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“EVERYTHING FOR PONDS AND AQUARIA”
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Editorial

Looking back over the year that has now passed, one of the most pleasing features concerning the aquarium cult appears to us to be the great increase in numbers and memberships of aquarium societies.

Attention was drawn early last year to the demands for experienced lecturers that are continually being made by societies. Despite excellent work by the Federation of British Aquaria Societies many clubs, particularly the newer ones, some isolated from large towns and cities, are still feeling the need for outside visitors to brighten their programmes for meetings.

Difficulties will continue to be encountered in attempting to fill their needs, unfortunately, and it seems desirable that other possibilities should be examined. For example, although the services of an authority on some particular subject who has heavy demands for his spare time cannot be obtained by one society in a remote locality, the possibility that he would consent to travel and lecture to a group meeting of societies from within the same area is a stronger one.

It is far more satisfactory for a lecturer to speak to a large audience than to a small one; his work is easier and more enjoyable. Adequate remuneration of travelling and other expenses is more easily arranged from the pooled resources of several societies. Apart from economy of effort achieved, the value of such “get togethers” from the point of view of new social contacts to be made and the mutually advantageous exchange of opinions and ideas does not need stressing.

The Autumn Assembly of the Federation of Northern Aquarium Societies last year was a good example of the advantages secured by group meetings. Then, a professional biologist from overseas was invited to address the meeting, a rare treat for his mixed society audience.

This appears to us to be an argument in favour of regional organisations operating under the integrating influences of the larger Federations; it may be that the spontaneous development of those already started is an expression of awareness of the good work they can do.
CONSIDERABLE interest has been shown in our announcements of the forthcoming British Aquarists' Festival, to be sponsored by this journal. It opens at Belle Vue, Manchester, on 2nd May, for four days, and the number of inquiries already received is to be taken as an assurance of the success of the venture, planned as the largest exhibition of aquarium and fish-keeping interests ever held, in promoting and publicising the hobby.

The artist's impression of the appearance of the tropical section of the Festival Exhibition Hall as it will be seen from the entrance is reproduced above, and conveys the scope and general lay-out of this part of the Exhibition. Every attention is being paid in planning the arrangements to secure maximum comfort and ideal conditions for both visitors and exhibits. Special care is to be taken to ensure that fishes entered can be placed in aquaria immediately on arrival.

Unique facilities will be offered to exhibitors, stand-holders and visitors in the Hall, including a modern restaurant and bar, information and rest rooms and offices. Belle Vue is the well-known meeting place of the Federation of Northern Aquarium Societies, the organisers of the Festival. An additional attraction is the Belle Vue aquarium in the grounds, open to ticket holders for the B.A.F., as will be the Belle Vue Zoo and amusement park.

All aspects of aquarium and pond maintenance, fish, reptile and amphibia keeping and water gardening will be represented, and lectures and demonstrations of particular value to beginners and members of the public are to be features of the Festival. Over eighty competitive classes for furnished aquaria, coldwater and tropical fishes and plants, with special divisions for breeders and junior aquarists are open for entries from individual aquarists and aquarium societies all over Britain.

We are fortunate in having as Festival Show Secretary Mr. R. O. B. List, who is well known as secretary of the Federation of British Aquatic Societies. Judges and judging standards will be those approved by the F.B.A.S. and close co-operation is being maintained between the two Federations so that the Festival will be a truly national event.

Show schedules will shortly be available and sent to all aquarium societies, and in coming issues of The Aquarist details will be given for the convenience of readers concerning routes by which the Festival can be reached from all parts of Britain.
A Red finned Barb Arrives from Africa

by R. W. ELGAR

These new barbs were sent to me as a gift from a friend in Australia, who had three pairs sent to him from Africa. He told me they were called red finned minnows, and thought that the Latin name was *Barbus unitaeniatus*. I made numerous enquiries and at last found that they were *Barbus unitaeniatus* and that they came from West Africa. In their wild state they grow to six inches, but my two pairs were about an inch old when I had them, and after six months the female is about three inches long, so I should say they do not grow so large in captivity. They hate swimming fish, and the males are red-brown with strips of black, running from the shoulder along the lateral line to the base of the tail, where it ends in a bright gold spot. Below this is a black one, which becomes distinct below the tail, and passes to the end of the tail, where it returns to the black spot. The lower breast and belly are grey, the fins are transparent, tinged with red. The eyes are golden. The females are marked like the males, but not so bright in colour; they are more rotund in form and are about half an inch longer than the males.

**Head-to-Tail Spinning**

Fed them about three months I decided to try to breed them. The females looked very full and the males had a more vivid colour. So I cleaned out a 30 in. by 12 in. by 12 in. tank and the centre thickly planted with dwarf Cryptocoryne. I filled it with tap water at a temperature of 78°. The two males were then netted, put in a bucket, and left there for themselves for a day. The following morning I added some of the female to the tank. The males started to chase her and then took place the usual head-to-tail spinning of the male. I left them alone till about mid-day and then took them out, but this is where the trouble began. They immediately hid in the thickest part of the plant and would not come out. I then placed the tank on the floor of the room and covered it with a sheet of glass to keep them in. I then again placed the fish in the tank, but they were gone before I could replace the glass. The only thing to do was to leave them until the evening. Then I again put them in, but this time I placed a net in the bottom of the tank; then I switched on the light, but they did not come out of the water. I then left the room and returned in an hour to find that the males had spawned. I then removed the spawn and placed it in the bigger tank with a ball of dampened Bemax, right alongside the heater. Within three days all the fry were free-swimming and seemed to be feeding well, so I went over to one of the well-known brands of finely ground fry foods. Within a week to ten days they were able to take micro worm, and the gold spot was beginning to show at the base of the caudal fin. Now that the fish were past the danger stage I decided to set up another tank and try the other female. This time I used a 24 in. by 12 in. by 12 in. tank, but instead of heavily planting it I covered the floor of the tank with stones, as when spawning zebras. This time the water was old, having been in the tank about three months. Before putting the female in I sliced up some potato and put it in with the Bemax. The female was introduced in the evening, and the two males in the morning. Once again they started spawning almost immediately, and after about three hours I took them out. The following morning the front glass was covered with fry. I fed them in the same way as the first batch and they seemed to thrive much better; perhaps this was because of the old water, or maybe the female was in better condition. When the young fish were movable I transferred them to a 6 ft. by 2 ft. tank. They are now growing at a tremendous rate, being half an inch to five-sixteenth inch in length. From both spawnings I counted about 280 fish all told. They always seem to keep together, and are never far from their feeding-place whenever anyone goes into the fish-house.

These colourful fish are well worth a place in the community tank; they are peaceful, yet full of life. I am looking forward to the time when I shall have about thirty adults swimming together—they should be a sight worth seeing.

The parent fish have been on their own in a 24 in. by 12 in. by 12 in. tank since the two spawnings; but on looking at them tonight I find they have spawned again; young fish are swimming around. I shall leave these as an experiment to see if the adults will touch them.
Despite the inclemency of the weather, for it was a dull and surprisingly cold afternoon for August, when I arrived at the home of Mr. A. D. Myers of Low Moor, Bradford and entered his fish house it was to find a most cheering atmosphere, warm, yet fresh and airy, comfortable, with beautifully modulated lighting over tanks containing a grand display of fish and plants.

This fish house of Mr. Myers is certainly very well designed. It is 18 feet long by 12 feet wide with a central height of 7 feet, and the roof sloping to sides 6 feet high. There is a partition down the centre with a door at one end; the building is thereby divided in half. One part houses the stock tanks whilst the other half is the breeding department. Each half has two panels of diffusing glass 3 feet by 2 feet situated in the roof to provide top lighting. All four panels are covered, on the inside, with wire gauze of fine mesh. This is intended to help in preventing condensation and Mr. Myers assured me that it is quite successful.

The building is made of wood and there is an inner lining of polished hard board. Two windows which may be let down during hot weather, are situated in each side. It is obvious from the appearance of his tanks, that Mr. Myers has successfully balanced the light input to the fish house.

Twenty-four tanks are housed in this building ranging from 4 feet by 1 foot by 15 inches down to 12 in. by 9 in. The tanks used as spawning tanks for the smaller species of egglayers are base heated by electricity and thermostatically controlled; the heaters are spiral type elements. Mr. Myers told me that he prefers base heating for breeding tanks intended for egglayers, because he considers that it gives a more even distribution of heat. This makes for a higher percentage of hatchings than is obtained with immersion heaters and losses in fry are not so high from chilling.

All the stock tanks, however, are heated by immersion heaters and outside fitting thermostats are used. As an emergency measure a system of base heating by oil heaters is situated under all tanks and this Mr. Myers has found useful on more than one occasion.

The staging, to carry the tanks, is uniform throughout and consists of frames made from angle-iron. A powerful pump is situated well away from the fish house in another outbuilding. This supplies aeration to all tanks and sectional control is available on the air supply lines.

In the stock tanks are to be seen mountain minnows, tiger, nigger and cherry barbs, *Nannostomus anomalus* flame fish, bloodfins and fighters, whilst in the livebearers section there are red waggartail, yellow waggartail and lemon platys, also an exceedingly grand lot of perma-bla-mollies. All the fish were obviously in fine condition and of good quality. Mr. Myers attributes this high standard of quality to obtaining, in the first place, good quality fish then breeding on selective lines only.
1950's Breeding Results Reviewed

by A. BOARDER

At the end of a breeding season it is well to look back over the period to examine the results and to sort out any points worth remembering. Some brings out certain happenings which are what has occurred before. If I can learn one point each year I feel that the time has not been run through briefly the days when spawning and will then pick out any special points for discussion.

Spawning with the fantail goldfish occurred on 10th May in an unheated greenhouse and not the pond where I usually spawn the fishes. Then a spawning in the open pond on 17th April, the 23rd April, and the last for that month the May brought two spawnings on the 23rd and fourth June the fishes spawned on the 1st, 2nd, 5th, July there were four, on the 10th, 17th, 27th August had only one, the 1st. The weather as a whole was not good and we had very little sunny weather in the first week in June until October.

Earlier Start

It is interesting to note that in the last six spawnings on successive days on sixteen April I have now come to expect that if the fishes are they are likely to spawn again on the date. It is useful to remember, as I am able to spot where a spawning has occurred, to know exactly when the fish have been spawn. I have also been able to make my own spawn, usually in the tank to encourage spawning is not enough in itself. Something more appears necessary and I will try to deal with other factors to see if it is possible to state with some degree of certainty what does have an exciting effect on the breeders. The ages of the fishes does not seem to make very much difference, as I have bred from a fantail as young as eleven months and as old as twelve years. I do think that young fishes or those spawning for the first time are more likely to spawn later in the season than those older fishes which have bred before. For preference I think that I would use two to six years old breeders, but have no objection to the use of older fishes.

The parr of the eggs last season was better on the whole than that of 1949, when we had such a hot season. It is usual to get many eggs infertile in a spawning but as a rule there are so many eggs laid that the few infertile ones make very little difference. I think that my spawnings brought about 1,500 fry each time and in each case there were many infertile eggs to be seen.

The fishes had no special preparations for spawning in the form of feeding. Undoubtedly chopped earth worms are the best food for conditioning the parent fishes and that is all that was given to my own fishes last year. The addition of a quantity of fresh tap water has had a good effect on more than one occasion and where other attempts fail to bring about a spawning it is always advisable to try the water change effect.

To my mind one of the very best things to bring forth a...
spawning is to move the breeders around a bit. I have noticed repeatedly that if fishes are moved from their pond or tank for a day or two into fresh surroundings they either spawn there or when they are returned to their original tank or pond. On some occasions when I have taken fishes to a show or an exhibition I have had the fishes spawn immediately they have been returned to their tank. Last April I took some small fantails from an indoor tank and had them in an exhibition for about ten days. When they were returned to their tank they immediately started spawning with the fish which had been left behind. On another occasion I had caught some fishes for a show and put them in a small pond where it was easier to catch them and found that they spawned the following morning. There were only four fishes removed into this pond and the other twenty-two spawners in the larger pond showed no inclination to spawn, and in fact did not do so after 28th July.

The Moving Trick

If then, you cannot get your fishes to spawn another season try this moving trick. If you have your fishes in a pond then try to fix up either another pond or a spawning tank. Take one or more male fishes from the pond and put them in the other tank for a day or two. Then introduce the females and if they do not spawn within a few days then the return of them to the original pond is almost certain to produce the required results. Sometimes the mere catching of a fish from the pond will excite the fishes to breed and I am inclined to the belief that the smell of the fish, the strong fishy smell which clings to the net after a fish has been caught, does have an encouraging effect on the excitement to spawn. There may be no truth in this suggestion but I do think that it may have a great deal to do with the actual desire to breed. I have known several other instances of fishes spawning just after they have been returned to their pond or tank after a brief absence. I am not sure how long the fry has again brought out very forcibly the fact that it is practically impossible to rear a number of fry to any size at all unless you have plenty of room. By this I mean that unless you can give the fry from a forntnight old at least twenty-four square inches of water surface for each one you are not likely to rear the fishes to an inch in length. It does not matter whether you use a tank or not. There is no short way to success. You must give this space or fail. I have said before in this journal that to rear a thousand fishes to an inch in length you must have at least eighty-four tanks each 24 in. by 12 in. by 12 in. and then feed well but carefully. In my own case last season my accommodation was hopelessly inadequate and I was forced to part with the great majority when they were fry; it would have been quite impossible to rear one-tenth of them with the tank space which I had available. Also it so happened that at the last show most of my exhibited fry were forced to be away from home. To leave 1,500 fry in a six gallon tank for a few days might not be fatal but to do so for much longer than that is certainly asking for trouble.

Catering for Fry

In the early stages of rearing it is essential that some of the water in the fry tank should be changed each day. If one is able to replace about a third of the quantity of water in the fry tank with some very green water from an outdoor pond each day then I am sure that the fry will grow on this alone to the age of a fortnight. In the average pond in early spring, besides the green algae there is almost sure to be a large number of Infusoria. This makes the perfect food for fry and as long as one is able to get plenty then there is little trouble. Unfortunately this happy state of affairs does not last long in my case. Before the fry arrive the outdoor pond is full of algae and Infusoria and they feed from this quite nicely for a few days. Often then the pond becomes clear overnight and the water is useless for purpose of feeding fry. If one had sufficient pond it could keep one solely for the purpose of breeding Infusoria and then another for breeding Daphnia for a follow-on when the fry are over a fortnight old.

The ideal for me would be a number of ponds each at twelve feet by six feet and two feet deep with shallow edges. The ponds would contain adult goldfishes all the year round and early spring. These fishes would eat any Daphnia or large insect larvae which might harm fry. Their presence and feeding would encourage algae and Infusoria, and when the fry were ready the large fishes could be caught from pond and the fry introduced immediately. Great care would have to be taken to see that no large fish were left in the pond as these would eat the fry. The pond should be covered with wire netting over a covering to exclude pests such as water beetles and flies. A pond of the size mentioned would rear for from 400 to 450 youngsters.

Although we had so little sunshine last year the temperature appeared to change colour fairly well and the water temperatures were often up in the seventies in the open pond. Young fishes which were good enough to add to the breedstock will not be placed in the outdoor pond until May as I do not think that it is wise to subject the very young fry to the rigours of a winter whilst still so small. They are now kept in an unheated greenhouse whose temperature here is usually some degrees higher than outside; the rising sun has the effect of raising the temperature quickly and the warmer water keeps the frost away for a good period of the night.

Show Results

Since the end of the breeding period the breeding fishes have been well fed with worms as often as they would take them. Up to the end of October this was every day. I all helps to keep up the stamina of the fish through the winter in better condition. The spawn have again done well at the shows at which I was able to exhibit. I have tried to exhibit at those shows where I have been able to provide a class for fantails and at three such I was able to obtain, at the first:—First, second, third and special best fish in the show. At the second show I took:—First, second, third, fourth and special best fancy goldfish in the show. At the third I had:—First, second, third, special for best cold water fish in the show. The class also contained nine, eleven and fifteen entries in them, and so of the other classes which competed for the special were quite strong in shubunkins, veils, moors and lion-heads.

As there were different judges at each of these open shows, it does indicate that a good fantail will still catch the eye of the judge. It is a pity though that several shows for cold water fishes are held in the middle of the breeding season when the exhibits, unless he has a large stock, has a job to find any fishes in real show condition. It is surprising how a day or two at spawning can knock the best out of a fine goldfish. If one were able to keep the fish in exhibition fish themselves it would be easy to keep them in show condition.

Unfortunately these fishes are just the ones that are wanted for breeding. In a concrete pond some scales are often knocked from the fish and although these will grow again it will take so weeks. A damaged fin will also mend in time but always without a knob or scar which may set a fish back in show. Before an actual show it is an advantage if a fish is to be placed in a show tank occasionally so that it may get used to the changed situation. A good fish may behave badly in a show tank that the judge cannot get it to show its paces and appear at its best, so that it may be passed by. On the whole I can say that last season was quite good for breeding and, I consider, a better one than 1949 when weather was so much superior.
Some New Views on the

Pencil fish and its Relatives

by

A. FRASER-BRUNNER

These fishes are very variable with growth, and also cause confusion by showing two quite different colour-patterns—a daytime, or active pattern of longitudinal stripes, and a nocturnal or resting pattern of broad cross-bands; one pattern sometimes shows through the other during the day. To sum up, we must now list:

Nannostomus beckfordi Günther (superseding N. anomalus, N. minimus, N. simplex and N. aristaefasciatus). This has only one black longitudinal band, no black edges on anal, which is red, and no adipose fin.

Nannostomus triarctus Steindachner. (superseding N. erythrus and N. vitatus). This has three black longitudinal bands, no black edge on anal and the adipose fin is sometimes present.

Nannostomus marginatus Eigenmann. This has three black lateral bands, a black border on the red anal fin, no adipose fin, and a shorter, deeper body than N. triarctus.

Pœcillobycon harrioni Eigenmann. This has two black longitudinal bands. Spot on side of snout, upper part of eye, line along base of anal fin and on caudal fin above and below the second dark band, crimson. Last anal rays dark.

Pœcillobycon unifasciatus, auratus and ocellatus. This has two longitudinal bands, the lower very conspicuous, extending on to anal fin and lower caudal lobe, which is larger than the upper. Fish tends to swim obliquely.

Hydra Control in a Breeding Tank

by Mrs. MORTEN GRINDAL
(Sweden)

Due to a prolonged Indian summer my return to town from the country was delayed until the middle of last October. From the last days in May until then, my white cloud mountain minnows spent a somewhat chilly summer outdoors in a large wooden tub covered by a disused window. The temperature varied during these months from 70° to 90° F. Plants had been collected from the local ditches. Even a flowering plant—similar to a michaelmas daisy—which grows in profusion along the shores of the Baltic Sea whose waters are more brackish than salt, was used and sent up its blossoms a few inches above the surface. Despite a muslin cloth stretched over the window-panes, there was soon a strong growth of green algae. I must confess that those fish got very little attention yet there was one more when they were removed! Small fry were observed at various times, but these disappeared, probably due to the presence of enemies introduced with the plants.

Breeding Preparations

On my return to town a couple of 10-gallon tanks were cleaned and the gravel washed and boiled. This latter precaution was taken owing to previous adverse experiences. I had no plants, but a friend, who had a surplus of Cryptocoryne griffithii, Hygrophila, Echinodorus and Vallisneria, supplied me with all that was required. These were first rinsed in salt water, then in fresh. Further they were placed for a quarter of an hour in a weak permanganate of potash and finally rinsed in clean water. After planting, the tanks were filled three-quarters full and about a dozen fish put into each tank. Heating was not used and as the tanks were placed about a couple of feet from a window they had artificial light in the evening only.

Next morning a lively activity of the inmates showed that spawning was in full swing. Later in the day plenty of eggs were seen and after a week there were swarms of young ones clinging to the glass sides of the tanks. A few small fry were even seen darting about on the water surface. Days passed and there was a goodly show of youngsters, yet somehow, judging from the numbers of eggs and newly hatched fry on the glass, I felt that there ought to have been more, but being rather busy I contented myself with the thought that the parents had been doing a little feasting.

Later in the week I started examining the sides of the aquariums with a strong magnifying glass just after a meal of micro worms had been given and found at once the true explanation. There were Hydra present, dozens of them, single, etched and clusters waving and stretching their greedy tentacles and it did not take many seconds before most of them held a small worm in their grasp.

I had read an article by Mr. Arthur S. Campbell in The Aquarium Journal, Vol. XX, No. 4, 1949, which claimed to be a surefire way to destroy Hydra without removing fishes (including small fry) or plants and following accurately the directions, did as follows. There was the choice of two chemicals, ammonium nitrite and ammonium sulphate. As the chemist had not the former in stock he made a dozen one gram packets of the sulphate. The dosage given in The Aquarium Journal was 3% grams for 10 gallons of water.

The quantity for my purpose was calculated on this basis. The powder was dissolved in hot water under constant stirring and added to the infected tanks, stirring the water with the hand so that the solution should be well circulated throughout the aquarium. The article stresses the importance of this part of the procedure. The temperature should then, if possible, be raised five to 10 degrees and to be on the safe side I tried the higher temperature. After a couple of hours the fish did not seem to be particularly happy, so it was allowed to drop five degrees. Mr. Campbell says that the Hydra do not die off and dissolve instantly but in about three to four days there are none left.

After three days the glass sides were completely free from them and since then they have not come back. It is not necessary to change the water even if the cure has to be repeated. An additional advantage is that these salts act as fertilisers and, given an adequate supply of light, they are a decided benefit to the vegetation.

The number of small fry have increased enormously and I have been forced to transfer them to a separate tank and already am beginning to wonder how I shall ever get rid of such increasing numbers.

In my case this certainly has been a hundred per cent cure and as far as I can see has had no detrimental effect either on later spawnings or hatching of the eggs.

I should like to say to readers who have had difficulty with the breeding of these minnows that my best result were when there were half a dozen or more fish in the breeding tank at the same time, and always one or two more males than females. As a rule the breeders are not removed but the young ones are transferred to another aquarium when they are about two to three weeks old. This is done with a teacup, the water in the new tank being siphoned from the first one. Infusoria are introduced by means of crushed meal worms, while later on their food is micro worms and brine shrimps. As they grow their diet is increased by dwarf white worms which I cultivate.
Tropical Fish Foods and Feeding

by J. H. P. BRYMER

All fish can, on a general basis, be classified into plankton feeders, vegetable feeders, carnivorous and/or predatory feeders—the latter divisions including species devouring other fishes, molluscs, worms and/or larvae. Many species progress, during growth, from the second to the third of these divisions.

Carnivorous feeders by circumstance when they have reached a sexually mature size of the mouth of a fish, its location and the shape and arrangement of its teeth, the shape and length of the jaw and the arrangement of its alimentary canals are some of the indications of the class of food which they are. Some of these pointers are visible, others are visible only by careful examination even dissection. Examples of these characteristics are seen in our native freshwater fishes—the large and small trout and the predatory pike with its formidable comparatively large mouths of the carnivorous trout; the ventrally disposed mouth of the salmon, which is a bottom-feeder, and the small mouth of the largemouth bass. The carnivorous species of fishes have a shorter gut in relation to body length than omnivorous and vegetable feeders. The more species the quicker the food is bolted; the time plays but little part in the gastronomy of most generalisations hold good for the small tropical fish kept in aquaria. The feeding habits of the smallest species may often follow those of its largest relatives, the one being larger in scale, and before proceeding to the aspect of feeding our tropical fishes we will briefly consider the various families with which aquarists are most familiar and the sort of food to which they are physically alike. All the smaller species kept in aquaria are carnivorous and predatory, on water shrimps and small fish. The aquarium species will devour fish with great avidity and will often attack other species than themselves. The ferocious tiger fish (Hyphessobrycon eques) is an entirely predatory fish with a mouth reaching a length of 30 inches and 25 lb. in weight. Most aquarium species are again carnivorous feeders, on larvae, worms, shrimps, and demersal fish, while a few such as the Loaches are predatory on other fishes and only occasionally on crustaceans and molluscs. (Cyprinodontidae) are almost without carnivorous on surface and demersal insects, pelagic fry. These fish, of which the Aplocheilus genus is a particularly good example, have heads and backs together with upturned mouths enable them to feed at the surface without causing a commotion. Carnivorous and predatory. Water insects, and worms form their diet in early life, but with growth they tend more and more to feed on fry and fishes smaller than themselves. Livebearers (Poeciliidae). Members of this family, the live-bearing toothed-carp, are among the few tropical aquarium fishes which, in addition to a carnivorous diet of insects, worms and larvae, require a proportion of vegetable food—green algae, small shoots of water plants, etc. Anabantus. Carnivorous on insects both surface and demersal. One or two species in this family—Helostoma temminckii (kissing gourami) in particular—need a proportionate vegetable diet. It is therefore evident that by far the greater proportion of tropical fish kept by aquarists receive a diet deficient in live food. For fish, the reason is twofold—ignorance and circumstances: the first of these will, it is hoped, no longer be valid for readers of this article. The rest of this article should assist those who find the question of providing live food one of expense and inconvenience.

Although some proprietary dried foods lack nothing from an analytical aspect, it is important that such live food as possible should be offered in addition to keep carnivorous fish in condition: the ideal to be aimed at is rather more live than prepared food. Like human beings who live for years on tinned food without apparent harm, although when fresh food is offered the tinned variety goes by the board, so will fish accept prepared foods when live food is not forthcoming and, although apparently quite healthy, cannot be properly conditioned without a generous diet of live food. To illustrate the simplicity of providing live food without unnecessary expense or inconvenience each of the commoner live foods is dealt with in turn.

Earthworm. The earthworm, although ubiquitous, only occurs in rivers when washed down by a spate following heavy rains and landslips and soil erosion. Sedges are not likely in nature to arrive stranded, and only fish of sufficient size can swallow such a welcome morsel. Small tropicals in the aquarium are more fortunate in that they appreciate worm in the shredded form, which is one of the best of foods provided by nature for animals. Dry weather in summer may make it difficult for aquarists to procure this food for fish but the following dodges usually work wonders—

Dissolve a sufficient amount of permanganate of potash in a bucket of water to turn the solution a deep pink and pour it on to a patch of grass; worms will be seen to surface within a minute or two. Again, a wet sack laid on a patch of earth or grass will usually reveal a number of worms when lifted after a day or two. Incidentally, use red worms for preference and not the green-yellow variety, and the smaller and rarer the better. An ingenious and useful worm-shredding device is marketed which has proved its value in doing its job quickly and without mess, and an almost equally effective method is to rub the worm between two flat files.

Residents in urban flats without the advantage of a garden in which to procure worms will find that a window-box of flowers is inoculated with a cupful of worms will always provide a ready source of live food and, incidentally, their flowers will grow more strongly than if the soil was devoid of these useful animals.

Clownfish, Gnat and Mosquito Larvae. These natural live foods are found in all except the very broken fresh waters of the world and within the sub-arctic regions as well
as the tropics. They form an important food of most fresh water fishes at some stage of their growth. They are bred without difficulty. A tub or barrel in a corner of the garden will soon be teeming with wriggling larvae from early spring until late autumn and can be taken with a sweep of a muslin net when required. Even an enamel bowl of water and dead leaves left in the open on an apartment balcony will provide a small supply of larvae without trouble.

White Worms (Enchytraeus). These are unknown to fish in the wild, but are nutritious food in spite of the misguided opinion that they are "starchy," which, of course, they are not. A culture is more easily maintained than is generally imagined. Although leaf mould, humus and compost form a useful basis on which to culture, I find that the following procedure is cleaner and gives much less trouble in maintenance: place your worm on a slice of bread (crust) soaked in milk and place a similar crust on top of it; place the sandwich in a wooden or metal box and cover the box with a sheet of glass to retain in the moisture and to exclude flies and mould spores. Condensed milk is preferable to the everyday dairy milk as it does not become sour so quickly; ordinary milk is perfectly satisfactory provided that it is boiled and poured on to the inside face of each crust while still boiling hot. This procedure prevents the milk from going sour for a few days and also kills any mould spores which, although invisible, may be present on the surface of the bread. Mould spores are slow to take a hold on the crust and toasting the crust slightly further discourages their growth and helps to keep excess milk from seeping through on to the base of the box. The culture should be stored in a cool (not cold) dark place. Renew feed every other day by separating out moulded or dried bread and cover with a fresh slice of moistened bread. The ova of these worms appear like small pearls the size of a pin's head or smaller and are readily devoured by small fry.

Raw Meat Scorpions. These form a useful stand-by for minced worm in feeding most tropical aquarium fishes except those predatory fish which insist on "moving" live food. Do not feed fat scorpions, as fat cannot be assimilated by fish and may result in constipation and disorders of the alimentary canal. Liver, minced fine or scraped, is, when obtainable, a food par excellence and is extensively employed in trout hatcheries throughout the world because of its properties in accelerating growth and bringing young fish to early maturity. Minced heart is also excellent.

**Fresh Fish.** Either sea or freshwater fish should be light boiled and shredded before being placed in the tank. It is a useful food for most fishes and is readily eaten. Excess uneaten scraps should be siphoned off as soon as they start to assume a swollen and "woolly" appearance.

**House Flies,** freshly swatted, and preferably just moving on the water after being stunned, are particularly relished by *Apocheilus* and cichlids. Do not, of course, feed flies killed by insecticides or your fish will be poisoned quickly.

**Rasbora Smalls.** When these start to become a nuisance in a tank by being too numerous, squash the shells and put them back in. They form a first-class natural wholes food and are much appreciated by barbels, cichlids and the topminnows.

**Daphnia and Cyclops.** These are useful live foods when a change of diet is required, although they are not nourishing weight for weight as the denser foods since their bodies have a high water content. They are a relatively expensive food when purchased from dealers, and although a stock can be maintained and propagated in a garden tub or barrel, the supply will not be very great. In winter they kill the *Daphnia* but the egg capsule of the female develops and the eggs hatch out in the mild weather following spring, thereby giving rise to a new colony.

**Sludge Worms (Tubifex).** These should be kept under dripping cold water tap and not be offered to the fish until they have been well scoured and washed by leaving them under the tap for at least an hour. When a dripping tap is not available, the container should hold only enough water to cover the lower part of the mass of worms: this will allow them to absorb atmospheric oxygen. Complete immersion in stagnant water will cause suffocation from oxygen deficiency in a few hours.

For young fry, the best live foods are newly-hatched shrimp, pounded Tubifex and very finely minced worm. Many fry will take a hard-boiled yolk of fish squeezed into the water through a pocket handkerchief also very finely minced. Shrimp, squids, crab, shrimp, liver, or heart.

Finally, remember: do not overfeed with dried foods; feed a little and often; provide a varied diet with a preponderance of live or animal food; tinned shell fish is not recommended as a normal diet but is useful as an emergency stand-by.

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**An Attractive Newcomer** (pictured in this month's colored calendar supplement)

**Recently** some small fishes were imported by Messrs. Fish Tanks Ltd., under the name *Neolobias* sp. and the directors, Mr. R. Datta, asked me to ascertain the correct name. Fortunately, Dr. E. Trewavas has recently been studying the genus *Neolobias* at the Natural History Museum, and was good enough to give me the latest information concerning them.

It appears that no real distinction can be drawn between the genus *Neolobias* (which Steindachner, who first proposed it, believed to belong to the family Cyprinodontidae or tooth-carp) and the older characin genus *Namaathioptes.* Dr. Trewavas proposes to publish a scientific account of this matter, so at this stage it only remains for me to draw attention to the fact that the new importation, which was first described by Bouleneger as *Neolobias trilineatus,* must now be known as *Namaathioptes trilineatus.*

This is a small and dainty characin from the Belgium Congo, first described from the Stanley Pool. Two specimens loaned to me by Mr. Dutta appear to be a pair and form the subject of the coloured supplement given with this issue, shown about natural size. The name *trilineatus* is justified by the three heavy black lines which lie along side, but there is a less conspicuous and incomplete fourth line along the side of the belly. Brilliance is imparted to the fish by the thin gleaming streak of golden red iridescence which lies just above the second black line of the tridescant line. The second black line is heaviest and passes into a conspicuous black spot at the base of the caudal fin. All the fins are colourless, but the lateral rays of the pelvis show a bluish gleam. There is a small and inconspicuous adipose fin.

In temperament the species seems quiet and inoffensive, not given to great activity; it is rather reminiscent of the South American *Namastomus* group. Like them, it has a small mouth, and requires therefore the smaller grade of *Daphnia* and dried foods. The breeding habits are unknown, but we have hopes.

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A. F. B.
Pike Rearing in an Aquarium

L. C. MANDEVILLE

In the middle of April last year, whilst collecting Daphnia in a local gravel pit, my son noticed that a number of fish were also included in the catch and they were uniformly dumped into the can with everything else. At home some of the catch was being examined with the greatest care when the little fish were noticed. They were little more than half an inch long, very slender and distinctly worm-like. What could they be? Closer examination revealed that the lower jaw was very well developed and we assumed rightly, as time went on, that they were young pike, though at this age they still retained the characteristically prognathous appearance of the adult.

One day once became of more interest than the Daphnia affair was to sort the young fish out. But a dozen were transferred to a separate aquarium and the rest were put into the gravel pit. We noted that when these young pike were caught and baled carefully from the net into a without ever being out of water. These were then given a 3 ft. 20-gallon aquarium to themselves. Though they were comparatively long, their appearance, the date of capture and the availability of food led us to the conclusion that they were much more than three weeks old. Their subsequent growth confirmed this conclusion.

Insatiable Appetites

Twelve such small fish seemed rather lost in such a large tank with glistening activity. Their appetites were literally insatiable. Fortunately we had a plentiful supply of mosquito larvae and they crammed these into the tank until their stomachs were so large that they changed the whole shape of the fish, being round with more or less triangular protruber-

ances. Two weeks they had doubled their length and really proper pike shape from head to tail, though the black banding of the first-year pike had not appeared. The diet was supplemented from time to time with Daphnia and white worms, and because of the amount of food, the growth was very even and no fish fell behind. By the end of May they were two and a half inches long and all twelve had survived. Soon after these small earthworms were added to the diet and there was a rapid increase in growth so that by the middle of July they were all about three inches long and taking guppies as large as they could eat. That was when we realised that twelve such hungry mouths could only be catered for, and a dealer friend agreed to sell us eight. He was anxious to get rid of them and so we took them, but not for too much for him and so we were able to keep them. In July and August the remaining four "made do" on earthworms and guppies, but, on returning from our holidays, we decided to fatten them up a bit, so we trapped some minnows. Minnows really did produce enthusiasm in the young pike and it was extraordinary the degree to which the stomachs could be distended without bursting. We contemplated photographing one of them when full to repletion but decided a fishy "gourmand" was not a suitable subject.

With the approach of autumn, and streams getting chillier, we did not view with continued enthusiasm the prospect of frequently catching minnows, so at the Harrow Club's show we disposed of two more, but not before impressing on their new owner the size of their appetites! Until the middle of October the remaining two continued to be accommodated out of doors in the 3 ft. aquarium, but during the cold spell the water was frozen over one morning and it was deemed advisable to bring them indoors. The cold weather had noticeably reduced their appetite, both in the amount and frequency of their meals, and the further indignity of being brought indoors and put into only a 2 ft. aquarium put them off their food for a fortnight. They were very scared and took some time to settle down but, eventually, wriggling earthworms proved irresistible.

Their body length is now five inches, which seems to us a very large growth, quite surpassing normal aquarium expectations. We are told that an adult pike will lay half a million eggs, which, even allowing for the hazards to which the eggs are exposed, will still leave a fairly large number to hatch, and the introductions which these fish make into the young of other species must be considerable.

Apart from the problem of feeding, these two specimens make extremely handsome and unusual aquarium fish. Their bold markings and lillie, unusual form, together with their relative stillness—they never go grubbing about on the bottom—allows them to be displayed in clean, clear water with a minimum of trouble. Any aquarist bent on trying an unusual species this spring might spend much money and still not get more interest than by raising specimens of this most voracious of our native freshwater fishes.

One of the young pike described in the article, photographed by the author.
How to Make a

described and illustrated by

MANY would-be tropical fish keepers, who desire to keep a tropical aquarium in the house, meet with feminine opposition; and it must be admitted that an iron-framed aquarium, bedecked with various electrical devices and resting on an iron stand, is not always in itself an object of beauty. So when I wanted to have an indoor aquarium, the task facing me was to make the tank at least presentable, if not attractive.

Television sets are very much the vogue nowadays, and my idea came from them. Would not a television set be much more interesting and instructive if, instead of dozens of flickering lines, there appeared on the screen multi-coloured tropical fish and plants? I decided to try to mount an ordinary aquarium inside a "television-style" cabinet, so that the front of the aquarium would form the screen. The cabinet could be made an insulated box in order that the water in the aquarium would be heated by the warm atmosphere around it, provided by two electric light bulbs.

Thinking that my first attempt had better be on a small scale, I bought an angle-iron frame measuring 12 ins. by 9 ins. by 9 ins. for 10/- from a dealer. I did not glaze until I had completed the cabinet in case I broke a pane of glass during the construction. I originally intended to put a glass front in the cabinet, to afford further insulation, but a little reasoning told me that moisture would condense on the inside of this false front. So the front glass of the tank was to be exposed. Although I made the cabinet to take the small frame just mentioned the design can, no doubt, be modified for any sized frame.

Making the Base

A prime necessity for an aquarium is a rock-firm base. I made the base, very simply, of four pieces of 1 in. thick wood. Fig. 1 shows the base from behind. On the back of the front are two wall-fitting bayonet sockets to hold the heating lamps. In the back there is a hole large enough to put a hand through to replace a bulb, if one should burn out. This hole is best cut by marking a 2 in. square exactly in the middle of the back, and then drilling 1 in. diameter holes centred on each of its corners. The piece of wood in the middle can be cut out with a hacksaw or a keyhole saw.

Insert a bulb, push it through the hole, put your hand inside and fix it in the socket. You will notice that there is space under each end of the base; these spaces permit the heat given off by the bulbs to rise round the tank. A few holes in the front and back do the same job. The dimensions of the stand may be seen on the diagram. The exact width and length allow the aquarium to be inserted from the top of the cabinet. Assemble the base with 2 in. 8 gauge wood screws.

Cabinet Framework

For a tank of the size mentioned about seven feet of 1 in. wood and seven feet of 1 by 1 in. wood will be needed. Cut out 18 in. lengths and two 16 in. lengths of 1 in. wood for the corner uprights. Do not attempt

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Their tops to the correct angle yet. Attach one to each corner of the base as shown in Fig. 2. The shorter uprights are in the front. They should be attached to the 9 in. sides of the base, with three 2½ in. wood screws, so that they project 1 in. to the front and back of the base.

The next job is to fix a fillet of 1 in. square wood round the bottom of the base. The two 12 in. lengths, at the front and back, can be nailed to the side. Some sort of a joint is necessary for the side fillets. If, like myself, you are not a skilled carpenter, halved joints, such as the one shown in Fig. 3, are best.

Making the top rail is the most tricky part of the construction. On the front of each of the front uprights pencil mark exactly 16 in. from the bottom; on the back the back uprights do the same 18 in. from the bottom. In order to cut the top of the uprights at the correct angle these marks with a ruler and draw a line across the face of the wood. Cut both uprights carefully along this line. Now make the top side rails of the framework from 1 in. timber. Use halved joints and remember that

THE AQUARIUM
Covering the Frame

To cover the "prototype" I used plywood reclaimed from a piece of furniture that was better than average tea-crate. Nevertheless, it required a lot of hard work with sandpaper. It is cheaper to buy new plywood offcuts now, and you might like to try making the work saved is worth the extra expense. Plywood plywood is relatively hardboard or some other similar material that appeals to you. It is a good idea to measure the pieces first and plan how you will cut them from the available. This will cut down waste. Stick the cabinet frame on the plywood and draw a line round it. The line will give the size of the cabinet accurately. Cut the piece out and, using a 3/16 in. flat nail to the bottom of the framework. Then, as the aid of a plane or sandpaper, make the edges square.

The back is covered next, followed by the sides and then the top. If the plywood edges showing on the back can be cut in the same manner as the There must, however, be a door in it for the effect of the above, this door should be about 5 in. high and 33 in. wide. It can be attached in several ways, and method is used will depend on the space behind the wall. The simplest is to hinge it on the framework at the top and fit it with a turnbutton at the top. Smooth off the back, covering the sides I put a sheet of asbestos in the front and back edges. Make the grain run the grain on the front horizontally or vertically, in both sides. When the front has been cut out, tack it in place temporarily with four panel pins. Now put the aquarium frame into the cabinet and slide it as far forward as possible. Draw a line round the inside of the front of the frame on the cabinet front. The inner rectangle is the piece that must be cut out. The inner rectangle is the piece that must be cut out. The inner rectangle is the piece that must be cut out. The inner rectangle is the piece that must be cut out. To facilitate this, drill a 1 in. diameter hole inside each corner of the rectangle so that it just takes the pencil lines. Now you should find it quite easy to cut along the inner lines with a hack saw. Clean up the hole with sandpaper.

The aquarium will stand an inch back from the front so a fillet 1/4 in. deep is required to touch the glass. It is best to use 1/8 in. panel pins to fix the fillet, on edge, round the inside of the front aperture. The front can now be fixed permanently. When on the base, the tank will slide forward slightly so that the fillet fits snugly inside the front of the frame.

The Electric Circuit

This is the most convenient time to do the electrical wiring. My aquarium is heated by two bulbs from below and lighted by another from above; it has no thermostat. Consequently three switches are necessary. I bought an ex-R.A.F. 3-bank switch for 2/- and mounted it in an appropriately sized plinth on the front of the cabinet. Fig. 4 shows the circuit; the centre switch controls the light bulb, which is a small 15-watt refrigerator bulb. For heating I use one 40-watt and one 25-watt bulb. In normal weather the larger is on at night and the smaller during the day, but in very cold weather I leave both bulbs on at night. This system has the disadvantage that it is not automatic; it is possible that the water will become too hot or too cold if the switches are forgotten.

Fig. 5 shows a circuit containing a thermostat, which naturally increases the expense, but will save current. In this case only one switch is required to control the lighting bulb. One of the flush-fitting pattern would be suitable, providing that its back was protected from the dampness. The lighting bulb fits into a wall-fitting bayonet socket which is fixed onto the back rail of the frame; a 3 by 1/4 by
1 in. block should be glued or nailed just under the rail as it will not be big enough alone. The heating bulbs are wired in parallel, so that if one should burn out the other will stay alight. If the room is in darkness it is possible to see whether the heating bulbs are alight or not.

It is very important that all the wiring is done with heavily insulated cable to protect it from the humidity. All joints should be amply covered with insulating tape. It is a good idea to earth the switchcase and the aquarium frame. If possible, get a qualified electrician to inspect your wiring unless you're accustomed to electrical work.

**Making the Lid**

The only major part of the construction remaining is the lid. Tack a piece of \( \frac{3}{4} \) in. square wood along the outside of the top, back rail; plane its top to the same angle as the top of the framework. The lid will be nailed to this piece of wood, which will be hinged on to the back of the cabinet. Cut a piece of plywood or hardboard to the correct size and mark it at its back edge, to the fillet just made. Attach the fillet to the back of the cabinet with a pair of small brass hinges. The nails with which the fillet was tacked to the framework can now be removed. Next the edges of the top should be sanded smooth.

The fish have to be fed at least once a day, so, to avoid lifting the lid every time, I made a feeding hole in the lid. It is a 1 in. diameter hole drilled in the centre about 4 in. from the front. I made a cover for this hole from a piece of a cotton reel, a 1½ in. square piece of plywood and a small drawer knob. The piece of wood was nailed on to the top of the cotton reel section and the drawer knob was screwed into the middle of the plywood. This plug fits the hole in the lid loosely and so enables me to feed the fish in a few seconds.

Most of you will know how amazingly adept tropicals are at committing suicide by jumping from the tank. To prevent this I attached an apron of \( \frac{1}{2} \) in. thick wood to the underside of the lid. It reaches down to within \( \frac{1}{2} \) in. of the top of the frame. I had to cut a notch, about \( \frac{1}{2} \) in. deep and \( \frac{1}{2} \) in. wide, in the back of the apron for the lighting lamp.

**Finishing the Cabinet**

The construction of the cabinet has now been completed and it only remains to apply the finish. The inside of the cabinet should be light in colour in order to reflect as much light and heat as possible. I gave mine three coats of white paint. It is best to use outdoor quality or enamel paint for this.

The outside of the cabinet should have been sanded smooth during construction. The finish is a matter of personal taste, but do avoid varnish stains; they give wood a cheap and glossy appearance. The cabinet could be painted to match the room in which it is to stand, or it could be stained and then polished with wax polish.

Before placing the glazed tank in the cabinet, I covered its back and ends with light blue model acrylicine tissue. This greatly improves the appearance of the tank interior. The tissue can be bought at any model shop; it costs about 4d. for a sheet 20 by 30 in.

It is quite easy to adapt the measurements given for an aquarium 12 by 9 by 11 in. to any sized frame. For an 18 by 12 by 11 in. frame, you would have to add 6 in. to every measurement involving the length of the tank, 3 in. to those involving the width and 3 in. to those involving the height. Because of the variety of aquarium sizes I have not given a list of the sizes of the materials, but you can prepare one for your aquarium from the diagrams and text.

A well set up aquarium inside this cabinet will make an attractive showcase for breeders with surplus stock, and it should completely overcome feminine opposition to "messy tanks" in the house.

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**Hospital Aquarium Fund**

**LAST** month the institution of a Hospital Aquarium Fund to provide equipment for aquarium societies to install in their local hospital wards, was announced on our pages. A committee for the administration of the Fund has now been formed, having the following members: Dr. J. F. Wilkinson (President of the F.N.A.S.); W. W. Charman (Managing Director of Buckley Pet Ltd.); R. G. Mealand, well-known aquarist; M. A. Fraser-Brunner, F.Z.S., and Mr. Anthony Evans, B.S. (Advisory Editor and Editor of *The Aquarium*).

The appeal for donations to the Fund is addressed not only to aquarists but to all members of the public, as fish present an ever-changing living picture—a constant source of pleasure.

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Readers are asked to bring its existence to the notice of their friends. A descriptive leaflet is in preparation to publicize the value of aquaria in brightening the surroundings of sufferers from chronic complaints and convalescent patients in hospitals, and this will receive wide circulation. Donations sent to the address at the foot of this column will gratefully be acknowledged in our pages.

No society wishing to help its local hospital in this way and at the same time desirous of increasing the number of devotees to the aquarium hobby, need be deterred through lack of sufficient capital once this Fund is established. Applications for help will be promptly attended to and arrangements made for delivery of apparatus and stock. Each aquarium installed from the Fund will bear an engraved plate indicating its origin and the name of the society responsible for its care.

Society secretaries who have not already signified the willingness of their members to participate in the scheme are requested to write, giving in full details of the hospital to receive the stocked aquarium to Hospital Aquarium Fund, "The Aquarium," 24, Wood Lane, Isleworth, Middlesex.
Rock Wall Splendour

by W. E. SHEWELL-COOPER

It is seldom that one finds an absolutely level garden somewhere, and even if one does it is rather a pity, there's a great attractiveness in "ups and downs" and as those who love the mountains know only too well. I always think that great interest can be assured by making the difference between levels in a garden by building a rock wall, which can be beautifully furnished with plants. The plan, therefore, is to make the rock wall between two terraces into what may be called a wall and to clothe the steps leading down to this wall with plants in between the cracks.

A garden pool is often found in such a garden, and rightly so, for there's nothing prettier than having the pool as a piece with flagged paths around and the rock wall with colour as the background. Such a wall is called a retaining wall; that is to say, it is built with the bank and has all the soil behind it to keep it in and to provide an extensive root run for the plants to make it beautiful. There are what are called solid walls, but these are built to divide up two parts of the garden and aim to take the place of a hedge. It is not about walls that I am writing now.

**Stones and Bedding**

Kinds of stone may be used for building a rock wall. I much prefer, however, the fairly flat natural ones, roughly shaped stones which are from three inches to six inches thick. These are laid properly on top of one another and in between being packed with a John Innes Compost. Readers who do not wish to spend much on soil mixture can buy this compost ready made in small bags from suppliers if necessary. Never leave large enough cracks between the stones so as to make the roots of the plants without cramping them much. Lay the stones with a slight inward slope so that the rainwater will drain down to the roots of the plants instead of dripping off the surface. The wall looks as if it was built perpendicularly, will slope back just a little. It helps matters, of course, to have a solid base so that there is no chance of sinking. For this reason that some gardeners lay the first two or three courses of rock-work in cement. They then wait until these set properly before the construction of the wall is finished.

It is possible to get in a stock of plants so that the wall is being built planting may be carried out. It is far better to spread out the stones up to position 1,2,3 and poke them in weeks afterwards. Arrange, for a successive display—i.e., it is better not to have the reds, pinks, blues, mauves and reds in flower in April and then to look rather bare in June or even July. It is possible to have a wall furnished with plants of a complete range of colours, i.e., red, pink, yellow, blue, white, rose, orange and lilac or else if you wish you can have a wall adame with one colour only, or examine a number of plants and choose those easy to grow and inexpensive to buy. The

**Useful Tips**

The vast majority of tanks are made of angle iron which has been painted over in green or cream paint. It is usually not long before this paint wears thin and rust is in evidence. Two or three coats of Japanese lacquer applied to all the outside framework gives a very beautiful effect and results in rust and stains being a thing of the past.

Aluminium covers also look well painted over with lacquer and the heat from the lighting lamps has no effect whatever on it. It does not crack or peel off, or even become soft once it has dried. All painting of this sort should be done when the aquarium is empty and liquid lacquer should on no account be allowed to drip into tank water. For a few weeks a freshly lacquered tank has a "painty" smell about it but this does not seem to harm the fish.

Fish-carrying cans can be painted with lacquer inside and out when intended for cold water fish. This prevents rust and has no effect whatever on the fish, even when freshly dried hard. I have never tried tropicals in these circumstances.

**Piston** type pumps need oiling occasionally and very lightly, thin oil should be used for this purpose. I always use typewriter oil which is excellent, gives no trouble and is a small bottle, used once a week, lasts a very long time indeed.

RAYMOND YATES
If the aquarium is to be regarded as an instrument or vehicle of education, then that at Haslemere should head the list of "Aquariums on the Map." It is all part of a well co-ordinated plan, an aquarium and museum, a place that is alive from basement to attic, and front door to back porch.

The history of this now well-known educational museum (if only more museums could claim and deserve such a title!) at Haslemere, in the haunt of the Surrey hills, is an interesting one. Like so many great movements, educational and sociological, it had its inception in a single human brain. This brain was that of Jonathan Hutchinson, member of a famous Quaker family and later an eminent surgeon, knighted for his services. Just over eighty-four years ago he set up his home at Inval, near Haslemere. Long before he set up his museum he had been advocating such a place, and in his sixtieth year set about visualising his ideals.

His interests were, to say the least, wide. At one time he negotiated for the carcass of a seventy-five tons whale, and even kept a grizzly bear on his premises. He had the rare quality of being able to impart his knowledge in an attractive form to others, so much so that in 1893 his museum was visited by the greatest of all museum makers, the late Sir William Flower, for many years director of the Natural History Museum at South Kensington. Two years later he moved his museum into Haslemere and shortly after obtained the services of Mr. E. W. Swanton as curator. Sir Jonathan, having his surgery in London, did virtually all his museum work at week-ends, so that the appointment of a permanent, resident curator was imperative. The writer had the privilege of several times meeting Mr. Swanton, another born naturalist and the author of a delightful work on country life and lore.

From this period onwards the museum became a Mecca for school children and their instructors, and large parties from the L.C.C., Surrey, Hampshire and Essex, and beyond, are now daily features the year round. Special courses in natural history followed by exams and prize distributions are a normal part of the museum's curriculum. It has had its ups and downs, for its founder was not able to endow it. Indeed, in 1913 when he died its position was critical, but luckily Haslemere residents formed a committee under Sir Archibald Geikie, the great geologist, and came to the rescue. To-day, the museum, though sorely in need of every possible support, is well established, but education worthy of the name was never a cheap commodity. It was nearly lost through financial difficulties in the first world war, and sustained serious bomb damage in the second, but is now luckily once more on the map and likely to remain there.

Now about the aquatic side of the museum. Since the retirement of Mr. Swanton it has been under the curatorship of Mr. John Clegg, well-known aquarist and president of the vigorous West Surrey Aquarists' Club at Guildford. The museum, in the heart of Haslemere, has a lovely setting and spacious grounds containing a fine lake. It has recently acquired an extension which includes several ponds. The entire museum has a light, airy atmosphere quite at variance with that of most such places. The aquarium proper consists of some twenty tanks ranged all along one side of a well-lit corridor, each tank being let in a wall, as all aquarium tanks, no matter where, should be. This is the only way to concentrate lighting and the visitors' attention adequately upon the exhibits, and also, of course, offers ample space for explanatory labels.

These tanks are devoted almost entirely to aquatic insects, and in the case of water skaters, etc., the water level is allowed to stand a little below the top frame edge, thus permitting one to see to perfection how the insect in quest of food adapts itself to the surface film. Here children can see more detail the private lives of insects they have already met in the museum's ponds. But there is better still to follow.

In 1937 there was a big influx of overseas visitors and further grant of £250 from the Carnegie United Kingdom Trust, which went towards the purchase of what is known to thousands of youngsters as the "Micro Zoo." This is a micro projector with a translucent screen measuring five feet by four. On a recent visit I saw a party of school children sitting in the big lecture theatre held spellbound by Mr. A. S. Edwards giving one of his daily demonstrations.

First we saw a drop of water from the local pond projected . . . what a revelation to some of us! The scene fairly swarmed with slipper animalcules, each of the slipper-shape and some very outsize slippers at that. There followed other marvels (how different even a poor snail embryo looks upon the screen) and finished up with "George II as a grand finale. George is a demoted nymph and he made his bow magnified to about twice its dimensions of a large lobster. Thus transformed, he devoured half a dozen water fleas, each apparently the size of a horse chestnut in the husk. It was a sight to impress even the most brainless and blasé grown-up film fan.

In addition to the aquatic insects is a small series of pond and river fishes, and (on loan) a beautiful littoral marine tank on the property of Mr. R. Fitzgerald. The museum covers every conceivable phase of local natural history, geology and antiquity, and is ably supported by four flourishing societies numbering amongst their members very practical field naturalists, photographers and gardeners. In 1938...
An Unsolved Problem

by L. R. BRIGHTWELL

at the London Zoo and several other aquariums; how does the lesser dog fish (Scyllium canicula) bite off just the tail portion of the common whelk in such numbers? That it does so there can be no doubt at all. I have opened scores of fish and found anything from ten to twenty-three whelk operculae in their stomachs. But never is there a shell or a fragment of one. It is scarcely conceivable that the fish’s gastric juices could dissolve a massive whelk shell, though this needs verification by experiment. It is quite possible, though not too easy, to catch a whelk unawares and sever the tail portion with an operculum, if one uses a very sharp knife, so it does seem likely the dog fish neatly shears away this bit-bit. A big-scale whelk dealer has assured me that headless, i.e., operculumless, whelks are not uncommon in a consignment. At Plymouth the writer did establish by numerous tests that a deliberately mutilated whelk fell an easy prey to the hermit crab, which cheerfully ousted the snail and appropriated its shell, though seldom touching the carcass save the soft visceral hump. The dog fish, like so many aquatic beasts, unfortunately operates chiefly at night so that the matter is as yet one of mere theorising, and presents a puzzle well worth any naturalist’s attention.

A Carnivore from the Congo

Belonophago hutsebauti

they eat only the fins of other fishes, which might well prove true in an aquarium. The body is encased in rather large, strong scales, each with a sharp spine in its centre. The British Museum authorities were pleased to see this species because it was known previously only from the specimens originally described from Buta in the Congo, in 1929, by Giltay, who named it Belonophagous hutsebauti. A second species, B. titani, has been described more recently by Poll. We hope more specimens of this novel fish will reach this country, and that their feeding habits will be discovered, but we guess they will be among those fishes best kept in a tank of their own.
Some Facts About Aquarium Water

by G. F. HERVEY

THREE hundred and fifty years ago, an amateur breeder of goldfish, to quote his own words, "... in the eleventh paragraph he writes: "... As for the water, to take running water from a river or lake is best, and clear, cold, well water is next to it. What must not be used is water from the canals in a city."

It was a simple way of expressing things, and yet, if we honestly condense all our up-to-date knowledge into one sentence, the result would not be very much superior. For modern experience teaches that the best water with which to fill an aquarium is that drawn from a pond or stream in which healthy fish are known to be living. Failing that, rain water drawn from a well-established water butt or tank should be used. Here, however, a note of warning must be sounded; for though rain water, as it is formed in the upper regions of the atmosphere, is the purest that nature supplies, it has a strong affinity for organic impurities, so that rain water in towns is usually polluted with smoke from factories, noxious gases, and the like, and must, therefore, be regarded with suspicion. Generally it is unwise to use water drawn direct from the tap; for nearly always tap water contains chlorine, a chemical that is harmful to fish and in large quantities will prove fatal to them. If force of circumstances compels the aquarist to use water from a tap, the water may either be "matured," by allowing it to stand for several days outdoors, preferably in an enamel pan that is expected to be boiled (in an enamel pan is safest), allowed to cool, and then aerated. Tap water that is strongly chlorinated should never be used until it has been boiled; standing in the sun to mature will not make it safe for fish.

Removing Chlorine

It is not always practical to boil the amount of water necessary to fill a large aquarium. If only a small amount of chlorine is known to be present, it may be removed by placing the finger under the tap and squirming the water as hard as possible into a container, or, better still, by squirting the water as hard as possible into a container through a hose with a very fine nozzle. An alternative method to de-chlorinate water is to add one grain (by weight) of sodium thiosulphate (photographic "hypo") to every gallon of water. The sodium thiosulphate should be dissolved in the water before the water is poured into the aquarium. In practice, however, the aquarist has very little to fear from chlorine. To what extent it affects tropical fishes I am ignorant, but tests have shown that goldfish are affected only if they are continuously exposed to chlorine in a concentration as strong as two parts of chlorine in ten million parts of water (though half this strength is enough to destroy the eggs of fishes) and water is rarely, if ever, chlorinated to this extent.

Melted snow may be used; for there is nothing to support the popular belief that melted snow kills fish, and, indeed, in some cases it is safer than tap water. The chief objections to melted snow, however, are that it lacks oxygen and mineral salts, and is usually, almost invariably, very dirty. If melted snow is to be used it should be taken from a reasonably clean source, boiled, filtered to remove larger particles of dirt, and oxygenated when cool. Salt may be added: three teaspoonsfuls of sodium chloride (common salt), one of potassium sulphate and one of magnesium sulphate, to every ten gallons.

Fresh water may be either neutral, acid, or alkaline. Of neutrality, or its degree of acidity or alkalinity, known as its pH value. There is nothing mysterious about the pH value of water, nor is the subject so complicated as some would have us believe. The pH value is defined as "... a number used to express the concentration of hydrochloric acid in an aqueous fluid and is thus indicative of the reaction of that fluid, that is, the neutrality or degree of acidity or alkalinity.

According to the theory of electrolytic dissociation fluids of which the constituent contain free, positive charged hydrogen (H') ions and negatively charged hydroxyl (OH-) ions. When the numbers of these ions present in a liquid are exactly balanced the liquid is to be neutral. If there be an excess of hydrogen (H') ions, the liquid is acid, and conversely if the hydroxyl (OH-) ions be in excess, it is alkaline.

Balance of Ions

"... The reaction of a liquid, therefore, depends entirely on the balance which exists between the concentrations of hydrogen and hydroxyl ions." Absolute neutrality has pH value of 7.07 (usually taken as 7.0). The addition of acid increases the H+ ion concentration of the water and pH of all acid solutions is less than 7.07. The addition of alkali increases the concentration of the OH- ions, decreases the concentration of the H+ ions, so that the pH of all alkali solutions is greater than 7.07. The range of pH values extends about equally on each side of 7.07; for the complete range of values forms a graduated scale from about 0.6 to 14.5. Natural waters are seldom more acid than pH 6 and more alkaline than pH 9. Rain water usually varies between pH 6.5 and pH 8.5, according to the locality. In industrial districts the pH value is likely to be lower than the water absorptions of gases from factory smoke and the like. Aquarian fishes cannot endure water that is either too acid or too alkaline, and most tolerate a range only from about pH 6 to 7.6.

To determine the pH value of water two methods may be used: 1) the electrometric method or the colorimetric method. The electrometric method is the more accurate, but requires an elaborate and expensive outfit and a considerable knowledge of chemistry. The colorimetric method is simple, inexpensive and requires no knowledge of chemistry; it is therefore, the better method for the aquarist. B.D.J. 6676 "Indicator or Johnson's Comparator Test Paper (Continued on next page)"
Baby Terrapins

by J. FRANCIS

ONCE again on the market are those attractive tiny terrapins or "freshwater turtles." They are difficult to keep, with their bright colours, unusual markings and ways, but their life in captivity is usually very dull unless special attention is given to their needs.

Often recommended for the tropical aquarium as the best home for them, they are best kept apart from fishes whose fins they may nip. They do need warm water (70°-80° F.), and in unheated surroundings should be fed and very soon die. Terrapins are active and require much room, and their quarters should be arranged so that they can be kept on a surface which may be planted with pincushion moss or mossed stones, provide an exit from the water for the favourite pastime of the baby terrapins. A splash of bark on the water can also be used. The tank must not be more than six inches in depth, and old or damaged aquaria make useful aqua-vivaria for them.

Water is an important factor in terrapins' lives, the provision of a warm water supply essential as they are always ready to accept live food. In winter an electric lamp should be placed over the terrapins for several hours each day, every opportunity of placing the animals in sunlight should be taken. Water plants with lead strips, and floating plants such as duckweed can be provided, for although mainly carnivorous, young terrapins sometimes take green food. Their carnivorous diet demands that their water should be changed regularly; dirty and odorous water causes them to lose interest in food and promotes eye infections.

Newly imported terrapins require live foods, for they have to be educated to take non-moving food. Very small specimens will accept Daphnia, Tubifex, and white worms. Larger ones delight in small earthworms, freshwater shrimp and garden woodlice. It is not very long before they begin to eat meat—raw beef, heart, liver, and chopped worms form a good introduction to this new mode of feeding for them. Vary the diet as much as possible. Remember that terrapins feed in water and not out of it; remove uneaten food before it pollutes the tank.

Growth is usually extremely slow in captivity and for it to occur at all plenty of lime salts for bone and shell formation are necessary. Hence any foods giving a source of these are specially useful. Small freshly dead fishes, the wood louse, the freshwater shrimp and louse, are examples.

When buying young terrapins choose active specimens with clear bright eyes. Should eye troubles develop—closed and suppurring lids—bathe the eyes with warm water, gently wiping them with soaked cotton wool, and then apply Golden Eye Ointment. Any ailing terrapin should be given plenty of light and clean water at the right temperature.
HOLLAND

LAST November's issue of Het Aquarium opens with an article on that peculiarly shaped Gymnotid fish which is almost unknown in the tanks of present-day fishkeepers. Its native habitat covers the whole of the eastern part of South America. This fish has neither a dorsal nor a caudal fin; the latter is replaced by a long whip-like appendage not unlike a rat's tail. Along its ventral surface is a fin like a fringed seam to its body. When swimming, this fin is in constant movement and the "tail" rolls and swings from side to side; backward swimming is as readily engaged in as forward.

Grey-brown in basic coloration, with glistening green gill-covers, E. virens has small eyes and a mouth with many teeth. It can attain a length of sixteen inches and this, together with the fact that it will take only live foods, makes it unsuitable for ordinary aquariums. Sex-determination is difficult and nothing appears to be known of the fishes' mode of propagation as yet.

Copeina arnoldi is a tropical fish that was well-established in Dutch tanks before the war, and it is now being reimported to Holland. According to its importer the water where the species is captured in Surinam are of a temperature of 80°F. and pH 4.5. Vegetation is almost unknown in water so acid but it is remarkable that a species of Ambulacia, previously considered to be an eastern plant, was growing in the vicinity. The fishes seem to migrate in large shoals from one part of the river to another.

Breeding habits of Copeina are most striking. In aquaria the males and females approach a glass side together, slowly rise to the water surface and then with an extremely rapid movement jump together about three inches out of the water, momentarily remaining against the glass where, with total lack of body colour, they deposit about 200 eggs. The male takes up a position close to the aerial eggs and keeps them moistened with vigorous flicks of his tail. The glass surface needs to be as rough as possible or the male's activities will wash off the eggs. Hatching occurs after two or three days and the young drop into the water. When they are free-swimming they need live foods in great quantities.

A plant taken to America by soldiers returning home from the Far East in the last war, and which after propagation in Californian fish farms reached Europe in 1947, is Hyphohipia polypyrus, now a very common aquarium species. A writer discussing it mentions that it can be propagated by floating detached leaves in a tank, when roots soon develop on them.

Can zebra fishes (Brachydanio rerio) and white cloud mountain minnows (Tinichthys albonubes) be kept together in one tank? This question has been receiving attention in correspondence to the Dutch journal. One aquarist finds that when the two species are kept together the zebras become emaciated and die. An experiment has been made with two identical tanks each containing the mixed species, in which one tank received plenty of light, had a temperature of about 75°F. and was given plenty of live foods and fine oatmeal mixed with cod-liver oil, whilst the other group of fishes was given only moderate feeding with no cod-liver oil in the dry food and kept at a lower temperature. After some time only one death had occurred in the first group whereas all the second group had died. Both fish species thus appear to be equally susceptible to poor surroundings and feeding.

IN December's issue of Het Aquarium a new import Holland, sold under the name of Barilius species, described. Four inches in length, its colour is blue with eleven vertical bars on the long elegant body. There is one dark spot on the tail and there are golden spots at the side of the upper jaw. In behaviour it resembles Dan malabaricus but it has been noticed to be predatory smaller fishes.

An appeal for more selective fish-breeding is made by a Dutch aquarist who writes that if amateurs and professionals alike did not think solely of numbers, but destroy all disfigured stocks and those not up to colour standards, would be possible for sound and healthy strains to be built up. He applauds the efforts of Britain's Guppy Breeding Society, now followed by Holland's Indiscriminate breeding results in runts and poorly developed fish finding their way on to the market to perpetuate their faults.

Vitamin D is required by young Pristella riddlei according to a Dutch biologist who explains the sudden death previously recorded for this species as due to the vitamin. The fishes require plenty of natural foods but are body-builders with the vitamin to take them over the first difficult post-hatching stage.

A description of a beautiful fish from the December issue of the Rotterdam Aquarium Exhibition held in the Rotterdam Zoo. This event attracted over 40,000 people, with those of school children and visitors from Britain, Germany and Belgium. I saw this Exhibition myself when on holiday in Holland and can confirm the words of praise which have been received from visitors. 160 tanks from body capacity 500 gallons, all beautifully displayed in a hall the middle of which had a natural shallow pond of spacious design containing flamingoes and other aquatic birds adding to the impression of being in tropical surroundings.

U.S.A.

POPULARITY of water fleas (Daphnia) as live foods means that tried methods for culturing them are always in demand. Here is a method described by the Oklahoma Aquarium Association's Aquarium News for November 1950. For the medium use a mixture of five grams of air-dried horse manure with twenty-five grams of finely ground dry sandy soil in a quart of filtered lake water. Tap water is not recommended. Stand this infusion in an open glass container giving a large surface area for two or three days and then strain it through silk bolting. Stand the filtrate in the cleaned container for another four to six days, it should develop a dark reddish brown colour, and is ready for use.

For a stock culture place fifteen to twenty Daphnia about a gallon and a half of this solution, adding a little dried yeast dissolved in water every other day. Culture for use are kept in one pint jars, each filled with one Daphnia placed in the medium. It is claimed that this medium lasts about eight weeks (it loses its dark-colour when used up) and that ten pint jars produce about a glass pipette to keep the cultures going, and if desired, young fleas can be grown to a larger size in separate jars or five to six days.

HARDNESS of aquarium water has an important influence on plant growth, writes W. Bergholtz in the Aquarium Journal (November, 1950). The aquarist finds that Ambulia and Cabomba deteriorated old-established tanks owing to the accumulation of lime salts as evaporation losses were made up weekly with a hard tap water. Indian fern, sword plants, water clover, grass and Vallisneria, on the other hand, thrived in this hard water. Adding clean rain water or distilled water over

THE AQUARIUM
Belgium

The first issue of a new aquarium monthly in Belgium—Notre Aquarium (M. Luc Capin, 73, Rue Gretry, Liège) price 2/6. Its contents articles on swordtails and their hybrids, Barbus and replies to aquarists' queries. In lay-out typography it is very similar to America's The Aquarium being the only journal published in French from which one can find wide circle of readers as a self-revue mensuelle pour la vulgarisation de l'aquarisme.

New Zealand

An unusual malformation of goldfishes was reported in the Dominion Aquarist and Pondkeeper last year. One breeder found that several of his fishes grew like onions under the sides of their lower fins. These fishes took in mouthfuls of water so that they bulged out and then deflated in rhythm with their respiration. The structures do not appear to be due to but are probably abnormalities that have arisen during the breeding process. Some of the females were able to produce eggs and some male fish were also found with similar abnormalities.

Antibiotics in Aquaria

More and more compounds similar to penicillin, with remarkable anti-bacterial and anti-virus properties, are being produced from plants and moulds in research. These antibiotics such as streptomycin, gramicidin, aureomycin, have not yet been used as cures for fish diseases. Surprisingly, they are of great value in the aquarium to be assessed. Several enthusiastic reports have been made from where they are more readily available to aquarists with an interesting note on the use of penicillin in the aquarium reported in Nature. Dr. H. K. King of the Zoological Gardens of Liverpool reports using it successfully in the treatment of an epizootic infection of young axolotls. After eight weeks old specimens occurred two units to a millilitre (2,200 units/gallon) and after 24 hours, when the losses ceased, the losses of edible frogs in a shallow tank were 20 units of penicillin to a millilitre (1 gallon) of the water. In both cases a diploidy was observed microscopically in the animals that has been the causative organism. Antibiotics are not difficult to obtain, but with further trials they should be highly effective agents for certain ailments.

Oxygenation of Water

With reference to your Editorial in the November issue wherein you quote the findings of Mr. James Atz and Mr. Mogens Holtegaard, the results of whose experiments have been somewhat of a shock to many of your readers, I feel I can, from an entirely different viewpoint, substantiate such findings. During the past five years, in connection with research on a new chemical engineering project, wherein the problem of oxygenation of waterborne media was of paramount importance, some very disappointing and contradictory results were obtained with the bubbling of air through the media. Briefly, I think it can be summed up that the extent of oxygenation is in an inverse proportion to the size of the air bubble, and the extremely small size of bubble required to achieve even a modicum of efficiency, can only be obtained by the expenditure of energy represented by a pressure which it is unlikely any normal aquarium pump generates.

It is a curious point that although this sub-division can be equally obtained by mechanical means or injection, the energy expended to obtain a similar efficiency remains surprisingly inflexible. You mention that something in the nature of an ocean hurricane is required to obtain the maximum diffusion of oxygen, but I would suggest that such a state of affairs is not thereby obtained, since a large quantity of air is introduced in this way in coalesces in large bubble pockets, which give the poorest oxygenation.

During experiments, it was found that Nature's own way of oxygenation, i.e. the form of rain or a jet of water on the surface, achieves the desired result in a surprisingly efficient manner, with no doubt due to the extremely fine sub-division of the air which is carried beneath the surface of the water. Although, as you point out, in all probability the small quantity of air that bubbles to the surface in the normal aquarium's tank achieves little result, I do think it is possible that apart from its spectacular effect, it creates a slight circulation in the water, which in turn leads to oxygenation at the surface.

One point I have investigated with the research project does suggest that a form of oxygenation for the aquarium might be in the shape of electrolysis, for here there would be no complicated or mechanical moving parts, and the oxygen produced in this state is nascent and extremely active, so that it might well serve to help clear the tank of undesirable organic matter. In passing, I should like to put forward a suggestion that the oxygen producing plants in aquarium owe their efficiency to the fact that their oxygen is possibly formed in the molecular state.

C. R. Wilkin, M.B.E.,
Manchester

American Catfish as Tropicals

May I endorse the remarks of your correspondent Mr. F. Richards (The Aquarist, November 1950)? A friend of mine set up, as a beginner, a tropical tank and went to a large departmental store to purchase his fishes. He bought twelve platys and swordtails, and was persuaded to have an American catfish to go with them. Within a week he had lost five fish, and I was called in to try and locate the trouble. Having had some experience of catfishes myself I advised him to remove his specimen...
Scientific Infusoria Culture
was persistently asking me for some fish in a tank,
and I found that if I made a hobby of fish-keeping. On asking
them to be fed on, he told me about live foods
Infusoria for small fry and Daphnia for larger fish.
Infusoria were cultured in a jar, with water,
water and banana skins, which, to me, is impracticable
and not a clean method.

The facilities at my disposal in a Bacteriological
lab made the subject at work, I found that
the food was fed on, he told me about live foods
the Infusoria were cultured in a jar, with water,
to be fed on, he told me about live foods
Infusoria for small fry and Daphnia for larger fish.

The next step was to produce a pure culture
of Infusoria on plain agar, and there was no inculus
in the culture. The point then was to prove that
the pond water, liked this in a pure state.

four boiling tubes of ordinary tap water these
stirrings after a few days:
Infusoria: no growth
Infusoria + Starch: growth
Infusoria + Agarogen: growth
Infusoria + Starch: maximum

Preparation from these tubes and from tube (3)
under the microscope (by the hanging drop
method) I was told that the Infusoria were the largest
and had ever seen. The starch appeared to help
the growth, and I added this in lieu of the potato that they
refrained to eat.

Combing out Algae
I experienced considerable difficulty in removing
the algae from the side of my pond I have been
considering for some years past it was not until last February
when I decided, in the belief that the method
employed to remove algae, I am of course
alga is a good food for fish but it can prove very
an ornamental pond when it turns brown.

G. FAITHFULL, A.M.I.T.T., Hadleigh, Essex.

Junior’s Letter
I have kept common goldfishes and fan-throats for some years past it was not until last February
I was judging at a show where the water in my pond was fairly warm
Provincial goldfishes is a very young pond in May. I brought
during late October and placing them in my
was surprised to see that they were twice the
brothers and sisters left in the tank. Their
much brighter and the scales of the males at
the length of the others.

The AQUARIUM Crossword
Compiled by J. LAUGHLAND

CLUES ACROSS
1. Popular tropical water plant (12)
2. This Latin prefix means three (3)
3. Underground root begins this plant (12)
4. Artistic distinction of Ranunculus (11, 11)
5. Conger, perhaps (3)
6. This order includes ariids and characins (12)
7. A lovely fish or cleaner (4)
8. Consume a varied diet from great fish (3)
9. Trichophyton icter (5, 7)
10. A corps of bream (11, 11)
11. Arm of the water boatman (3)
12. More commonly lighting to the aquarium (12)
13. The anciloids provide the consequent in a co-relationship expressing quantity, degree, etc. (2)
14. Fish fossils (12)

CLUES DOWN
1. Order of toothed carp (12)
2. Marine flat-fish (3)
3. British fish-eating animal (5)
4. April or lesser its head, becomes confused and tides out (6)
5. "Fish" produces eruption (3)
6. All urchins are not sea urchins, but contain the roll of pitch (3)
7. Run for water vessels, perhaps (6)
8. A sea current (3)
9. Bivisa shellfish (4)
10. Kind of the image (2)
11. Aquarium planting medium (4)
12. Grown up river (3)
13. A sea current (3)
14. My rig is upset and dirty (5)
15. Whole of the Allis shad (3)
16. One kind of tank heating (3)

PICK YOUR ANSWER
(1 mark each. No cheating, if you please)
1. Sodium thiosulphate is used to de-chlorinate water: It is:
   (a) Washing soda. (b) Photographic hypo. (c) Sulphuric acid.
2. Sulphate of lime?
3. How many teeth has a goldfish? (a) Two. (b) Four. (c) Eight.
4. On which Cyprinodonts do the scales normally stand out, like a fish with droplets? (a) Pachypharyngus plagiurus. (b) Rivulus ciliatocauda.
5. The popular name of Carassius carassius is: (a) The goldfish. (b) The rudd. (c) The crucian carp. (d) The roach.
6. In 1665 Samuel Pepys writes: . . . . . . of fishes kept in a glass of water . . . . . Mr. C. W. Coates, of the New York Aquarium, believes they were: (a) Bitterling. (b) Goldfish. (c) Gouramis.
7. The word ‘aquarium’, to denote a container of water with aquatic animals living in it, was first used about: (a) 75 years ago. (b) 100 years ago. (c) 125 years ago. (d) 150 years ago.

G. F. H.

(Solutions on page 205)
News from Aquarium Societies

Breeding and habits of the angel fish was the subject of a lecture given by Mr. D. Perrry of Mid-Somerset Aquarium Society at the December meeting of the Bristol Aquarium Society. This society’s meetings are held on the second Monday of each month at the Grand Hotel, Bristol at 7.30 p.m., and visitors and their friends are invited by the secretary to spend the evening there.

Although formed only three weeks previously the Chester and District Aquarium Society staged some tanks at the annual local show of Chester Caged Birds Society recently. Coldwater and tropical fishes were exhibited. Keen interest was shown by the public and members were kept busy answering questions such as “Are the plants real?” and “How often do you change the water?” The society now has twenty-seven members.

The December monthly meeting of the Cambridge and District Aquarium Society heard a most interesting and instructive talk by Mr. Davey on lay-outs for aquaria. He spoke of the need for the right type of compost and stones of natural appearance, stressing that the furnished aquarium should be made to appear deeper by careful planting. His suggestions for designs for exhibition furnished aquaria were warmly welcomed by members. At a recent table show held by the society between thirty and forty tropical and coldwater fishes were displayed. The society’s annual general meeting was held early this month.

BRITISH and District Aquariumists’ Society held their annual dinner, at which trophies and prizes for past shows were awarded, a week before their annual general meeting last month. The society’s new secretary is Mr. Baker, 12, Berkley Avenue, Bexleyheath, Kent, and to accommodate the expanded membership the new meeting place is The Coffee Tavern, Basye Road, Bexleyheath, Kent, with meetings on the second Monday of each month at 8 p.m.

SPECIAL evening meeting during December for the East London Aquariumists’ and Pondkeepers’ Association was taken up with a lantern lecture given by Mr. A. Fraser-Brunner, one of the association’s vice-presidents. He spoke of his travels in the Gulf of Aden, carrying his listeners around the shores of the Gulf and Italian Somaliland with a call at various places and to many “fairytale towns.” Many slides were shown of the wonderful and sometimes weird inhabitants of local years of the reefs which adorn the shores of the beautiful coral fishes. Officers of the Federation of British Aquarium Societies and the Committee of Illford Aquariumists’ Society were present by invitation and all joined in a hearty vote of thanks to the lecturer.

NAUGURAL meeting of the Greenock and District Aquarium Society was held in November last, when over two dozen members were present. Meetings are to be held on the third Thursday of each month at the Y.M.C.A. Halls, West Stewart Street, Greenock, and the secretary is Mr. D. O. Carr, 13, Finnan Road, Greenock.

The Eastern Counties Section of the Guppy Breeders’ Society now holds its monthly meetings on the first Tuesday of each month at 8 p.m. in the Rose and Crown Hotel, Hilden Broadway, Secretary is Mr. J. T. Keene, 11, Southend Drive, Harpenden, Herts.

NEW secretary of the Hull and District Pond and Aquarium Society is Mr. Landham, Anthered House, Walthamstow, N. 10, to whom all correspondence should be sent. Meetings are held fortnightly instead of monthly. At the November meetings opposing views on setting up tropical aquaria were given by two members, a discussion following to help the many beginners present at meeting.

TWIN monthly meetings, on the first and third Tuesdays of the month, are now held by the Hornsey and District Aquarium Society. Membership is to be limited to fifty, and subscriptions are raised to 10s. (adults) and 5s. (juveniles) a year.

NEW headquarters of the Ilford and District Aquariumists’ and Pondkeepers’ Society are at 155, George Street, Hornsey, N. 8, where meetings are held on the second Monday of each month at 7.30 p.m. More members are wanted by the society, which invites application to the secretary, Mrs. Wilson, 21, Elgin Road, Seven Kings, Ilford.

For the best Home Aquarium was awarded to a member winner of society’s competition held last November.

MEETINGS of the National Aquarium Society are held at the Horticultural Hall, Westminster, normally on the first Monday of each month at 7.30 p.m. Recent society activities have included a lecture by Mr. D. Law on fresh water plantings by lecture by Mr. W. P. Jackson on plants in breeding aquaria. Plans for the society’s 1951 show are progressing well.

KINGSTON and District Aquarium Society is to hold meetings twice monthly, on first and third Tuesdays of the month, in addition to lectures and table shows. The Society recently held a meeting at the Smith’s Hotel, Elstree, Herts.

GROUP of aquariumists from the Walthamstow and District Aquariumists’ Society visited the Leytonstone Aquariums and Pond Aquarium Society as a “brains trust” at a recent meeting. A table show morning was also held. Two furnished aquaria were exhibited, and local church bazaar for publicity purposes.

FIRST annual general meeting of the Nelson and District Aquarium Society was held last month. New officers were elected and a fresh member undertook the care of the local hospital aquarium for a three months’ period.

PRESENTATION of a furnished tropical aquarium to the children of the Birmingham General Hospital by the North Birmingham Pond and Aquarium Society is to take place during the course of this month. A junior section has been formed in the society, and meetings are held each month at Birches Farm, Perry Barr, Birmingham. Mr. Anderson, Aquariumist in the area were invited to attend a lecture on the breeding of popular tropical fishes.

REMOVAL of the meeting place of the Plymouth and District Aquariumists’ and Pondkeepers’ Society to 50, Ebrington Street, Plymouth is notified. The secretary is Mr. W. A. M. Mason, Maple Cottage, Mill Road, Plympton, Plympton, Devon.

SEVEN aquarium societies in Scotland are listed in the Scottish Aquarium Society’s November 1951 Corinck Aquarium Journal. An article on the Madagascar Lace plant mentions that Glasgow is one of the localities where this plant can be seen growing in the Botanical Gardens, and the soft slightly acid water seems to suit it very well. At the society meeting early in January Mr. M. Campbell was scheduled to speak on reefs for the aquarium; next month Mr. B. C. K. Koo is to give some personal observations on breeding.

The annual general meeting of the Scarborough Aquarium Society, “Scallop’s,” 21, Castle Road, Scarborough was held, and Mr. M. Campbell was elected secretary. Over thirty members now join the society.

ESTABLISHED last year, the Smethwick and District Aquarium Society now reports good progress with increasing membership. Talks have been given by members and visitors and also to schools engaged this year. A library of aquatic literature has been started.

Photos: R. A. Phillips

To help increase public knowledge of tropical and coldwater fish the Thames Valley Aquatic Society has provided a selection for exhibition in the main hall of Surbiton (Surrey) Library. Surbiton Council installed the tank, which has become a popular feature to old and young.
A.T.A. Annual Dinner

The annual dinner of the Aquatic Trade Association held last month in London proved a great success. Many well-known firms were present, and in addition to the usual prizes for the best fish and plants, there were different types of aquariums on show, and the room was filled with the most beautiful fish and plants. The highlight of the evening was a lecture by Mr. T. W. Parkinson on the care and breeding of aquarium fish. The guest speaker was Mr. J. H. Sheppard, the founder of the Aquarium Society of India.

Aquarium Societies—Continued

The members of the Southern Amateur Aquarium Society, the secretary of which is Mr. C. H. G. Normanton, are always on the lookout for new members and encourage all to join. They have recently held a successful exhibition, which attracted much interest from the public. The society is always looking for new ideas and improvements to the hobby.

The Tyneside Aquatic and Pondkeepers Association, under the leadership of Mr. H. M. Smith, has been very active in recent months. They have recently held a successful fish show, which attracted much interest from the public. The society is always looking for new ideas and improvements to the hobby.

West Greenwich Aquarium and Pondkeepers Association held a successful fish show last month, which attracted much interest from the public. The society is always looking for new ideas and improvements to the hobby.

FEDERATION A.G.M.

The annual general meeting of the Federation of British Aquarium Societies coincided with the twelfth anniversary of the foundation, and the advances made through the years were a matter of great satisfaction. The meeting was presided over by the chairman, Mr. W. H. B. Cooper, who recalled the history of the federation and the achievements made since its inception.

New Societies

Aquarists in the Cambridge (S.E.6) area are forming an association known as the Cambridge Aquarium Society (C.A.A.S.). Acting secretary is Mr. R. J. Davies, 40, Sandhurst Road, Cambridge, S.E.6, who will be pleased to hear from local aquarists.

Isle of Wight aquarists interested in joining the newly formed I.O.W. Aquarists’ Society should contact the secretary, Mr. A. Toomey, 5, Nelson Street, Ryde, Isle of Wight.

FORMATION is announced of an Aquarists’ Section of the Lambeth Gardening Association to be known as the Lambeth Aquarist Society. 100 people are interested in the society and others should write to the temporary secretary, Mr. H. E. Billings, Trelawny, 7, St. Gothard’s Road, West Norwood, S.E.27.

Crossword Solution

MYRIOPHYLLUM
I A I U T T R I A
CRYPTOCORYNE
R A E E L C M
OSTARIOPHYSI
C H A R X X X
Y R C C C L
PEARL GOURAMI
Y R O A R I O
ILLUMINATING
N A I S M L A
ICHTHYOLITES

PICK YOUR ANSWER (Solution)

2. (b) 3 (a) 4 (c) 6 marks—There’s glory for you! 10 marks—Excellent; 4 marks—Very good; 3 marks—Good; 2 marks—Fair; 1 mark—Poor; 0 marks—Ishabod!
British Aquarists’ Festival

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★ The show will include a reptile section and biological exhibits, water gardens, an exhibition of underwater photography, lectures and film shows, and numerous trade exhibits.

★ The Festival will be organised by the Federation of Northern Aquarium Societies who will provide experienced stewards.

★ Judges will be appointed by the Federation of British Aquatic Societies and judging will be to their official standards.

★ Numerous valuable trophies and awards will be offered, and will be presented to the winners at the Spring Assembly of the Federation of Northern Aquarium Societies on 6th May.

★ The schedule for the competitive classes will be available shortly from the show secretary:—R. O. B. List, 31, Coronation Court, Willesden Lane, London, N.W.6. Telephone: MAIda Vale 8742.

All other information relative to the Festival can be obtained from the Exhibition Offices

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