planorbis* species will tempt even the smallest angels, while the favourite sport of guppies seems to be pecking at any part of the body exposed beyond the horny armour. All in all, snails have a pretty thin time of it in the average aquarium.

Snails get their own back (when they can) by eating fishes' eggs. For this reason it is important that a tank set up for spawning should be cleared of all snails. There is a time, however, when snails can prove most useful and helpful servants to the fish breeder. This is just after fry have become free-swimming and are taking food. A few snails placed in their aquarium will eat small amounts of decaying matter and by so doing help to produce Infusoria. Snails also do a lot towards ridding oily surface scum.

# Springtime is Newt Time

*by* C. G. ASHDOWN

NEWTS are impostors. They parade about looking like direct descendants from the dragons of mythology, but in actual fact are absolutely harmless. Few people dare to keep them, and so they are numbered among the more unusual pets; yet to those who brave the protests of the female element in their household the newt is an interesting creature. It does not harm either fishes or plants, and will breed freely in captivity, the courtship being most elaborate.

Newts are found throughout Great Britain, abounding in most ponds and ditches from March to early September, and are easily captured in a net, by fishing for them with a lively worm tied to piece of cotton, or, a most exciting method, by stalking them from the bank and catching them in the hands. During spring and summer the male is distinguished by a crest which runs along the back and tail, and since the females are fatter and duller in colour, the aquarist should have no difficulty in sexing.

*Pair of great crested or warty newts (Triturus cristatus). The male on the left is engaged in the peculiar "dance" observed in springtime, performed prior to the deposition of spermatophores used to fertilise the crestless female*

Photo: W. S. Pitt

The species most likely to be caught is the smooth newt (*Triturus vulgaris*), which is about three inches long, with an olive brown back, and yellow and orange sides and underparts with black spots. The male's crest is tipped with red or violet. Our largest newt, the great crested (*T. cristatus*) may be six inches and is not quite so common as the smooth newt. It is much darker in colour, being almost black, and the male's crest is high and serrated. The great crested newt is a lover of the water, and looks particularly fine in an aquarium. Neither of these species occurs in Wales. A third species, somewhat rare, but found all over Britain, is the palmate newt (*T. helveticus*); it grows a mere three inches, and is easily identified by its spotless throat.

Newts eat insects, small tadpoles, grubs, worms, and lice; and in captivity they can be fed on small garden worms and gentles. A pair of newts in my possession ate an average of four or five worms a day, in addition to water lice, caddis worms, and tadpoles. I noticed that the female ate twice as much as the male, but I cannot say if this is the general rule. They will not touch their prey unless it moves, but are easily deceived. Drop a dead worm near a newt, move the worm slightly with a glass dip tube, and your pet will launch himself on the worm with all the fury of a crocodile. Nevertheless, there is no danger in handling the newt, as despite popular belief it cannot bite or sting; neither is the poison exuded by its skin harmful to man—unless taken internally.

Newts like to leave the water at intervals, and being able climbers they will soon escape from a glass tank unless it is covered. You should provide for your pets' needs in this matter by floating a piece of cork or well soaked wood in their tank. A much more attractive arrangement is to build a small island with some rocks and cement.

They take readily to life in a tank, and from March will breed there, the male wooing his mate by dancing in front of her, showing off his coloured underside, and waving his tail and crest. After this, he retreats a short distance, and deposits a small packet of sperms on the sand. Finally, he creates a current with his tail and wafts a secretion towards the female which excites her to pick up this packet with the sensitive cloacal lips. Unlike the frog or toad, the female newt deposits the eggs singly on the leaves of water plants—anacharis and water crowfoot are great favourites—and uses her rear legs to curl the leaf round the egg to conceal it. The eggs hatch in two to three weeks, depending on temperature, and the newly hatched tadpoles are half an inch long with a pair of large, golden eyes, and feathery gills for breathing.

If it is desired to rear the tadpoles, they must be removed to a separate tank containing a liberal supply of weeds. They will metamorphose in approximately four months, the forelegs growing first, which is just the opposite to frogs and toads. Then the young newt leaves the water, and often does not return to it until mature, some three or four years later.

In July, the male's crest will start to disappear, and as the cold weather draws nigh your newts will abandon the water to hibernate. Having no scales to guard against water-loss, newts must have a damp place in which to pass the winter, and suitable accommodation can be provided by placing a layer of earth in an old aquarium, or other water-tight vessel, to a depth of three inches. This should be well wetted. A few large stones are added to form suitable hiding places, and the newts introduced. Such a home must be watered at intervals to replace the moisture lost by evaporation. Perhaps the best thing to do in winter is to return your newts to their native haunts: they are easily caught again next spring.

The aquarist is not confined to the three British species, for many foreign species are available from the dealers. The marbled newt (*T. marmorata*), a handsome green and black species from France and Spain, will interbreed with our own great crested newt; and when the resulting hybrid was first discovered, it was mistaken for a distinct species and labelled *T. blasii*. Another species dwells in the subterranean waters of Texas, and has been pumped up with well water from a depth of nearly two hundred feet.

# Goldfish Breeding in Tanks and Ponds

*by* A. BOARDER

WITH the advent of spring all pondkeepers and many aquarists as well will be looking forward to breeding their fishes. Now, it is possible to breed many types of goldfish in ponds and also in tanks but it must be realised that the better the conditions then the better the chance of success. For instance, if one has a pond large enough the fishes can be left to themselves and are almost sure to spawn; then there will be many fry reared to strong healthy fishes. If, on the other hand, one only has a tank of 24 ins. by 12 ins. by 12 ins., which holds about 12 gallons of water, then it can be understood quite readily that the chances of breeding fishes therein are much smaller.

It is not impossible, though, by any means, as some aquarists have managed to breed a few fish in such quarters. Of course, the more fishes in the tank then the less chance is there of success. I advise all who are keen to breed a few goldfish in an indoor tank of the size mentioned to cut down the number of fishes to a minimum, so that there will not be so much chance of other fishes eating the eggs or young fry. Two male fish and one female fish are all that is necessary, and if you try to have more then you will not be as likely to get some youngsters. The tank should be well planted with water plants such as *Myriophyllum*, hornwort, Elodea and willow moss. Any fine-leaved plants will do but there must be plenty so that there is not only plenty of cover for the fry but also enough growing plants to assist in oxygenating the water.

The tank should stand near a window—one which faces the rising sun if possible, but not directly in front of it; better if it is at right angles to it so that only the end faces the window. See that the tank is in a healthy condition and change practically all the water before you actually try to get the fish to spawn. Remove all snails from the tank as these will only eat many eggs of the fishes when laid. The provision of some artificial lighting for the tank is an advantage but is not absolutely essential. Over a tank of the size mentioned two 25-watt lamps will do to give that little extra light and warmth on dull days. They should not be kept on for long periods but when there is little or no sunshine then it is beneficial to put the lamps on for a while.

Feed the fishes well and often on chopped earthworms and only a little of the ordinary packet food if you have been using this. Do not change the whole diet at once but gradually change it to an almost entirely living one if possible. White worms, flies, gentles, *Tubifex*, *Daphnia*, frog tadpoles and mosquito larvae will all help to bring the breeding fish into that tip-top condition which ensures a good spawning. Having made sure that there are no fishes in the tank other than the actual spawners and having removed the snails it will be an advantage if the female fish can be removed from the tank for a few days. This temporary parting often encourages the fishes to spawn when they are put together again. If you have no other small tank in which to place the fish then it is policy to separate the sexes by a glass partition. The glass need not be clear, and I think it an advantage if the fishes do not see one another for a day or two.

When you are ready for the spawning then put the fishes together and do not disturb them any more than you can help. I know that once they start spawning in earnest they do not take very much notice of viewers, but some fishes are a bit shy and will stop chasing if anyone approaches the tank too closely. As most spawnings take place in the early morning it is advisable to put the fishes together late at night. I have noticed though, that sometimes fishes in an indoor tank will spawn at times other than those they would spawn in an open pond, and so you may find them spawning late in the evening. You will be in no doubt when the fishes are actually spawning as the males will be chasing and nudging the female continually. The female fish is pushed into the thickest part of the water weeds where she releases the eggs. These are fertilised as they are laid and being adhesive they stick to the weeds and show up as tiny balls of jelly as big as a pin's head. One female can lay thousands of eggs and so you will see my point about not having more than one female fish in the tank!

Once the eggs are laid the fishes will sometimes start to eat some of them. Although it is possible to rear a few fry in the tank, if something is not done to keep the parents away from the eggs then there are not likely to be many fry hatch out. If you have no other tank then divide the tank again as soon as the eggs have been laid. Do not worry about all the eggs—you could not rear all the fry that might hatch in any case. Divide off about a third of the tank and if you cannot see a fair number of eggs in that partitioned part add a few pieces of water plant which have a good sprinkling of eggs on them.

When you put the partition in be sure that it is tight at the sides. The fry are so very tiny when they are first hatched that they will be able to get through the slightest crack and can then be eaten by the older fishes. Get a piece of

Photo: L. E. Perkins

*Healthy goldfish eggs are nearly transparent pinhead sized globes of jelly scattered over water plants. Dead eggs become white and fluffy with fungus like the one shown enlarged on the left.*

*Newly hatched fry are very easy to overlook in a pond owing to their small size and slight colour. The eyes are the most conspicuous feature as the enlarged picture of a young shubunkin on the right shows.*

rubber tubing and cut this down lengthways with a razor blade. You can place a piece of this tubing down each side of the glass partition to seal any crack. Although there is no need to increase the warmth of the water for the hatching I am sure that it is advisable to get a fairly quick hatch. In the average room the tank water will probably be about 60° to 65° F. and this will give a hatching in about a week. If the temperature can be raised into the seventies then the eggs will hatch in four days. Do not under any circumstances raise the temperature to more than 75° F. as you may do more harm than good.

It will help considerably when the eggs have been laid if you are able to remove at least some of them for hatching in a separate container. This need not be large or deep; one of the very best things for the purpose is one of the old fashioned toilet basins. These are shallow but wide brimmed and are ideal for hatching fry. Pieces of weed with eggs attached are removed from the tank (it will not harm the eggs if they are out of the water for a little while) and placed in the bowl, which may be stood in the window where it can get some sunshine. Sun will not harm the eggs in this position but if you use an all glass-sided tank for hatching then I do not advise placing the container where the direct rays of the sun can reach the eggs through un-shaded glass.

Fry which hatch in the partitioned portion of the tank are not likely to require any artificial feeding from you for nearly a week after they hatch. At first they can exist on the yolk-sac with which they were born; this will last them for two days or so according to the temperature of the water. The warmer the water then the sooner will the food reserve be used up and vice versa. Fry which have been hatched in the bowl will need feeding before those hatched in the tank as it will contain small animal life sufficient to keep the fry going for only a few days.

The best food for the fry for the first week to ten days is Infusoria. This is a minute form of animal water life which is almost too small to see with the naked eye. It flourishes in old ponds and well established tanks and can be bred by placing some potato peelings, banana peel, crushed lettuce leaves or boiled hay into some water which has been standing in the open for a time. After a few days the medium will start to decompose and the Infusoria will appear. Aquarists have their own preferences for the medium but if you make a few experiments you will soon find which type suits you the best. If you see a whitish moving cloud in the water you will probably have a good culture of *Paramoecium* or slipper animaculae. These make very good food for the fry of all types of goldfishes. They can be fed little and often either by pouring some of the liquid into the fry container or by straining the liquid through a very fine silken net first. The net is then rinsed in the container for the fry to pick up the Infusoria.

The ideal is to be able to keep up an almost continuous supply of food and this can be done by placing a container over the fry with a siphon drip feed which is kept replenished so that it hardly ever stops. As long as the fry can keep eating they will soon grow. In cold weather it will be noticed that the fry do not feed as well as when the weather is warmer. The fry tank is kept at 70° for the best results. Once the fry are a fortnight old they can be tried with food slightly larger than Infusoria. Small worms, either white or earth, can be well crushed up nearly to pulp and this will form a very good building food. It must be realised that Infusoria is of little value once fry are a fortnight old, but during the early days keep the supply of Infusoria going by changing part of the water in the culture each day as otherwise it becomes too foul.

Having dealt with the breeding of fishes in a tank I will give a few tips for those who wish to breed in a small pond. Ponds vary as to their size and suitability and one which is about 6 feet by 4 feet with a depth somewhere of at least 18 inches can be used to breed goldfish successfully. On the other hand if the pond is so large that parts of it are out of reach then it may not be quite as good as the smaller pond for the purpose of breeding. There is no doubt that all types of goldfishes prefer to spawn in shallow water, and where this has not been provided for when the pond was first made it is a decided advantage if a shelf of some kind is added. If you can arrange for a shelf with the water shallowing away gradually to almost nothing this will be ideal.

Place some bunches of fine-leaved water plants at the shallow end and see that they are anchored to prevent them from floating out into the middle of the pond. Each day wash this weed up and down in the water so as to wash off the dirt and mulm which will form on it. This mulm may prevent the eggs from sticking to the weed when they are laid. If your pond is of a fair size and does not contain too many fishes you have a very good chance of breeding some fishes in the pond without having to take the eggs away. It depends a great deal on the size of the pond, the amount of water plants therein, and the amount of live food which you are able to provide for the parent fish. If your fishes are of a fancy type such as shubunkins, fantails, moors or veils it will be advisable to remove some of the eggs as above and continue with the treatment described.

If you are of the opinion that the pond is too small to expect much success in rearing fry then you must try to form some sort of a screen to prevent the parent fishes from getting into the shallow part of the pond once the eggs have been laid. This can be either in the form of a partition or just a line of large stones. It must be remembered though that once the fry are free swimming they will swim through very small openings and so reach the older fishes. Another method is to make a fairly large floating screen or sieve so the eggs can be placed inside when they are laid. This will prevent the parent fishes from eating eggs or fry but will allow plenty of Infusoria to enter the screen as food for the fry.

Pond bred fry are not as likely to need artificial feeding to the same degree as those hatched in a small container; in fact it is possible that the fry in the pond will not be visible to you for about a month from hatching. The more cover in the pond, from all types of water plants, the better the chance of success but the less chance of you seeing the fry for some time. In a fair sized pond which is well established there is little need for any artificial feeding of fry for about a month and then a little dried food can be sprinkled on the surface of the water in warm weather. This may be the first time you see the fry—if you keep at a distance and are very quiet.

For the specialist breeder the above method of breeding will not be good enough. Where particular fishes are needed for spawning then it is imperative that the fishes are caught from the pond and spawned in a tank or small pond so that there is more control. In the open pond all of the male fishes may take part in a spawning and so the specialist breeder may get crosses which are not wanted. If the actual fish with which it is intended to breed are separated it is easy to keep to a special pair or trio. I like to use a good sized fairly shallow tank for spawning. This can be an old cold-water cistern which has been floated over with some cement inside and matured. See that there is plenty of water weed in this tank and see that the water is changed before the spawning time. Leave the water to sweeten for about a week and then put in the male fish. After three days or so the female fish can be added. Spawning may take place in a day or two. Once the eggs are laid you must remove the fish immediately, as no chances can be taken with specimen fishes. This method always seems to ensure plenty of fertile eggs and a consequent good hatching. The treatment of the fry will be the same as that already described.


*A page for the beginner contributed by*

J. P. VOLRATH

APRIL is the ideal month to start fish-keeping. Most of the frosts are over and warmer months for the breeding season lie ahead. Nowadays the would-be aquarist has the choice of many types and sizes of aquaria. Unfortunately the initial outlay is high and many newcomers to the hobby try to economise by buying fish globes. This is false economy. Globes have been designed by glass manufacturers for easy production rather than for keeping fish healthy. Instead of buying a globe, which may cost three shillings or more, it is preferable to use a dark earthenware mixing bowl which can be bought cheaply at a chain store. They are better because they have a larger surface area ; we will have more to say about this shortly.

A proper aquarium is infinitely superior to any improvisation. There are two types of aquaria, the all-glass and the metal framed kinds. Both have their advantages and you must decide which is better for your purposes : the all-glass tank is cheap and unless it is cracked it cannot possibly leak. On the other hand the glass is usually of an inferior quality and the tank must have a perfectly level and firm base or it will crack. Metal framed aquaria have clear glass and if a pane is broken it is easily replaced ; however, these aquaria are expensive to buy. You can save a great deal by buying a frame and glazing it yourself. This isn't a difficult job—instructions were given in last month's issue of *The Aquarist*.

### Aquarium Balance

This has been a bone of contention for a long time, but we will try to look at the question from a scientific viewpoint. All members of the animal kingdom, including ourselves and fishes, respire all the time. We think of respiration as just breathing, but real respiration is the provision of energy by changing a food, say sugar, into carbon dioxide and water with oxygen. This may be represented by the chemical equation below :—

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$$

Sugar and oxygen react to make carbon dioxide and water. Plants also respire in the same way, but in the presence of light they carry on, to a much greater extent, another process called photosynthesis. This is just the opposite of respiration. It may be shown as :—

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

Carbon dioxide and water react to make sugar and oxygen. So during the day the plants produce oxygen and the fish use it ; and during the night both use it.

There is, however, another factor to consider. This is the surface of the water. As oxygen is used by fish it is replaced by more oxygen dissolving in the water from the air. This can only happen at a certain rate so that if the surface area is too small oxygen will be used faster than it is replaced. This will force your fish to come to the surface for air, which means they are in danger of suffocating. It's a good rule to remember that each fish one inch long needs at least 24 square inches of surface. A fish two inches long will need a little more than double the amount.

Your aquarium should rest on a firm base near a window. You should not allow the sun to shine directly on to it for long because this causes large rises in temperature which are very bad for fish. It may also cause green water, which will be discussed in a future number.

### Compost and Water

If you are beginning fish keeping, you would be wise to use sand alone in the bottom of your tank. The grains should all be about the size of a pinhead. Finer sand packs hard and too coarse sand harbours sediment and decaying food. Wash it well and spread it two inches deep at the back and one inch at the front so that sediment collects at the front of the tank. I have found unboiled tap water perfectly satisfactory providing that it is allowed to stand for a week in the aquarium.

### In the Country

When you are out in the country keep an eye open for mating frogs and frogspawn. One pond I know near Leatherhead, Surrey, is usually alive with mating frogs at this time of the year. Put some spawn or tadpoles in your new aquarium. If the tadpoles live, so will your fish. Incidentally, young frog tadpoles are an excellent fish food ; toad tadpoles are useless.

**Next month we will talk about some plants for your aquarium and how to select healthy fish.**

*Photo: Lionel E. Day*

*At this time of year many natural waters hold breeding frogs and their jelly-like masses of spawn. Frogs must be kept out of garden ponds until the end of May, but their tadpoles can be added as a useful form of live fish food*

# Planting time in th

*by* ——————

*(Photographs by*

*Best yellow variety of water-lily for the pond is "Sunrise"*

NOW that the rigours of winter are safely behind us and the lengthening days and stronger sunlight stimulate the activities of spring, we can turn our thoughts seriously to the question of planting our pond or water-garden to provide a rich and varied display during the warmer months to come.

In a pond already established we may see ripples on the surface which tell us that the fish are rousing from their winter torpor. New shoots have appeared on many of the waterside plants, and must be given air space by cutting away all dead and decaying vegetation. Plants which became too rampant last season should be divided, leaving only half or a quarter of the original stock.

With a new pond, first consideration will need to be given to the underwater oxygenators, which, though rarely seen, being planted at the bottom, are nevertheless an extremely important part of the furnishing. They not only provide food and cover for the fish and serve as suitable depositories for the eggs, but by their activity they absorb the waste carbon dioxide given off by the fish, emitting at the same time valuable oxygen.

Oxygenating aquatics should be planted either in pots or boxes and dropped into the water, or planted in the bed of the pool itself. In either case see that they are *firmly* planted, or in a few hours you may have the mortification of seeing them float at the surface. When planting aquatics always use good turfy loam, from which all fibre has been removed, and plant very firmly, ramming the roots down without injuring the crown. A little bonemeal may be mixed with the loam, but *never* use peat or leaf.

Some of the best known and most useful plants are the "Elodeas." Forming dense whorls of dark green foliage—erect as in *Egeria densa* or curled as in *Lagarosiphon major*—they emit in daylight a constant stream of oxygen. *Anacharis callitrichoides* is a smaller form, with good oxygenating powers, but a nuisance if not kept under control.

A plant known to most fish breeders is the vernal starwort (*Callitriche verna*). It will thrive in stagnant or in slowly-flowing water. The leaves grow in pairs, the upper ones floating close to the surface on occasions, forming emerald green star-like rosettes. *C. verna* is a great favourite with female newts, which wrap their eggs in its narrow leaves; freshwater shrimps also find a splendid retreat in its tangled masses. One of our finest outdoor submerged aquatics is *Apium inundatum*, the water celery. From creeping rootstock arise slender, much-branched stems clothed with delicate fern-like foliage. Close heads of small white flowers rise six to eight inches above water level.

Most people know the "Myriophyllums." In my opinion, two of the finest varieties to grow, from an oxy-

*Marsh marigolds, Caltha palustris, surround this duckweed covered pond with their blooms*

genating and fish-breeding point of view, are *Myriophyllum proimazum* and *M. japonicum*. The threadlike stems are covered with whorls of finely divided foliage, a delicate pale green colour. Water lobelia is a charming little plant, sometimes found wild in lakes in Scotland and Western England. It forms dense carpets of erect foliage at the bottom of the water, sending above the surface slender, almost leafless, stems bearing terminal racemes of light blue drooping flowers.

One of the most interesting submerged aquatics to grow is the common bladderwort (*Utricularia vulgaris*). The leaves are divided into numerous hair-like segments and bear small air bladders. These bladders act as traps for small water insects, *Daphnia*, etc. The victim has no difficulty in gaining admission to them, but, once inside, never regains its liberty. The plant, being carnivorous, is nourished by the bodies of its captives. Before blooming, the stem and leaves float in the water by help of minute bladders, which become filled with air. The flowers, growing in clusters of six or eight, are large and bright yellow, somewhat the shape of an antirrhinum; they are

# the Water-Garden

— FRANCES PERRY

(by the Author)

raised several inches out of the water.

The most opportune time to transplant water-lilies is the spring, in May or June, when the plants are starting into vigorous growth. When first put out, they should be barely covered with water for a few days until they have somewhat recovered from the shock of moving; then gradually add more water, taking a fortnight or more to fill the pool completely. If this rule were observed more, it is no exaggeration to say that nine-tenths of water-lily failures could be avoided. The sudden shock of 18 inches or more of cold water (often straight from the tap) on to a newly planted *Nymphaea* is often sufficient to check its growth for weeks.

For the average pool (depth of water about 18 inches), some good lily varieties to grow are *N. odorata alba*, a

*A double variety of the marsh marigold, Caltha palustris plena, is a bog plant of great beauty*

charming North American species with snow-white flowers and a delicious fragrance; *N. odorata exquisite*, a beautiful variety with large star-shaped, shell-pink flowers, very fragrant; *N. laydeckeri purpurata*, with deep rosy-crimson flowers, prolific and one of the most popular; *N. marliacea chromatella*, with handsome mottled foliage and soft primrose blooms; *N. rose nymphe*, the finest pink of all, with glorious star-shaped flowers standing well out of the water, of a rich glowing rose.

For the larger pool or lake with two feet or more of water, excellent varieties are *N. Gladstoniana* and *N. tuberosa Richardsoni*, with snow-white, cup-shaped flowers; *N. marliacea rosea*, soft, rosy pink; "Sunrise," the best yellow variety known, with deep golden sweetly scented flowers; and *N. escarboucle*, finest and darkest red of all, the rich wine-coloured flowers often the size of a soup plate.

For the tiny sink garden, there are such perfect miniatures as *N. pygmaea alba* and *N. pygmaea helvola*, with flowers the size of a sixpence. They can be successfully grown in three inches of soil and three inches of water, but must be covered in frosty weather or they will freeze solid.

*Large wine-coloured blooms of the water-lily N. escarboucle, most vivid of all the reds*

One of the loveliest of all known water plants for conservatory or open pool is *Aponogeton distachyus*, the water hawthorn. The broad lanceolate leaves are dark and glossy; large furcate flowers, snow-white with jet black anthers, emit the powerful fragrance of hawthorn. It can be successfully grown in six to eighteen inches of water and blooms throughout the summer. Several new varieties of this attractive genus have been introduced to this country and most of them appear hardy in shallow water in protected positions. *A. spathaceum* bears narrow grass-like leaves and small furcate flowers like *A. distachyus*. It should be grown in a few inches of water. *A. angustifolium* is a perfect miniature of the Cape pond weed with its narrow lanceolate leaves and snow-white flowers. These, however, bear no black anthers, but emit a strong almond perfume. *A. junceum* is a larger variety with silvery white flowers, green anthers and a conspicuous lavender-blue ovary. Leaves and flowers stand well out of the water.

Some ornamental grasses are suitable for the side of the pool, and *Glyceria spectabilis* and *Eriophorum latifolium* are undoubtedly two of the most striking. Such moisture-loving subjects as the marsh marigold, *Caltha palustris*, its double form, *C. palustris plena*, and water forget-me-nots can be grown in the margin, also the handsome bogbean, *Menyanthes trifoliata*, with its large clover-like leaves and white, fringed flowers.

(*To be continued*)

*Flowers of Aponogeton distachyus, the water hawthorn, a very lovely plant*

## AQUARIST AT HOME:

# *Mr. H. Charles*

(LEEDS)

Interviewed and photographed
*by* JAS. STOTT

WHEN I visited Mr. H. Charles of Crossgates, Leeds, for this interview I was accompanied by Mr. J. A. Holloway of the Halifax and District Aquarists' Society. We went over in his car and had the unpleasant experience of trying to negotiate the streets of Leeds whilst that city was enshrouded in a blanket of dense fog. We had to make five attempts before we could get to the right exit from the city and into the district of Crossgates. It was, therefore, with a feeling of elation when we found ourselves at the entrance to the home of Mr. Charles.

This member of the Leeds Society is well known in the West Riding for his ability in the art of aquascaping, the effectiveness of which is in no small measure due to the skilful use of the exceedingly fine artificial rockwork which Mr. Charles makes himself. He has won four times in succession in the class for tropical furnished aquaria at the Leeds Annual Show and is, therefore, to be presented in the near future with a small replica of the large cup which is the trophy for this class and competed for annually.

At the time of this visit Mr. Charles was using a small converted greenhouse for his fish house but he informed me that plans are in hand to construct a much larger building for this purpose and his ideas in this direction sound interesting. Although thirteen tanks are housed in the greenhouse, ranging in sizes from 66 ins. by 15 ins. by 18 ins. to 24 ins. by 12 ins. by 12 ins. they are fitted in exceedingly well for the size of the building. The electrical fittings were installed for him by the local authorities and this was extremely well done. Immersion heaters are used but it is proposed to change to base heating in the new establishment.

I was interested to see some really nice jewel fish in lovely condition and colour. Serious breeding attempts are intended with these this year. This also applies to the angel fishes—something of a speciality with Mr. Charles.

He has quite a good breeding pair to start the programme with and some young ones coming along in fine style to follow at a later date. Among the other species to be seen in this fish house were mountain minnows, various varieties of barbs, zebras and most of the usual livebearers.

Naturally we got on to the subject of the artificial rockwork which Mr. Charles makes for his show tanks. This is made from cement which is suitably coloured, during the mixing stage, by the use of colouring medium which is fast in water. The general design of a rock setting for a tank is first thought out in detail and then is made up in sections. Each section is fashioned roughly to the required shape, permitted partially to set, after which the contours and details are sculptured in much the same way as the sculptor works. Maturing is then carried out by immersion in water for several weeks.

**Mr. Charles said that he had designed and produced an entirely new rock setting for his proposed furnished exhibit at the British Aquarists' Festival at Manchester next month. This was, at the time of my visit, in the maturing process.**

Although Mr. Charles is essentially a tropical enthusiast he has an attractive pond at the head of his lawn which is of informal design and contains goldfish, golden orfe and green tench.

# How and Why?

*What is the recommended mix for pond-maker's concrete ?*

To make good water-repellent concrete some care must be taken in choosing and mixing the materials. Use a " rapid-hardening " or a high alumina cement, " class A " sharp sand and graded coarse aggregate (shingle) and mix them in the proportions—using a bucket as a measure—of one part cement to two parts sand to three parts of shingle. Mix the sand and cement first, add the shingle, mix again and then add water slowly, mixing all the time until an even mixture of the right consistency is obtained.

*How long is it before the pond can be filled ?*

Concrete made with ordinary cement requires about a week to harden; rapid-hardening cements give concrete that is ready in one day. Rapid-hardening cements also possess an advantage in containing less free lime than the ordinary cement, so that the maturing period necessary before the pond can be stocked, is reduced.

*Why is a maturing period necessary ?*

Some lime emerges from all fresh concrete and this is harmful to fishes and plants; in the maturing period it is either washed away or rendered harmless. Filling the pond with water, scrubbing down the sides, emptying, re-filling, and soaking for several weeks is a sure way of removing free lime. The time is lessened if the lime is neutralised chemically with acid; add commercial phosphoric acid to the pond and stir it in. Test the water with litmus paper. Continue to add the acid in small amounts until the water is acid in reaction. Allow it to stand several days and if it is still acid the pond may be emptied, rinsed and the business of stocking begun. Potassium permanganate is useless for this job although it is often advocated.

*How can I avoid the scrubbing and rinsing treatment ?*

If the surface of the new concrete is treated with a sealing agent the lime is trapped in the concrete and does not come out unless the sealing layer gets damaged at any time. Three coats of water glass diluted three times with water, each coat being thoroughly dry before the next is applied, can be brushed all over the concrete to make the pond ready for immediate use.

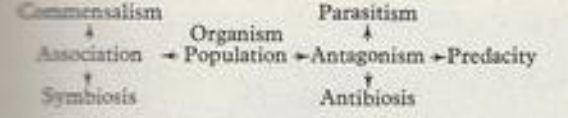
*J. Francis*

# Antibiotics in the Aquarium

*by* HAROLD L. ROSENTHAL

As the aquarium hobby emerges from infancy to become a real science, it is only natural that the hobby should borrow from other fields of science. This is as it should be, since no one science can be entirely separated from any other. One of the oldest sciences—the study of plant and animal antagonism—has gained tremendous impetus in the past decade with the discovery of penicillin.

The fact that living organisms have a great effect on other organisms is an old observation. The relationship existing between different forms of life may be shown by the following diagram :




At the present time, we are chiefly interested in one phase of antagonism—that of " antibiosis," in which one organism produces some chemical substance that is detrimental to another.

The first discovery of an antibiotic agent was made by a British scientist, Sir Alexander Fleming, in England. He found that a type of mould (*Penicillium*) could inhibit the growth of a large variety of bacteria. This first chance observation soon led to the isolation of penicillin and other chemical substances with antibiotic action. These chemical products, or antibiotics, are primarily produced in large quantities by bacteria and fungi. Some algae and higher plants also yield small amounts of active materials. Of the many thousands of antibiotic substances that have been isolated from micro-organisms, relatively few are useful against disease. The majority are definitely toxic to higher organisms as well as bacteria, but nine antibiotic agents have been found useful in the treatment of human and animal diseases of bacterial origin.

### Use by Aquarists

As scientific research leads to technological developments and better production methods, the quantity and availability of antibiotics increases, so that aquarists in America have obtained some of these newer agents without too much difficulty. Consequently, reports are beginning to appear in the aquarium journals of the United States on the effectiveness of antibiotic agents in curing diseases of fish.

The major antibiotic agents available at the present time are only active against bacteria and some viruses at low concentrations. At increased dosages, some protozoa and fungi are also slightly affected, but at these higher concentrations the drugs may also be toxic to fishes. Very little information directly concerned with fishes or their diseases is available at the present writing. Our knowledge of the antibiotic agents is based primarily on studies made in mammals and birds. Fishes, however, are not too distantly removed from higher animals and the results obtained on other forms of life may be applied to fishes and their diseases if a reasonable amount of care is exercised.

Tropical and cold water fishes are often beset with a wide variety of illnesses caused by viruses, bacteria, fungi, protozoans, worms, lice, injuries and nutritional diseases which are related to typical mammalian diseases. By and large, the diseases are difficult to diagnose without proper scientific training, but it would be safe to assume that the majority of ills are due to invasions of the living system by disease-producing micro-organisms or bacteria. Diseases obviously of non-bacterial origin are best treated with other well-known drugs unless the aquarist wishes to experiment with some antibiotic agent. However, diseases which appear to be of a bacterial nature, or which cannot be easily diagnosed, should be treated with an available antibiotic, with the hope that a cure can be effected. In the event that one particular agent does not yield the desired results, others may be tried with a good chance of finding one that is effective.

In general, the antibiotic drugs are soluble in water and may be used as cures in the form of a bath. Occasionally, the drugs may be applied directly to the affected region. Since the antibiotics vary so much in their chemical nature and effectiveness, the following review of them and their reported uses by aquarists may be helpful. Except where indicated, the species of fish used was not given—an unfortunate omission.

**Penicillin :** This antibiotic has been reported to cure an infected wound on the side of a fighting fish (*Betta*). The treatment consisted of placing the fish in half a gallon of water containing 50,000 units of the drug. The solution was changed daily for four days and the wound healed in four weeks. Other reports indicate that mouth fungus is susceptible to penicillin treatment.

Penicillin is active against a large variety of bacteria and is relatively non-toxic for fishes. Since the drug is unstable at room temperature, treatments require its use every four to six hours. The drug may be added directly to the aquarium at a dosage of 100,000-200,000 units per gallon of water.

**Streptomycin :** No reports on this drug have as yet appeared in the literature. The drug has an action similar to penicillin, but is more toxic, and somewhat more stable. Probably the best use of this drug would be to replace penicillin. Its use directly in the aquarium water at the same dosage level would be the best starting point.

**Aureomycin :** This is one of the newest and most used drugs and one with the greatest potentialities in the treatment of diseases of fish. The drug is bright orange in colour, and is quite stable. Mouth fungus in a community tank has been treated successfully using a concentration of 50 milligrams in a gallon of water. The drug has also been shown to be relatively non-toxic to fishes at concentrations four times as great. Small amounts of aureomycin may also improve the colour, appetite and growth of fishes when added to their tank at very low concentrations. This side effect is probably due to the inhibitory action of the drug on intestinal poison-producing organisms. Fishes that become listless or develop a hollow belly may be stimulated by treatment with aureomycin.

Aureomycin is practically insoluble in acid water but readily soluble in alkaline water. If the aquarium is acid, the drug may be mixed with prepared food and fed, as it is readily absorbed from the intestinal tract and distributed to the tissues.

**Chloromycetin :** In aquaria with acid water, chloro-

mycetin is probably better than aureomycin although the action of both drugs is similar. Mouth fungus has been cured at concentrations of 20 milligrams in a gallon. Toxicity tests with fishes indicate that the drug is without any apparent effect at five times the concentrations over a twelve-hour period.

One or two reports claiming that " velvet " and white spot diseases can be cured in forty-eight hours at the above concentrations may not be valid since a copper sponge was also used. Although many protozoans are adversely affected by chloromycetin and aureomycin, the concentrations necessary are not practical.

**Neomycin :** Neomycin is similar in its action to streptomycin, but reports from aquarists are lacking. Since the drug is not absorbed from the intestinal tract or through the skin it may be best used as an intestinal antiseptic or for the topical application to wounds and abscesses.

**Terramycin :** This is the newest drug so far developed, but no aquarists' results have been reported. It is readily absorbed from the intestinal tract, with very low toxicity for humans.

**Polymyxin, Bacitracin and Tyrothricin :** These drugs are best used for topical application or for sterilisation of the digestive tract, since none of them is readily absorbed. No results on fishes have as yet been reported.

Many of the antibiotic agents are proving useful in human medicine when combinations of them are used. For example, mixtures of bacitracin and penicillin give better results against some diseases at concentrations lower than either one alone. The use of antibiotics in fish culture has great possibilities but their use must be considered with caution.

*In no case should a diseased fish be treated, or allowed to remain in contact with a drug, any longer than is absolutely necessary.* If *any* drug is used, the water should be completely changed within forty-eight hours. More information concerning the antibiotic agents and their effects on both fishes and fish diseases is necessary before the drugs can be advocated with any assurance.

# Malayan Burrowing Snails

*by* MARTIN DOMINIC

SNAILS can be a nuisance, and frequently are—either because of the damage they do to plants or to their fondness for the eggs of fishes. But it would be wrong to apply this generalisation to all snails, for several species kept in aquaria are found to do little or no harm to plants, while one at least seems to be free from blame regarding eggs also. This latter is *Melania tuberculata*, the Malayan burrowing snail.

It is easily distinguished from the usual aquarium species by the shape of its shell, which is an elongate cone having about eight whorls ; numerous deep grooves pass spirally round it, and towards the apex there are rows of small tubercles. The aperture of the shell is protected by several stout spines, and is closed by a thick and tough operculum. The colour of the shell varies somewhat between yellowish brown and grey-green, and is beautifully marked with stripes and spots of rich brown in a more or less longitudinal pattern. A common habit of the snail, however, is to bury itself partly in the sand, with about the last third of the shell, the apical part, projecting above the surface ; consequently this part is often coated with a white deposit of lime when kept in hard waters such as that of London. The animal itself is black, with a rather small white foot, a long head and two widely set tentacles. The total length of this snail seldom exceeds one and a half inches, so it is suitable for all ordinary aquaria.

### Go-slow Snail

It moves slowly, dragging the shell in regular heaves, giving a rather laborious impression ; it has been estimated to travel about eight inches a day.

The food appears to be entirely composed of the half decayed animal and vegetable detritus, called " mulm," which accumulates at the bottom of the tank ; living tissues of either plants or animals seem never to be touched. The sand is never disturbed, the water clouded or the roots of plants displaced, owing to the slow movement.

*Safe addition to the tropical aquarium is this Malayan snail of burrowing and livebearing habit. To the right of the illustration the shell apices of two burrowed specimens are to be seen*

As mentioned above, these snails often lie buried in the sand with just the points of the shells protruding ; this seems to be the resting position. At other times they may all disappear completely into the sand, and it has been suggested that they burrow deep to search for food when that at the surface becomes scarce ; this seems logical, as some pieces of chopped earthworm will often bring them up again. They rarely climb on the plants or on the glass of the aquarium, probably owing to the difficulty of raising the shell ; when trying to crawl upwards they usually fall down again before getting very far. They are very sensitive to the slightest touch, withdrawing instantly and snapping the operculum shut. Even the largest fishes, like cichlids, find the shells impermeable, and they are never molested.

*Melania* thrives well at a temperature of between 65° and 80° F. and at irregular intervals gives birth to young ones, for it is viviparous. The young, which are few in number, are about 1.5 mm. long, shaped like the adults but transparent, not gaining their colour and typical pattern until twice that length.

The attractive shape and colour, together with its inoffensive habits, make this one of the very few snails that can be recommended for the tropical aquarium without reservation.

# News and Reviews

## HOLLAND

THE illustrated monthly magazine *Lacerta*, published by the Dutch Herpetological Society of that name offers plenty of interesting material for devotees of herpetology. I have received volume 8 (October 1949 to September 1950) and although it is impossible to review all the issues, with their beautiful photographs, here, I will mention some of the outstanding features of this volume.

The tree-snake (*Ahaetulla nasuta*), a slightly poisonous species, and the grass snake (*Natrix natrix*) are dealt with early on, with sketches of terrarium arrangement suitable for these snakes. A North African lizard (*Uromastyx acanthinurus*) that shows a taste for cornflowers, marigolds etc. in addition to its natural foods is another article's subject.

A Dutch soldier returned from Indonesia tells of his experiences with *Coluber oxycephala* (bright green with a blue tongue), *Dryophis plasinus* and *Ptyas mucosus*, snakes that he smuggled home in his kit. Swiss snakes mentioned include *Natrix natrix*, *N. tessellata*, *N. maura*, *Coronella austriaca*, *Elaphe longissima*, *Coluber viridi-flavus*, *Vipera berus* and *V. aspis*.

Amongst treasured terrarium stocks we find the horned toad lizards (*Phrynosoma cornutum* and *P. blainvillii blainvillii*) described by one member of *Lacerta*. Amphibia receive mention in an article on the salamanders of the Balkan States (*Triturus vulgaris*, *T. tomasinii*, *Schreibers graecus*) and on one of Holland's toads *Bufo calamita*.

The February, 1950 issue opens with a sketch and photograph of a vivarium for green lizards (*Lacerta viridis*), and in the March issue the most interesting article is one describing the birth and metamorphosis of the fire salamander (*Salamandra salamandra*). Various tree-frogs (*Hyla* species) are reviewed in the April and May issues of last year and the June number deals with a terrarium rarity—the big headed tortoise (*Platysternon megacephalon*).

One of the latest imports to Holland is *Crocodilus porosus*, coming from West Borneo, and in an account of the North American tortoises *Pseudemys*, *scripta*, *troostii* are the most interesting and colourful according to the July issue. In September detailed instructions for the care of vivarium animals during winter were given. One member of the society tells of a visit he made at New York's Bronx Zoo—an eldorado of herpetologists. November's issue concludes with articles on the garden vivarium, how to cure a tortoise of pneumonia, a report of successful breeding of the frog *Dimpleosus pictus*, descriptions of jungle plants suitable for the vivarium and an account of the herpeto-fauna in South-East Holland.

JANUARY'S issue of *Het Aquarium* commences this year with breeding results from the lemon tetra (*Hyphessobrycon pulchripinnis*) and from the new import *Neolebias trilineatus*. The writer says that the latter fish spawn at a temperature of 80° F. and that a clutch of approximately 200 eggs took twenty-four hours to hatch. The fry are easily reared on small Infusoria, sieved *Daphnia* etc.

In the opening paragraphs of an article " A detailed study of breeding mountain minnows (*Tanichthys albonubes*) in the open " how the fishes were discovered in China is described and the advice is given that this species should be kept at 61°-65° F. and not in the seventies. The construction of a pond—at least 20 inches deep, in a sunny spot but hedged or fenced to protect from cold winds—in which to breed them is also described.

Among letters to the editor of *Het Aquarium* I found a query on the neon tetra disease. According to the answer given there is no remedy known as yet ; Ladiges says that infection occurs via the urine, and Professor Stolk has obtained some good results using a solution of methylene blue (1 gram to 100 litres of water). Another query was : is it true that fishes imported from Germany are sterile ?

The Editor states that this is a serious accusation and that extensive enquiries should be made before answering this commonly circulating rumour. Elusiveness of *Daphnia* is another query, and according to the answer given, *Daphnia* disappears when the wind goes through north and re-appears when the wind is southerly unless it is very strong.

W. J. VAN DER KOLK

## SWEDEN

THE February number of *Akvariet* presents *Aequidens latifrons*, the blue acara, as one of the cichlids suitable for the community tank. Despite its size—in the course of time it becomes as large as a full-grown *Trichogaster leeri*—not even the smallest fish is in danger provided that enough food is given. It eats enormously and accepts anything from oatmeal to a good sized worm. Even although it does not as a rule uproot plants it is advisable to use sand which is not too fine, as during the breeding season these fish show great digging activity.

Both sexes are similar in colour but the female, as a rule, is smaller and of a darker tone. The popular name blue acara is somewhat misleading, as the colour is more of a greenish blue with irregular purplish stripes. Even the fins have blue-green markings and are tipped with orange. A prolific breeder, this cichlid lays its eggs on a flat stone, but has been known to show a preference for the glass pane of the tank. They are hatched after three days and the young are then transferred in the parents' mouths to a previously prepared hole in the sand. From time to time new holes are dug and the young again removed. When sole occupants of an aquarium these fish are perfect parents, and their solicitude and care for the young is an interesting study.

In another article it is stated that the hardness of water is measured in degrees, so that 1° means that 0.01 gram lime is dissolved in one litre of water. In this terminology water below 5 degrees is very soft, about 10 degrees—soft ; 10-20 degrees, medium hard ; 20-30 degrees, hard water ; over 30 degrees, very hard water.

The water in Copenhagen and Malmö (Sweden) is between 15-20 degrees and is relatively hard. Stockholm and Gothenborough have very soft water, 3-6 degrees. In such water it is possible to breed, with a few exceptions, the majority of tropical fish. There are districts where the tap water has a hardness of more than 22 degrees. In such water it is impossible to breed the more " difficult " tetras.

An aquarist in Kalmar reports that he has a couple of *Corydoras paleatus* which he bought 4th May, 1927. Quite old-timers !

MORTEN GRINDAL

# Considering the Water-Lily : 2

*by* W. E. SHEWELL-COOPER

IT is possible to divide the water-lilies into all kinds of groups. The Nymphaeaceae family can be divided up into two sections: first of all the Acocarpiae, and secondly, the Syncarpiae. The former is usually divided into two genera, the latter into three, of which the most important is probably *Castania*. Some readers may have old gardening books which refer to water-lilies as *Castania* instead of *Nymphaea*. I prefer to be a little more arbitrary and make the division into tender and hardy lilies; then the hardies can be subdivided once again into four main groups depending on the depth of water which they prefer to grow in.

It isn't my plan to say much about tropical types this month, because there will be few who have greenhouses in which these can be grown. Some species, it is true, are grown outside in the summer, but these seldom ripen off their tubers and so have to be replaced the following spring. One or two experts have gone to the expense of heating an outside pool by means of hot water pipes and they have thus got one or two varieties to live through, especially *N. stellata* which bears the most delightful light blue or sky blue flowers. Another blue which I have seen in South Africa is the cape blue water-lily which gives off the most delightful scent.

I suppose that the most important of the tropical lilies is the royal purple, which—though its name suggest a different colour—produces largish blooms of a dark blue shade with the most lovely golden stamens. This species is very fragrant and indoor pool-owners should certainly try it. Some aquarists have written to ask about the day-flowering and night-flowering hybrids. Among the night flowerers I can recommend the dark crimson " Frank Trelease " and the white " Missouri," though " O'Marama " with its rosy red blooms plus a faint white line running through each petal is a very fascinating kind and a very free bloomer at that. In the day flowerers, just make a note of " Blue Beauty," " Edward C. Elliott " (a pale pink), and "Henry Shaw," a campanula bloom.

Now let us deal with the hardies and consider the various groups. Group 1 consists of the plants which prefer to grow in from six to twelve inches of water and which will only cover an area of about two feet. *Tetragona helvosa* has attractive olive green foliage which is heavily mottled with maroon. It produces a profusion of small star-shaped rich sulphur yellow flowers. On the other hand with *T. pygmaea alba*, perhaps the daintiest of all the water-lilies, the flowers are snow white, star-shaped and tiny. I have grown it in a receptacle fifteen inches across and only nine inches deep—that will give you an idea of its daintiness.

*Odorata minor* also comes into Group 1. Its foliage is pale green, the leaves are small (as are the flowers which have delightful yellow anthers and very fine scent). Then there is *Laydeckeri fulgens* which produces larger blooms, a bright carmine in colour. The leaves are olive green with brown red spots on them and of sweet scent. *L. lilacea* bears flowers which change from pink and white to pink and crimson later, while *L. purpurata* is a wine red to start with and then crimson later with fascinating orange red stamens.

Now to turn to Group 2. Here we have a far greater choice. This group contains water-lilies which will grow in a foot of water and cover an area of four feet. There's " Albatross," a snow white with golden yellow anthers, and " Conqueror," which produces very large brilliant red flowers stained and spotted with white. " Firecrest," a rich rose pink with orange stamens tipped with fiery red, and " Paul Hariot," whose blossoms turn from copper pink to bright red with the inside petals yellow pink. *Sanguinea*, as its name suggests, is a brilliant crimson with orange red stamens; it has large green leaves spotted maroon. When the flowers of "Sioux" open they are chrome yellow diffused with bronze and then they turn to a reddish orange copper.

About the water-lilies which grow best in two feet of water or more and cover an area of seven feet. I should like to start with *Escarboucle* with its bright crimson flowers and matching stamens and then pass on to " Formosa," a soft rose turning into a deeper rose with grand blush white sepals. " Indiana " is a yellowish orange, changing as the flowers develop through bronze orange to coppery red. The flowers are offset by the deep green leaves spotted with maroon. A favourite with many is " James Brydon " because it is a paeony-shaped flower; I featured it in my *A.B.C. of the Rock Garden and Pool* in one of the drawings. It needs plenty of room though because it is apt to spread.

Lastly we have the Group 4, which needs at least three feet of water. The plants are all spreaders and they cover an area of ten feet. My favourite here is *Gladstoniana*, a pure white paeony-flowered lily with green shading in the sepals. It needs so much room, though, you need a really large pond to show it well. *Virginalis* is a good line because it flowers from May till September. The flowers are very large and they bear shell-shaped petals, snow white and yet rose at the base. *Colossea*, as its name suggests, is a huge type which I have seen blooming right the way through until the end of October and starting about the middle of May. It's a very pale pink which turns to white as the flowers get older.

# Aquarium Maths

BREEDING pairs of fish are very expensive and many species of coldwater and tropical fish are difficult, if not impossible, to sex. Therefore some aquarists buy a few young fish at a reasonable price and rear them in the hope that at least one fish of each sex is obtained. All the fish might be of one sex so that there is not a pair present. It's an interesting little diversion to calculate the odds in favour of a given number of fish containing a pair.

If we buy two young goldfish the first can be either male or female; similarly there are two possibilities for the second fish. Thus there will be four possible arrangements. Of these two will be pairs: therefore the odds on our two fish being a pair are 1:1.

Should we decide to buy three fish, there will be just double the number of possible combinations of the sexes—eight in all. Still only two of them will be all male or all female, so the odds are 6:2 or 3:1 that our fish will include a pair. With four fish our odds on getting a pair are increased to 7:1. To be almost certain we might buy ten fish when the chances are 511:1 that we will get a pair!

It is, however, impossible to reckon up the chances of getting a *well-matched* pair of fish even with the most abstruse mathematics.

*J. P. Volrath*

*News from the*

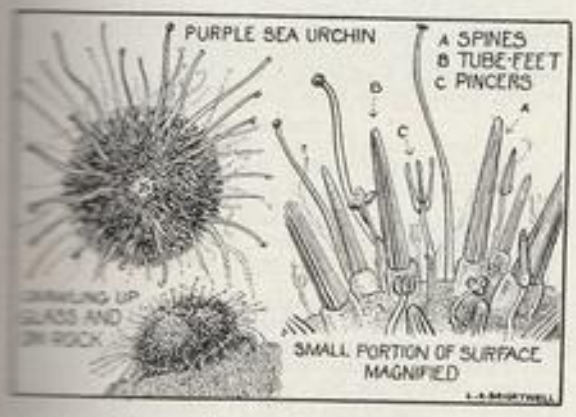
# London Zoo Aquarium

*by* L. R. BRIGHTWELL

NEW arrivals at the Zoo aquarium include a fine selection of coral fishes (*Amphiprion*) and the hardy *Scatophagus argus*. Some of the coral fishes are valued at five pounds each. Of exceptional interest are some specimens of the famous archer fish (*Toxotes jaculator*) from Malaya. The present examples are in sea water and are fed on small guppies. Despite every inducement the Zoo rears its own flies the year round), they refuse to live up to their name, though photographs recently published in an American journal seem to offer tolerably convincing evidence that the title is well justified.

### Sea-shore Life

The small tanks on the western wall of the sea water hall continue to offer useful hints to marine enthusiasts. The various sea urchins are now working shorewards, and one species at least, the little green and purple *Psammechinus miliaris*, abundant off Brighton's Black Rock at very low "springs" will grace a small tank, given good aeration, for many months, possibly longer. Rather like a small sweet chestnut husk to the naked eye, a good binocular microscope reveals its whole surface aboil with activity. The long

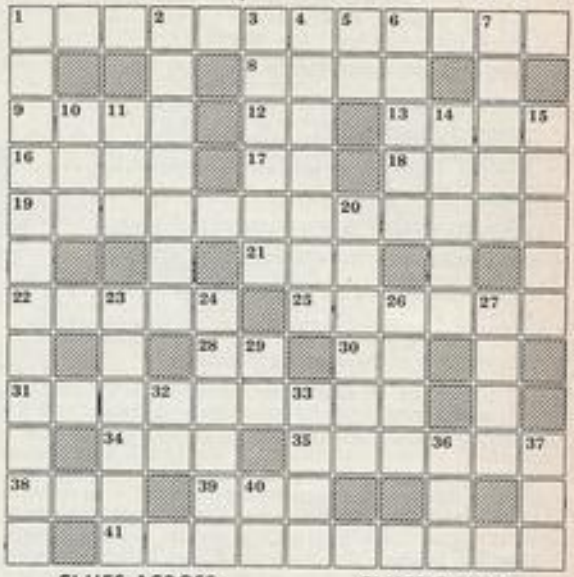



*Drawing of the purple sea urchin and enlargement of the animal's surface to show three different types of organs*

hydraulically operated tube feet and movable spines carry it quite nimbly over the tank floor, walls and window. Between the spines are thousands of three-bladed pincer organs mounted on long stalks which continually cleanse the surface of any rubbish which may foul it. The five-sided complex lantern is, in the large species, quite a dangerous weapon, carving holes an inch square in such shells as those of the razor clam and scallop. The gourmet at this season finds in the sea urchin's egg masses one of his favourite delicacies. So great is the demand for these in some countries that their fishery has to be controlled by law. One London restaurant provides them—at a price !

# The AQUARIST Crossword

Compiled by J. LAUGHLAND



**CLUES ACROSS**

1 Circular floats (7, 5)
8 Island made famous by film of shark hunting natives (4)
9 — fish, an Echinoderm (4)
12 Somewhat vulgar thanks from the tanks (2)
13 Head and tail of loach (4)
16 Tip from fish in tank (4)
17 Bream for morn (1, 1)
18 Behead 7 down for sound returned (4)
19 Nod in thy pain (anag) (6, 6)
21 Seek the girl (3)
22 A measure, perhaps of water(5)
25 A pound to trickles for slumbers (6)
28 Prior to the year I (1, 1)
30 Exclamation of larval fish (2)
31 Hatcher (9)
34 Aquarist should know that this Greek prefix means upon (3)
35 Set low for young birds (6)
38 Go wrong in the herring pond (3)
39 And not in Northern waters (3)
41 Aquatic plant which ends with a solo (10)

**CLUES DOWN**

1 "A fool at one end and a worm at the other" (Dr. Johnson) (7, 5)
2 Natural action of American darter fish (7)
3 Species of 41 across (6)
4 Popular name for whales (7)
5 Distinction of *Ranatra* (1, 1)
6 A small bay (5)
7 Lizard (5)
10 Fish can, perhaps (3)
11 Lose the top of sand (3)
14 Yellow clay in loch reeds (5)
15 For sharpening razor fish? In honesty, no and yes! (5)
20 Colour of 14 (6)
23 Fishes get these sores (6)
24 Beg bin for tidal moving (6)
26 Rank of pearl danio (4)
27 Mixed tape, sometimes used in tanks (4)
29 Commercial distinction (Scottish) in the acara (1, 1)
32 Rise in guppies (2)
33 Wrong of *Val. terra* (4)
36 Organ of pearl danio (3)
37 Home of the seal (3)
40 Common call of the tortoise (2)

## PICK YOUR ANSWER

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

1. One of the following fish, eaten alive, was at one time recommended by doctors as a cure for consumption: (a) dace. (b) gudgeon. (c) loach. (d) tench.
2. If the trivial (specific) name of a fish is *ocellatus* you would expect it to show: (a) A deeply bifurcated caudal fin. (b) A dark-coloured margin to the dorsal fin. (c) A spot of colour surrounded by a ring of another colour. (d) A light-coloured line extending from the eye to the caudal peduncle.
3. The guppy (*Lebistes reticulatus*) was once known as: (a) *Poecilia poecilioides*. (b) *Poecilichthys coeruleus*. (c) *Poeciliopsis taeniensis*. (d) *Poeciliorichthys taeniurus*.
4. In 1753 one of the following naturalists was made a Knight of the Polar Star and ennobled: (a) Cuvier. (b) Lacépède. (c) Linné. (d) Valenciennes.
5. The scientific name of the Cape Lopez Fish is: (a) *Aphyosemion gardneri*. (b) *Aphyosemion calliurum*. (c) *Aphyosemion bivittatum*. (d) *Aphyosemion australe*.
6. Which is the largest of the four following species? (a) *Barbus chola*. (b) *Barbus everetti*. (c) *Barbus semifasciolatus*. (d) *Barbus terio*.

(*Solutions on page 22*)

G. F. H.

# OUR READERS

# *Write—*

*Readers are invited to express their views and opinions on subjects of interest to aquarists. A selection from queries received will also be answered here. The Editor reserves the right to shorten letters when considered necessary and is not responsible for the opinions expressed by correspondents.*

Address letters:

**The Editor,** *The Aquarist*,
**The Butts, Half Acre,**
**Brentford, Middlesex.**

### Specimens Wanted

FOR some time we have been interested in the problem of experimental tumour production in fishes, and for this we have been using mainly guppies which we have exposed to various carcinogens. We would also like to investigate naturally-occurring tumours in tropical and coldwater fish (either aquarium kept or wild). In order to complete our survey we would also like to study tumours of other cold-blooded animals such as reptiles and amphibians.

May we, through the courtesy of your columns, appeal to fellow aquarists to let us know whether they have any such specimens? If there is any doubt in the aquarist's mind about the nature of any suspected tumour or swelling we would gladly correspond on this point and offer advice, after which we could make the necessary arrangements for collection.

We would prefer live specimens but if this is impossible they must be adequately preserved and we shall be only too pleased to supply material and methods for their satisfactory preservation, as poorly or imperfectly preserved specimens are of little value for complete microscopical study. In case of emergency a specimen can be preserved by keeping immersed in methylated spirits and this should be done as soon as possible after death.

It is hoped that through this investigation further light may be thrown on the complex problems of the nature and origin of cancer.

F. N. Ghadially, M.D.,
H. J. Whiteley, M.D., B.Sc.,
Department of Pathology,
The University, Sheffield, 10.

### Leaking Tanks

I AM amused by the assertion that once a tank "springs a leak" the tank has to be stripped and reglazed.

My method, used successfully for many years, if a tank suddenly begins leaking, is to light a candle and let the hot wax drip into the leak. A little digging around the leak before applying the wax is helpful, and the wax should be pressed in whilst hot.

This method is good with any size of tank; it is only a matter of minutes to stop a leak and the unnecessary panic of emptying the tank is obviated. The last tank so treated by me (36 ins by 21 ins. by 15 ins.) was "waxed" in one corner whilst full, about 18 months ago, and is still watertight.

R. E. Billings,
West Norwood, S.E.27.

### Painless Death

WITH regard to Mrs. Grace Hunter's letter (*The Aquarist*, February) I think I must call your attention to the case of a diseased fighting fish which I thought was incurable and so dumped it without ceremony into my garden pond (temperature about 40° F.). About four days later I noticed to my surprise the "incurable" fighting fish swimming merrily around the pond. I hastily netted it, and after a stay in water slowly returning to normal aquarium temperature I replaced it in the tank. It resumed a normal life and seems to be living happily ever after!

David Snell,
Westcliff-on-Sea, Essex.

### Aquarium Surrounds

QUITE a number of articles have appeared giving methods of hiding aquarium frames with wooden surrounds. Why? To me this practice seems a waste of space, time and money.

For years I have built tanks of wood with glass fronts, and have found them superior to the usual aquaria. At present I am engaged in making a 24 ins. by 15 ins. by 15 ins. tank and the details may be of interest.

Three packing-case lids (stout plywood at 1/6 each) from a local ex-Service stores, a tube of Bostik, a tin of glazing cement, 40-60 wood screws, an old second-hand mirror (scraped and cleaned to form a thick glass front panel) and a tin of bitumastic paint, are all that are required. About six hours work and you have a cheap, strong and perfectly good aquarium.

H. R. R. Odam,
Nottingham.

### Algae Removal

I FIND that a wire brush is the best thing to clean the sides of my pond and to remove algae. The brush must be dried after use or it will soon rust.

W. J. Dinnes,
Bude, Cornwall.

### A Good Cause

DURING the past year we have been successful in equipping and maintaining two or three tanks of tropical fishes, and with the knowledge gained, we now feel that we should like to extend our activities to breeding fish.

We have been fortunate in obtaining much practical help from the secretary of Cardiff Aquarist Society. Our greatest difficulty is the supplying of sufficient suitable literature to so large a group of enthusiasts, and we should be grateful to any of your readers for any periodicals or books on the subject.

The children of this school are chosen for their physical disabilities and we feel that we should encourage them in this hobby which we consider so suitable for them.

THOMAS V. WILSON, *Headmaster*,
Greenhill Open Air School,
Rhiwbina, Cardiff.

### Frogs in Ponds

MY pond has latterly been beautifully clear, and a friend who was admiring this clarity pointed out an unusual object at the bottom. A net soon transferred this to the surrounding grass where it was seen to be a frog, tightly clinging with arms and legs a five-inch goldfish. Its arms were around the gills of the fish which was alive but did not survive. This shows, I think, that frogs and goldfishes are not good bed-fellows.

E. C. HANDCOCK,
Dublin.

### A Dangerous Principle

READING Mr. Wheeler's letter on *Hydra* control (*The Aquarist*, February) reminded me of a usually accepted principle which has probably caused the deaths of numerous fishes.

It is generally accepted that a 24 ins. by 12 ins. by 12 ins. tank holds 12½ gallons of water. This is not the case, because the thickness of metal, putty and glass, depth of compost, and water level have not been allowed for; the amount actually contained will be found to be nearer nine gallons than 12½. This is important, because it is the volume of water above compost and rocks that determines the strength of solution when substances are added to an aquarium to combat pests and diseases.

It is useful to determine the exact volume per inch depth in an aquarium by temporarily sticking a piece of paper on the front glass and making marks on it before and after adding a measured volume of water.

C. C. L. DAVEY,
Chatham, Kent.

## See you at the BRITISH AQUARISTS' FESTIVAL

*Party Rates*

Admission tickets to the B.A.F. for parties of aquarists—20 or more—at reduced prices (1/3 adults, 6d. children) may be obtained from Exhibition Organiser, 24, Wood Lane, Isleworth, Middlesex.

*Accommodation and Enquiries*

Municipal Information Bureau, Town Hall, Albert Square, Manchester.

*B.A.F. Opening and Closing Hours*

| | |
|---|---|
| Wednesday, 2nd May .. .. .. | 3 p.m.— 9 p.m. |
| Thursday, Friday—3rd, 4th May .. | 11 a.m.— 9 p.m. |
| Saturday, 5th May .. .. .. | 11 a.m.—10 p.m. |

## Society News

MEMBERS of the **Bethnal Green Aquatic Society** set up at the Queen Elizabeth's Hospital for Children, Hackney Road, London E.2 a three foot tropical aquarium last month. It was later presented to the hospital by the Mayor of Bethnal Green.

HISTORY of tropical fish keeping was the subject of Mr. Barry Funnell's talk to the **Bexhill and District Aquatic Society** recently. He began with the importation of goldfish in the eighteenth century and with the aid of epidiascope pictures he traced the discovery and arrival of fishes up to present times.

RECENT lectures heard by members of the **Bradford and District Aquarist Society** include one by Mr. G. W. Cooke on live foods and one for beginners on setting up a tank. Question time has become a regular feature of the society's meetings. A characin table show was also held at last month's meeting.

GREATEST enemy to the tropical water plant in the aquarium is considered by Mr. S. Cleveland to be the aquarist himself, he revealed in a lecture to the **Cambridge and District Aquarists' Society**. Failure is often caused by careless handling and indifferent planting said the speaker. He gave many useful hints on growing and propagating the plants available for aquaria.

MR. H. LODER described with the aid of a blackboard how tropical fishes may be sexed, for the benefit of members of the **Colne and District Aquatic Society** at a meeting last month. The society is entering a furnished aquarium in the appropriate section of the British Aquarists' Festival at Manchester next month and trials have already been made.

A FILM show put on by Mr. N. L. Smith for the **Chester and District Aquarists' Society** included films on sea and sea shore life and microscopic water organisms. At the society's A.G.M. Mr. G. S. Mottershead, curator of Chester Zoological Garden was elected president.

LAST month Dr. C. Cole of West Bromwich spoke to aquarists of the **Coventry Pool and Aquarium Society** about the results of experiments he had made using hormones in attempts to control the sex of tropical fishes.

ONE of Londons oldest aquarium societies is the **Croydon Aquarists' Society**, now entering its 19th year, first formed as a branch of the very old-established Croydon Scientific and Natural History Society. This month the society is to see and hear about some of the reptiles kept by Mr. B. M. Smith of the British Herpetological Society. Meetings are held on the first Thursday of each month, 7.30 p.m., at Thornton Heath Public Library, 188, Brigstock Road, Croydon, Surrey and the secretary is Mr. G. S. O. Saunders, 5, Blenheim Gardens, Wallington, Surrey.

FOLLOWING the February lecture by Mr. Roach to the **Guppy Breeders' Society, Eastern Counties Section**, on rearing and feeding show class guppies Mr. Fraser-Brunner last month spoke to members at their meeting on the history, development and anatomy of the guppy. Table shows at both meetings were well supported.

OVER 80 aquarists attended the March meeting of the **Halifax and District Aquarists' Society**, when the first round of an inter-society table show with **Huddersfield Aquarists' Society** was held. The round consisted of two classes for tropicals, Halifax scoring 14 points, Huddersfield 3 points. A return match at Huddersfield is to be held on the 11th of this month.

AT the March meeting of the **Hounslow and District Aquarists' Society** subjects under discussion were the sexing and breeding of both tropical and coldwater fishes. The society made a display of aquaria for the hobbies and handicrafts exhibition held early in the month at Twickenham.

RECENT meetings of the **Kingston and District Aquarist Society** have included a talk by Mr. R. Reid on the controlled breeding of shubunkins and fancy goldfishes and a film show by Mr. Batchelor of Lotus Aquatics. This month's plans include a table show for barbs, anabantids, shubunkins and native fishes, and an aquarium section is being organised at the Kingston Hobbies Exhibition 18th April for the Kingston Rotary Club.

BREEDING mollies was the title of a talk given by Mr. Walter Smith to the **Oldham and District Aquarist Society** recently. He stressed the importance of feeding frequently and providing green water for success in breeding these fishes.

AT the last meeting of the **Ruislip Aquarists' Society** Mr. Bone gave a talk on his experiences of breeding various tropical fishes. A competitive table show with the Uxbridge Aquarists' Society is being held this month.

OVER 150 members are now possessed by the **Ulster Aquarium Society**. Many of these heard Mr. J. Millar give a talk on aquatic insects and saw the slides and specimens he had preserved. Last month an American film—The Voice of the Deep—introduced the sounds made by various marine fishes—croakers, snapping shrimps etc. The society's new badge, the red hand of Ulster above the white outline of a fish on a blue background, is proving very popular.

MR. SEYMOUR lectured on plants and pond life to the **Walsall and District Aquatic Society** last month. This month a display of aquaria is arranged at the Walsall Town Hall Hobbies Exhibition from 16th to 21st April, and a lecture by Mr. Cope of Smethwick on coldwater fish breeding will be heard.

# F.B.A.S. Hospital Aquarium Presentation

A TROPICAL aquarium has been installed in the out-patients department of the Westminster Children's Hospital by the Federation of British Aquatic Societies. This photograph, taken at the presentation ceremony last month shows Mr. R. O. B. List, F.B.A.S., secretary (left) after handing over the gift to the matron Miss M. W. Spicer, holding Mr. List's daughter (right), identifying fishes for the benefit of the hospital's nurses. The aquarium carries a bronze plaque and was donated with stand and hood by the Reliance Aquaria Co. Ltd., with electrical equipment donated by Angel Electrical Industries Ltd.; plants and fishes were provided by the Twenty Club and set up by Mrs. Russell Holland. It is to be maintained by aquarist volunteers living in the locality.

## New Societies

FOURTEEN aquarists in **Southport** have formed an **Aqua-Art Club**, holding meetings the first Thursday of each month at Queen Anne Street, Southport. The secretary is Mr. R. Woollatt, 4, Market Street, Southport.

NEW Society in the **Bermondsey**, London, area is to hold weekly meetings every Thursday, 7.30 p.m. at the Bermondsey Men's Institute (L.C.C.), Weston Street, Old Kent Road, S.E.1. Acting secretary is Mr. F. Mapson, The Lodge, 97, Belmont Hill, Lewisham, London, S.E.13.

THE **Catford Aquarium, Reptile and Pondkeepers' Society** holds meetings on Monday evenings, 7.30 p.m. at the Lewisham Men's Institute (L.C.C.), Holbeach Road, Catford, S.E.6. 25 local aquarists have joined and a L.C.C. lecturer is leading them in studies of aquatic life. More members are wanted, and those interested should write to the secretary, Mr. J. W. Davies, 40, Sandhurst Road, Catford, S.E.6.

MEETINGS of the newly formed **Horley and District Aquarium and Pondkeepers' Society** are held on alternate Tuesdays at the Cafe Collette, Victoria Road, Horley. The secretary, Mr. J. Gibson, Flat 2, London House, Station Road, Horley, will be pleased to hear from intending members.

SECRETARY of the **Penzance and District Aquarist Society** is Mr. E. D. Warren, Riviera Restaurant, Greenmarket, Penzance, who would like to hear from interested aquarists and intending members.

FEBRUARY last saw the formation of the **Rochdale and District Aquarists' Society**, with twenty-six members. Enquiries will be welcomed by the secretary, Mr. E. G. Maynock, at 29, Sheriff Street, Rochdale, Lancs.

AT the February inaugural meeting of the **Salisbury and District Aquarists' Society** thirty interested aquarists attended at the Wheatsheaf Inn. Secretary Mr. W. Vincent, 64, St. Marks Road, Salisbury, Wilts, will be glad to welcome new members.

AQUARISTS interested in membership of the newly formed **Seaham and District Society** are invited to write to the secretary, Mr. W. Elliott, 24, Alexandrina Street, Seaham, Co. Durham.

INAUGURAL meeting of aquarists interested in forming a society in the **Sydenham and Penge** district of London S.E.26 will take place this month. Details may be obtained from Mr. H. E. St. Ives, 71, Byne Road, Sydenham, London, S.E.26.

FORMED last month after a meeting convened for the purpose by the Cornish Aquarists' Association the **Truro and District Aquarists' Society** will meet on the first Monday of each month, 7.30 p.m. at the People's Palace, Pydar Street, Truro. Membership fees are 10s. a year for adults, 2s. 6d. for juniors. Secretary is Mr. H. Pascoe, 80, Lemon Street, Truro, Cornwall.

## Secretary Changes

CHANGES of secretaries have been reported from the following societies: **Benhurst Aquarists' Society** (Mr. B. Ashman, 19, Knighton Road, Romford, Essex); **Harrow Aquarists' Club** (Mr. H. P. Harbour, 26, Abercorn Crescent, Harrow, Middlesex); **North Herts Aquarists Society** (Mr. A. A. Wyatt, 2, Desborough Road, Walsworth, Hitchin, Herts); **Paisley Aquarist Society** (Mr. A. M. Glen, 35, Stockholm Crescent, Paisley).

## Aquarist's Calendar

2nd-5th May: **British Aquarists' Festival**, Belle Vue, Manchester 12. Opens 3 p.m. Wednesday, 2nd May; Thursday and Friday 11 a.m.-9 p.m.; Saturday 11 a.m.-10 p.m.

16th-19th May: **East London Aquarists' and Pondkeepers' Association's** 10th Annual Show, Romford Road, E.7.

30th May-6th June: **Swinton and District Aquarists' Society's** display of aquaria and vivaria at Pendlebury Public Hall, Bolton Road, Pendlebury.

31st May-2nd June: **Winchester City Aquarists'** Show, St. Thomas' Hall, Winchester.

## Crossword Solution

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| S | | S | A | G | I | T | T | A | R | I | A | | | |

**PICK YOUR ANSWER (Solution)**

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

6 marks—I'll believe you, but hundreds wouldn't!; 5 marks—Excellent; 4 marks—Very good; 3 marks—Good; 2 marks—Fair; 1 mark—Poor; 0 marks—Very poor show!

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TUBS strong stout hardwood half casks 26 × 17 20/-; 36 × 18 30/- two, carriage paid. List free. Capt. Battersby, Herstmonceux, Sussex.

WESTMORLAND, Mendip and other stone, suitable for ponds aquariums, walling, paving. London stock to suit all requirements, large and small pieces. Descriptive price list on application. Fitzpatricks, Garden Stone Merchants, 455, Old Ford Road, London, E.3. (ADVance 2991).

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MICRO WORMS. This amazing live food is suitable for fry and many adult tropicals. Very simple to culture and gives you an everlasting supply. 2/6, with full instructions.
TUBIFEX. The best live food for all fish. As used by most large aquaria establishments. 2/- and 3/6, or sent weekly, six weeks for 10/-.
DRIED DAPHNIA or shrimp, 1/-. All post paid, prompt dispatch. D. Joel, Malvern, Victoria Avenue, Lalndon, Essex.

AQUARIUMS, fish, plants, thermostats, heaters, aerators, pumps, appliances, live daphnia, tubifex, micro, always in stock. Cambridge Aviaries, Breeders of Birds, Pets and Fancy Fish, Cambridge Road, Kingston, Surrey. (Callers only).

EASY terms, heaters, thermostats, aerators, filters, aquariums and all accessories. Straightforward easy terms arranged, send stamp for lists and full particulars. Joseph Sankey Ltd., Aquatic Experts, 17, Smallbrook Street, Birmingham, 2.

WE specialise in "Micro Culture," 2/- post paid. A. S. Reid, 385, Bolton Road, Salford 6, Lancs.

AQUARIUM, America's leading monthly aquarists' magazine, edited by Wm. Innes. One year's subscription 21/6. Also available: Life, 57/6; National Geographic, 43/-; Popular Science, 28/6, etc. S.A.E. for full list. Hobson, 79, Southbrook Road, Exeter.

300 SETS (approximately) aquaria frames made from 18 gauge metal and finished in stoved green crackelled enamel. Sets of three 18 × 10 × 10, 14 × 8 × 8, 12 × 6 × 6, 17/6 per set for the lot or nearest offer. Buyer to collect from Croydon area, sample by post. 'Phone Vigilant 4193 or write Symons, 192b, High Street, Sutton, Surrey.

TROPICAL fish and accessories. John Lester Ltd., 190, Balham High Road, S.W.12. Send S.A.E. for list.

MICRO WORMS. For culture with full instructions send p.o. 2/-. Repeat orders at half price if accompanied by instruction sheet received with original order. Prompt dispatch, post paid to Seymour, 118, Mill Lane, West Hampstead, London, N.W.6.

SEVEN highest class veiltail goldfish to show standards, from 9 months to 2 years. Private collection, £3 to £8 each. All will spawn this season. Specimen fish unobtainable elsewhere. Write for details to Horrocks, "Tudor House," Arnold Ave., Blackpool.

LIVERPOOL calling. T. C. Farrall, 15, Edge Lane, Liverpool 7, near Edge Hill Church, offers the following tropicals. Angels 3/6, Widows 4/-, Clouds 4/6, Midnight Mollies Latipina strain 12/6, Perma Black Mollies 6/6, Speckled Mollies 3/6, Nigger Barbs 4/6, Tiger Barbs 5/6, Rosy Barbs 2/6, Albino Special Fighters 9/6, Red Swordtails 1/6, Green Swordtails 2/6, Platys 2/6, Golden Guppies 1/6, Guppies (pair) 1/6, Fighters 5/-, Wagtail Platys Lemon 3/6, red 4/6, Zebras 2/-, Pearl Danios 2/6, Berlin Swordtails 2/6, Blue Gouramis 2/6, Thick-lipped Gouramis 6/-, Dwarf Gouramis 7/6, Beacons 5/-, Flames 3/6, Catfish from 10/-, Pristella Riddlei 5/-, Harlequins 10/-, Cherry Barbs 6/6, Rosaceus 10/-, Black-lined Tetras 2/-, Paradise Fish 7/6, Neons 12/6. Always something new, and remember, I only sell English bred fish, also everything for the tropical enthusiast. Tanks 24 × 12 × 12 reinforced bottom (plate) 32 oz. sides one inch angle iron, 35/-. Heaters from 7/6. Thermostats from 18/-. All from T. C. Farrall, 15, Edge Lane, Liverpool 7. Phone: Anfield 2704. Liverpool Calling!

TROPICALS. Over 40 varieties usually available. Heaters, thermostats, etc. Goldfish, Shubunkins, Orfe, etc. Lightweight and Angle Iron Aquariums. "Ceel-Tite" Aquarium Putty. British Livestock, Lowther Street, Coventry.

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WOODEN Aquarium Stands. Any design. Lowe, 59, Northiam, Woodside Park, N.12. Hillside 6284.

ANGLE Iron Aquaria, 32 oz. and ¼ in. bottom: 24 × 12 × 12 37/6. 24 × 15 × 12 39/6, 36 × 15 × 12 60/-. Pressed Steel Aquaria, 12 × 6 × 6 9/6, 16 × 9 × 9 16/6. Two Tier Stands 24 × 12 35/-. Tropical fish, plants, food, accessories. Syd Sharrock, 128, Park Street (Boyds Midland Station), Derby. Becketwell 48982.

"CRO-SAN" Vitamin Fish Food, promotes healthy growth in fry and adult, recommended for breeding. 1/6 and 2/9, post free. Crook, M.P.S., 20, High Street, Norton, S.O.T.

AMBULIA 4/6 doz., broad leaf Ind. fern 1/- root, Ind. fern 6d. root. Cultivated Hornwort, Elodea crispa, Vallis., Water Crowfoot, Fontinalis, Floating fern, Riccia, all at 3/- per doz., postage 6d. for parcels under 7/6. Parsons, Ashmead, Ash, Nr. Aldershot.

## WANTED

NEW Aquarium stores opening for wholesale and retail trade, require fish gadgets of all descriptions, including large bowls, also goldfish, etc. at wholesale rates. Replies to 12, Cobourg Street, Plymouth.

REPTILES. Wanted young alligator, pythons, lizards, etc. Would like to correspond with others interested. Leslie Narbett, 71, St. Julians Road, Newport, Mon.

YOUR prices for surplus fish, plants, etc. Also wanted, Daphnia, Tubifex, frames, etc. Box 3041, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex.

WANTED. Extra good quality Red Platy, please state size, age and price required. All letters answered. Walter R. Smith, 39, Tib Street, Manchester 4.

REQUIRED. Adult female moor (black) for breeding. Abbey Chase, Chertsey. Phone: Chertsey 3160.

## SITUATION WANTED

AQUARIST, experienced in exotics, educated, 30, desires progressive position with trade or public aquarium. Apply Box 3040, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex.