



The
AQUARIST

THE
ORIGINAL
MONTHLY MAGAZINE
DEVOTED TO AQUARIUM
POND AND REPTILE
KEEPING

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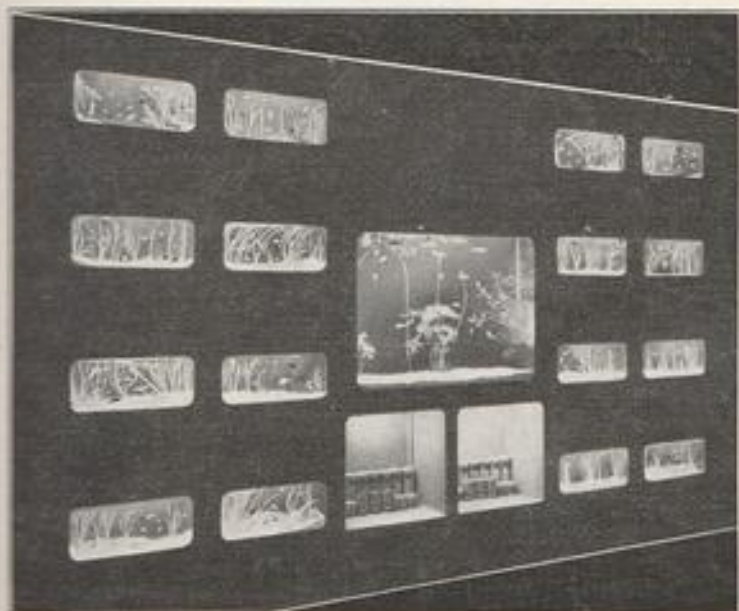
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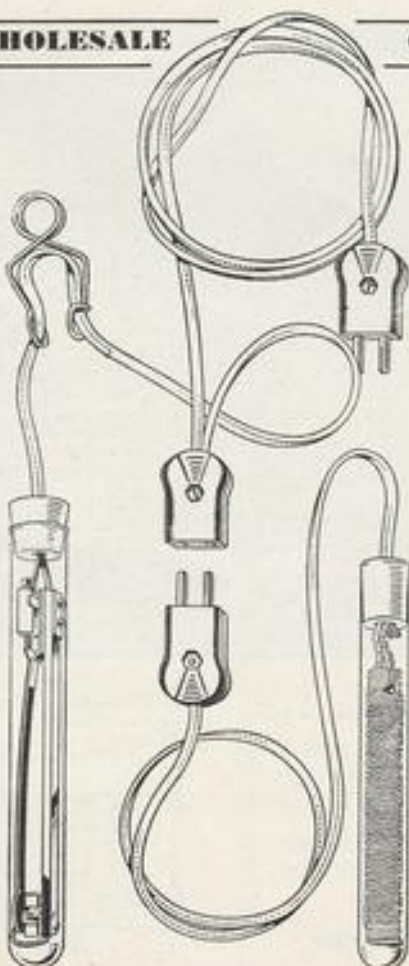
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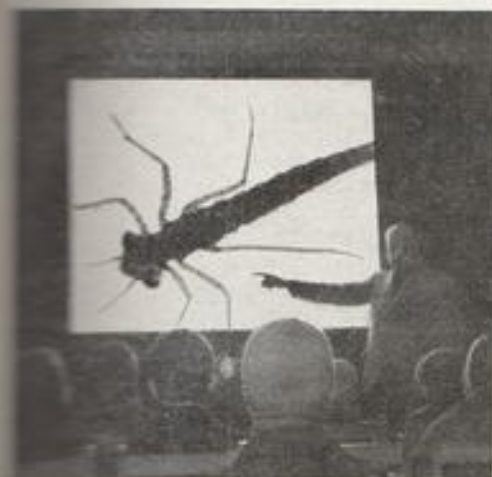
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John Clegg

Illustration of the living dragonfly nymph by means of the microscope projector at Haslemere Educational Museum (see page 196)

VOL. XV No. 10

1951

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 Aquatic 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.

British Aquarists' Festival 1951



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.

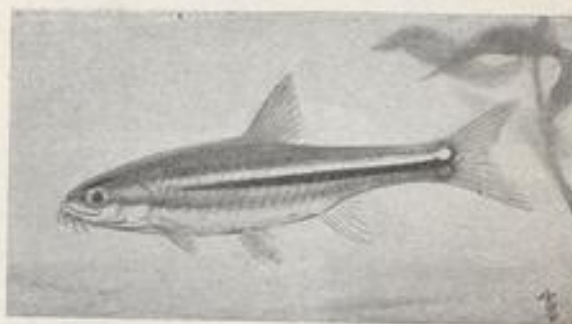
A Red finned Barb Arrives from Africa

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 African minnows, and thought that the Latin name was *Barbus untaenatus*. I made numerous enquiries and at last found out they were *Barbus untaenatus* and that they came from Nigeria in West Africa. In their wild state they grow to a length of six inches, but my two pairs were about three months old when I had them, and after six months the bigger female is about three inches long, so I should imagine that they do not grow so large in captivity. They are rather fast swimming fish, and the males are red-brown on the back and sides with a bright gold line running from the shoulder along the lateral line to the base of the caudal fin where it ends in a bright gold spot. Below the gold line is a black one, which becomes distinct below the dorsal fin and passes to the end of the tail, where it surrounds the gold spot. The lower breast and belly are silver, and the fins are transparent, tinged with red. The iris of the eye is golden. The females are marked like the males but not so bright in colour; they are more rotund in shape, and are about half an inch longer than the males.

Head-to-Tail Spinning

After about three months I decided to try to breed them. The two females looked very full and the males had a more intense colour. So I cleaned out a 30 in. by 12 in. by 12 in. tank and set it up with large *Cryptocoryne* at the back and sides of the tank and the centre thickly planted with dwarf *Cryptocoryne*. This is where I made my big mistake as you will see later. I filled the tank with tap water at a temperature of 78°. The two males were then netted, put in a bag and left by themselves for a day. The following morning I netted the plumpest female and introduced her to the tank. Almost immediately the males started to chase her and the spawning took place with the usual head-to-tail spinning of the barbs. I left them alone till about mid-day and then decided to take them out, but this is where the trouble started, for they immediately hid in the thickest part of the plants, and apart from pulling the tank to pieces, it was impossible to catch them; so rather than lose the eggs I decided to leave them until nightfall. When it was completely dark, I went up to the fish-house, found a net and held the top of the tank; then I switched on the light, but they were too quick for me, and were gone before I could get the net in. The only thing to do was to leave them until morning. The following morning I went up to have a look at them, and on looking into the tank was surprised to find that the fishes will only come out when I



Barbus untaenatus, the "red finned African minnow"

dropped it in the 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., 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-eighths 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 adult fish 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.



Exterior of Mr. Myers's fish house

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. by 9 in. The tanks used as spawning tanks for the smaller species of egg-layers 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 egg-layers, because he considers that it gives a more even distribution of heat. This makes for a higher percentage of hatching 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

AQUARIST AT HOME:

Mr. A. D. Myers

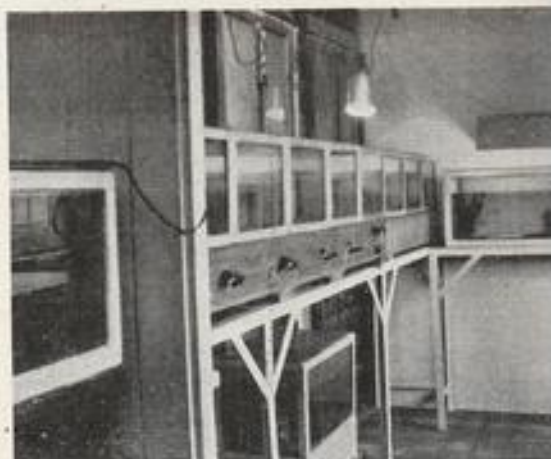
(BRADFORD)

Interviewed by JAS. STOTT

emergency measure a system of base heating by oil heat 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 power 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 minnow, tiger, nigger and cherry barb, *Naumostomus anomalus*, flame fish, bloodfins and fighters, whilst in the livebear section there are red wagtail, yellow wagtail and lemon moon 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.



Part of the house's breeding section, showing the base-heated aquaria

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.

Each season brings out certain happenings which are different from what has occurred before. If I can learn one thing each year I feel that the time has not been wasted. I will run through briefly the days when spawning occurred and will then pick out any special points for further description.

The first spawning with the fantail goldfish occurred on 14th April, but this was in an unheated greenhouse and not in the open pond where I usually spawn the fishes. Then there was a spawning in the open pond on 17th April, another on the 23rd April, and the last for that month the 29th. May brought two spawnings on the 23rd and 29th, while in June the fishes spawned on the 1st, 2nd, 5th and 10th. In July there were four, on the 10th, 17th, 27th and 30th. August had only one, the 1st. The weather as a general rule was not good and we had very little sunny weather after the first week in June until October.

Earlier Start

The spawning was spread out over a longer period than in 1949, when the first spawning was on 4th May, and the last on 29th June. It is interesting to note that in the last six seasons I had spawnings on successive days on sixteen occasions. I have now come to expect that if the fishes spawn one day they are very likely to spawn again on the following day. This is useful to remember, as I am able to remove fresh water plants for the spawnings and to make other preparations. I have also been helped on several occasions when my green tench have spawned in the pond before the fantails.

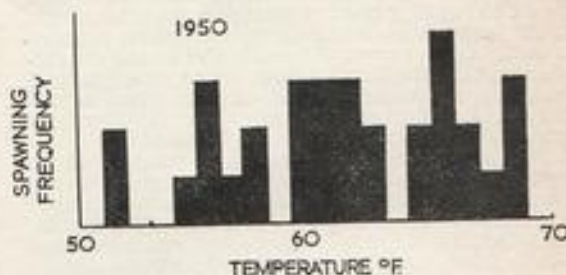
The weather at the time of the spawnings last year had been as sunny as I have been led to expect in previous seasons. The spawning in the middle of April was in one of the coldest weeks of the winter and spring. Can we learn anything from the effect of the weather on the spawnings in the last season? I am afraid that the weather was so varied that it does not appear possible to say with any accuracy how the particular weather affects the breeding fish. I must wait until last year I had formed the opinion that the weather did, in fact, play a major part in governing some of the spawnings, for I had found the fantails had often spawned at the commencement of a warm, sunny spell. This action this last season has, however, given me cause to change this factor.

What about Temperature?

Now I will deal with the temperature question. It has often been stated that the fishes will only spawn when the temperature of the water is up to a certain point and many breeders have thought that until the temperature is up in the water there is little chance of a spawning. Last year I am beyond doubt that the temperature of the water plays a very small part in the incentive to spawning. Breeders have sometimes been asked to make a careful note of the temperatures of the water when the fishes actually spawned. I am afraid that the more records of temperatures are kept the more bewildered one is apt to become. I will give a few examples. On looking back through my

breeding records of the past six seasons I find that in 34 spawnings I have had them at temperatures varying from 76° F. down to 51-55° F. There have been spawnings at most of the temperatures between 60° and 70°, only two at over 70° (one at 74° and the other at 76°), whilst below 60° there have been spawnings as follows:—two at 58°, one at 57°, three at 56°, one at 55°, one at 52° and one at 51.5°. For the thirty-four spawnings under review the average temperature is 62.6° F.

The more I examine the figures the more am I convinced that the temperature of the water plays a very small part in the conditions which govern actual spawnings. It therefore seems that the mere raising of the temperature of a 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



The randomness with which goldfish spawnings occur in the temperature range of 50-70° F is shown in this diagrammatic summary of the numbers of times the author's fishes spawned, at varying water temperatures, in 1950

much difference, as I have bred from fantails as young as eleven months and as old as twelve years. I do think though, 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 year old breeders, but have no objection to the use of older fishes.

The fertility 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.

The subsequent raising of 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 fortnight old at least twenty-four square inches of water surface for each one you are not likely to rear one fish to an inch in length. It does not matter either what food you use or whether you use aeration 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 time when most of my fry needed most attention I had 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 pond becomes clear overnight and the water is useless for purpose of feeding fry. If one had sufficient ponds 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 ends. The ponds would contain adult goldfishes all the winter and early spring. These fishes would eat any *Daphnia* 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 let into the pond as these would eat the fry. The pond should be covered to exclude pests such as water beetles and dragonfly. A pond of the size mentioned would rear for from 400 to 450 youngsters.

Although we had so little sunshine last year the fishes appeared to change colour fairly well and the water temperatures were often up in the seventies in the open pond. The young fishes which were good enough to add to the breeding stock will not be placed in the outdoor pond until May next year as I do not think that it is wise to subject the very young ones to the rigours of a winter whilst still so small. They are now kept in an unheated greenhouse. The 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 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. This all helps to keep up the stamina of the fishes and gets them through the winter in better condition. The spawning have again done well at the shows at which I was able to exhibit. I have tried to exhibit at those shows which provided a class for fantails and at three such I was able to obtain, at the first:—First, second, third and special for 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 and special for best cold water fish in the show. The class contained nine, eleven and fifteen entries in them, and so of the other classes which competed for the specials 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 exhibitor, 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 fancy goldfish. If one were able to keep the exhibition fishes 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 off fish and although these will grow again it will take so many weeks. A damaged fin will also mend in time but it is always without a knob or scar which may set a fish back in a show. Before an actual show it is an advantage if a fish can be placed in a show tank occasionally so that it may get used to the changed conditions. Often 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 the weather was so much superior.

Some New Views on the

Pencil fish and its Relatives

by

A. FRASER-BRUNNER



Pencil fish (*Nannobrycon eques*)

In a recent scientific study Dr. J. J. Hoedeman, of Amsterdam, has ascertained how the genus *Poecilobrycon* may be distinguished from *Nannostomus*, and has shown that there are fewer species belonging to these groups than we have supposed. It appears that sometimes young and old stages of the same species have been given separate names, while in others the incorrect name has come into common use. Thus the fish which most aquarists know by the name *Nannostomus anomalus* is really *N. beckfordi*, described by Günther in 1872, four years before Steindachner bestowed the name *anomalus* upon it. *Nannostomus melanurus* and *N. marginatus* remain unchanged. The adipose fin in these species is often absent, but when present is situated above the end of the anal fin.

The genus *Poecilobrycon* is now found to include only one species, *P. harrisoni*, which so far as we know, has not yet been seen in the aquarium. This genus is distinguished from *Nannostomus* chiefly by the position of the adipose fin, which is always present and is situated much farther back than the end of the anal fin.



Nannostomus trifasciatus

The most important change relates to the well-known pencil fish, which most aquarists know as *Poecilobrycon eques*. It is, however, so different from the preceding ones that Dr. Hoedeman has proposed a new genus to receive it. Moreover, several names, such as *eques*, *melanurus* and *ocellatus* which have been used in various aquarist books, are found to be based merely on phases or growth stages of the same species. The oldest of these names is *eques*, given by Steindachner in 1876, so the pencil fish should now be known as *Nannobrycon eques*. It is distinguished from all those previously mentioned by the shape of the air-bladder, which gets very narrow posteriorly, and is no doubt responsible for the slanting, tail-down, resting position so typical of the fish; connected with this is the second feature, the much enlarged lower lobe of the caudal fin, which serves to correct the position when the fish swims, as explained in this journal when discussing *Thayeria affinis* (*The Aquarist*, Vol. XIII, p. 126, 1948). It is interesting to note that here, as in *Thayeria*, the lower

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. aripirangensis*). This has only one black longitudinal band, no black edge on anal, which is red, and no adipose fin.

Nannostomus trifasciatus Steindachner. (superseding *N. erythrus* and *N. vittatus*). 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. trifasciatus*.

Poecilobrycon harrisoni 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.

Nannobrycon eques Steindachner. (superseding *Poecilobrycon 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.

Dr. Hoedeman's careful and well-illustrated paper appeared in *The Amsterdam Naturalist* Vol. I, p. 11, 1950.



Photos:

Nannostomus marginatus

B. & F.

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 40° to 70° 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 had with planaria. I had no plants, but a friend, who had a surplus of *Cryptocoryne griffithi*, *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 ones 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 3½ 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

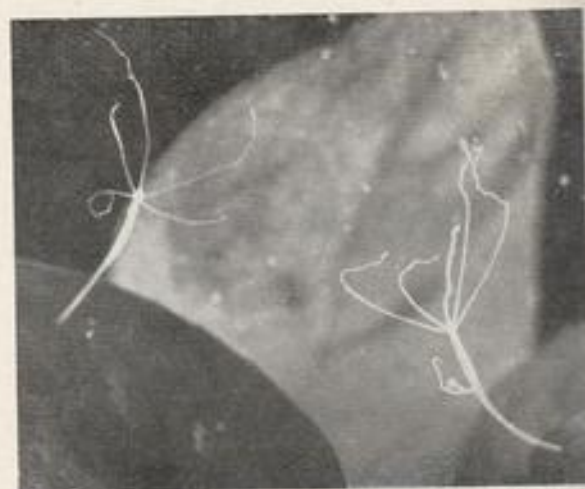


Photo :

Dorien Leigh

Two specimens of *Hydra*, enlarged, one bearing a bud

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.

THE AQUARIS

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 those species devouring other fishes, molluscs, worms and insects. Many species progress, during growth, from the first to the second and often to the third of these divisions. Fishes are omnivorous feeders by circumstance when there is scarcity of their natural prey.

The relative size of the mouth of a fish, its location and position, the shape and arrangement of its teeth, the shape of its body and the length and arrangement of its alimentary canal are some of the indications of the class of feeder with which we are concerned. Some of these pointers are readily visible, others are visible only by careful examination or even dissection. Examples of these characteristics come to mind in our native freshwater fishes—the large and protruding jaws of the predatory pike with its formidable teeth; the comparatively large mouths of the carnivorous salmon and trout; the ventrally disposed mouth of the omnivorous bream, which is a bottom-feeder, and the small mouth of the largely vegetarian carp. The carnivorous and predatory fishes have a shorter gut in relation to body length than the omnivorous and vegetarian feeders. The more predatory the species the quicker the food is bolted: the sense of taste plays but little part in the gastronomy of most fishes.

These generalisations hold good for the small tropical species kept in aquaria. The feeding habits of the smallest species may often follow those of its largest relatives, the difference being one of scale, and before proceeding to the practical aspect of feeding our tropical fishes we will briefly consider the various families with which aquarists are most concerned and the sort of food to which they are physically adapted in nature.

Barbel. All the smaller species met with in aquaria are, contrary to commonly accepted beliefs, carnivorous. Their natural food comprises crustaceans, water insects, worms and small molluscs. The largest barbel, the mahseer of India, Burma and Ceylon which runs to 120 lb. in weight, is also predatory and is for this reason often angled with a spear or minnow.

Catfish. Carnivorous and predatory, on water insects, shrimps and small fish. The aquarium species will nearly all devour fry with great avidity and will often attack smaller fishes than themselves. The ferocious tiger fish (*Hydrophilus lineatus*) of Africa is an entirely predatory species reaching a length of 30 inches and 25 lb. in weight.

Catfish. Most aquarium species are again carnivorous bottom-feeders, on larvae, worms, shrimps, and demersal insects, while a few such as the *Loricaria* species are vegetarians in addition. Many of the larger catfish are strictly predatory on other fishes and only occasionally omnivorous on crustacea and molluscs.

Dipodomys (Cyprinodontidae) are almost without exception carnivorous on surface and demersal insects, worms and pelagic fry. These fish, of which the *Aplochcheilus* genus is a particularly good example, have flattened heads and backs together with upturned mouths which enable them to feed at the surface without causing a disturbing ripple.

Gourami. Carnivorous and predatory. Water insects, shrimps 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-carps, 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.

Anabantids. Carnivorous on insects both surface and demersal. One or two aquarium species in this family—*Helostoma temminckii* (kissing gourami) in particular—need a proportionate vegetarian 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 this, reasons are two—ignorance and circumstances: the first of these will, it is hoped, no longer be valid for readers of this article so far, and 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 as much 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. They are not likely in nature to arrive shredded, 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 potassium 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 redder 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 "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.

Chironomus, 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 (*Enchytrae*). 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 worms 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 assist in retaining 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 Scrapings. 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 scrapings, 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 lightly 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 *Aplocheilichthys* and cichlids. Do not, of course, feed fish killed by insecticides or your fish will be poisoned quickly.

Ramshorn Snails. When these start to become a nuisance in a tank by being too numerous, squash the shells and dump them back in. They form a first-class natural wholesome food and are very 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 barrel, the supply will not be very great. In winter fish kills the *Daphnia* but the egg capsule of the female drifts off and the eggs hatch out in the mild weather of the 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 brine shrimp, pounded *Tubifex* and very finely minced earthworm. Many fry will take a hard-boiled yolk of egg squeezed into the water through a pocket handkerchief, also very finely scraped lean (raw) meat, liver, or heart.

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

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

RECENTLY some small fishes were imported by Messrs. Fish Tanks Ltd., under the name *Neolebias* sp. and the director, Mr. R. Dutta, asked me to ascertain the correct name. Fortunately, Dr. E. Trewavas has recently been studying the genus *Neolebias* 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 *Neolebias* (which Steindachner, who first proposed it, believed to belong to the family Cyprinodontidae or tooth-carps) and the older characin genus *Nannaethiops*. 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 Boulenger as *Neolebias trilineatus*, must now be known as *Nannaethiops trilineatus*.

This is a small and dainty characin from the Belgian 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 the 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 motif which is continued forward by a shining patch on the upper part of the eye. The space between the upper two black lines is wider than those below, and is yellow above the iridescent line. The second black line is the heaviest and passes into a conspicuous black spot at the base of the caudal fin. All the fins are colourless, but the dorsal rays of the pelvics 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 *Nannostomus* group. Like them, it has a small mouth, and requires therefore the smaller grades of *Daphnia* and dried foods. The breeding habits are still unknown, but we have hopes.

A. F. B.

Pike Rearing in an Aquarium

by ————— 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 fry were also included in the catch and they were unconsciously dumped into the can with everything else. On reaching home some of the catch was being examined for "cleanliness" when again the little fish were noticed. They were little more than half an inch long, very slender and silvery, with a dark longitudinal line. What could they be? Closer examination revealed that the lower jaw was unusually well developed and we assumed rightly, as time passed, that they were young pike, though at this age they had nothing of the characteristically prognathous appearance of the adult.

The fry at once became of more interest than the *Daphnia* and an effort was made to sort the young fish out. But though half a dozen were transferred to a separate aquarium they were all dead before nightfall, no doubt as a result of careless handling and crowding in the *Daphnia* can.

Next day we returned to the gravel pit suitably prepared with glass jars, balers and nets and this time a dozen young fish were caught and baled carefully from the net into a small jar without ever being out of water. These were carried home and given a 3 ft. 20-gallon aquarium to themselves. Though they were comparatively long, their general appearance, the date of capture and the availability of liberal supplies of food led us to the conclusion that they were not much more than three weeks old. Their subsequent rapid growth confirmed this conclusion.

Insatiable Appetites

Twelve such small fish seemed rather lost in such a large aquarium until their food was put in, when those twelve little shining bodies filled the tank with glistening activity. Their appetites were literally insatiable. Fortunately we had a plentiful supply of mosquito larvae and they crammed themselves full of these until their stomachs were so distended that they changed the whole shape of the fish. They swam around with more or less triangular protruberances.

After two weeks they had doubled their length and really were proper pike shape from head to tail, though the characteristic black banding of the first-year pike had not yet developed. The diet was supplemented from time to time with large *Daphnia* and white worms, and because of the enormous amount of food, the growth was very even and no one lagged behind. By the end of May they were two and a quarter inches long and all twelve had survived. Soon after this 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 regular diet.

At this stage we realised that twelve such hungry mouths were more than we could cater for, and a dealer friend who was annoyed by them relieved us of eight. He was anxious to keep them himself but sad to tell in a few weeks he found their appetites far too much for him and they came to an untimely end.

Through July and August the remaining four "made do" with earthworms and guppies, but, on returning from our summer holidays, we decided to fatten them up a bit, so we



One of the young pike described in the article, photographed by the author

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 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 scary and took some time to settle down but, eventually, wriggling earthworms proved irresistible.

Their body length is now five inches, which seems to us incredibly rapid 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 fair number to hatch, and the inroads 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 lithe, 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.

How to Make a

described and illustrated by



Front view of the tropical tank cabinet (lid closed)

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. for 10/- from a dealer. I did not glaze it 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

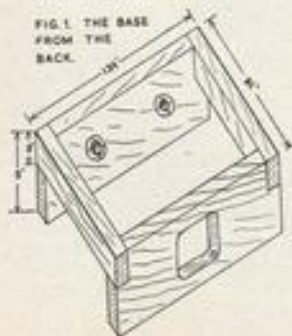


FIG. 1. THE BASE FROM THE BACK.

centred on each of its corners. The piece of wood in middle can be cut out with a hacksaw or a keyhole saw. Insert a bulb, push it through the hole, put your hand aft and fix it in the socket. You will notice that there is space under each end of the base; these spaces permit heated by the bulbs to rise round the tank. A few 1 holes in the front and back do the same job. The dimensions of the stand may be seen on the diagram. The width and length allow the aquarium to be inserted from top of the cabinet. Assemble the base with 2 in. 8 ga wood screws.

Cabinet Framework

For a tank of the size mentioned about seven feet of 2 1 in. wood and seven feet of 1 by 1 in. wood will be needed. Cut out 18 in. lengths and two 16 1/2 in. lengths of the 2 1 in. wood for the corner uprights. Do not attempt

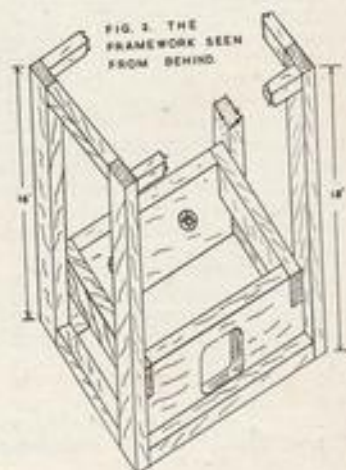


FIG. 2. THE FRAMEWORK SEEN FROM BEHIND.

cut 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 1/2 sides of the base, with three 2 1/2 in. wood screws, so that they jut out 1 in. to the front and back of the base.

The next job is to fix a fillet of 1 in. square wood round bottom of the base. The two 12 1/2 in. lengths, at the front and back, can be nailed to the base. Some sort of a joint 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 1 in. timber. Use halved joints and remember that

Television" Aquarium

J. P. VOLRATH

with slope from the back down to the front.

The top back rail of 2 by 1 in. wood on edge is made next. Once again I used halved joints, but these are probably inferior to mortise and tenon joints. The last piece of the framework to be completed is the top front rail. This does not have to take much strain so I made it from 1 in. square wood. The tops of the front and back rails must be planed to an angle so that the lid lies at its correct slant. The frame and base of the cabinet are now complete and most of the hard work has been done.

Covering the Frame

To cover the "prototype" I used plywood reclaimed from a rather better than average tea-chest. Nevertheless, this meant a lot of hard work with sandpaper. It is possible to buy new plywood offcuts now, and you might consider that the work saved is worth the extra expense. Alternatively hardboard or some other similar material might appeal to you. It is a good idea to measure the pieces required first and plan how you will cut them from the material available. This will cut down waste.

Stand the cabinet frame on the plywood and draw a pencil line round it. The line will give the size of the bottom accurately. Cut the piece out and, using $\frac{1}{4}$ in. panel pins, nail it to the bottom of the framework. Then, with the aid of a plane or sandpaper, make the edges perfectly square.

If the back is covered next, followed by the sides and then the front, there will be no plywood edges showing on the front. The back can be cut out in the same manner as the bottom. There must, however, be a door in it for the removal of bulbs. This door should be about 5 in. high and 4 in. wide. It can be attached in several ways, and which method is used will depend on the space behind the tank. The simplest is to hinge it on the framework at the bottom and fix it with a turnbutton at the top. Smooth off the edges of the back.

When covering the sides I put a sheet of asbestos in the cabinet to protect the plywood from the heat of the electric light bulbs. I held it in place with a few glazier's sprigs, but panel pins will do the job just as well. The sides are covered in exactly the same way as the back, but take extra care with the front and back edges. Make the grain run the same way, either horizontally or vertically, in both sides.

When the front has been cut out, tack it in place temporarily

Top view of the tank with cabinet
(lid raised)



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. This will enable the hole in the front to be cut accurately. Take the front off and draw four lines each $\frac{1}{4}$ in. inside the corresponding ones drawn with the front in position. 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 touches the pencil lines. Now you should find it quite easy to cut along the inner lines with a hacksaw. Clean up the hole with sandpaper.

The aquarium will stand an inch back from the front so a fillet $1\frac{1}{2}$ in. deep is required to touch the glass. It is best to use $\frac{1}{4}$ 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 $\frac{1}{2}$ by

FIG. 3. A HALVED JOINT



FIG. 4. THE ELECTRICAL CIRCUIT WITHOUT A THERMOSTAT.

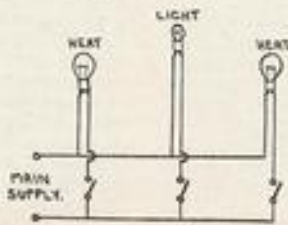
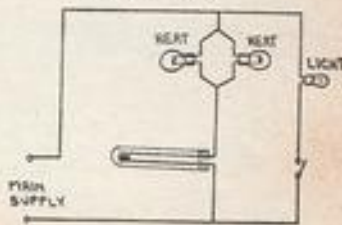


FIG. 5. THE ELECTRICAL CIRCUIT WITH A THERMOSTAT.



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 $\frac{1}{2}$ 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 nail it along 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 little 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 $1\frac{1}{2}$ 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 $2\frac{1}{2}$ in. deep and 1 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 aeroplane 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 9 in. to any sized frame. For an 18 by 12 by 12 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.

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.); Mr. W. W. Charman (Managing Director of Buckley Press Ltd.); Mr. R. G. Mealand, well-known aquarist; Mr. A. Fraser-Brunner, F.Z.S., and Mr. Anthony Evans, B.S. (Advisory Editor and Editor of *The Aquarist*).

The appeal for donations to the Fund is addressed not only to aquarists but to all members of the public, and

Fish present an ever-changing living picture—a constant source of pleasure



readers are asked to bring its existence to the notice of their friends. A descriptive leaflet is in preparation to publicise 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 be gratefully 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 if possible details of the hospital to receive the stocked aquarium to Hospital Aquarium Fund, "The Aquarist" 24, Wood Lane, Isleworth, Middlesex.

Rock Wall Splendour

by W. E. SHEWELL-COOPER



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

A garden pool is often found in such a garden, and rightly so, and there's nothing prettier than having the pool as a stone piece with flagged paths around and the rock wall above with colour as the background. Such a wall is what is called a retaining wall; that is to say, it is built against the bank and has all the soil behind it to keep it steady and to provide an extensive root run for the plants that are to make it beautiful. There are what are called dry 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 such walls that I am writing now.

Stones and Bedding

Various kinds of stone may be used for building a rock wall. I much prefer, however, the fairly flat natural-looking roughish stones which are from three inches to eight inches thick. These are laid properly on top of one another, the spaces in between being packed with a John Innes Peat Compost. Readers who do not wish to make up their own soil mixture can buy this compost ready made—please furnish addresses of suppliers if necessary.

Always leave large enough cracks between the stones so as to accommodate the roots of the plants without cramping them too 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 then, though looking as if it was built perpendicularly, will, in fact, slope back just a little. It helps matters, of course, if you have a solid base so that there is no chance of sinking and it is for this reason that some gardeners lay the first two courses of rock-work in cement. They then wait until the base has set properly before the construction of the wall is completed.

Try and get in a stock of plants so that as the wall is being built the planting may be carried out. It is far better to get the roots spread out as the stones are put into position than to try and poke them in weeks afterwards. Arrange, if possible, a successive display—it is better not to have the wall almost in April and then to look rather bare in June or August. It is possible to have a wall furnished with plants that give a complete range of colours, i.e., red, pink, yellow, orange, blue, white, rose, and lilac or else if you prefer, you can have a wall aflame with one colour only.

Let us examine a number of plants and choose those which are easy to grow and inexpensive to buy. The *Primulas*, blues, mauves and reds are in flower in April and May. The *Campanulas*, most of them blue, though there are a few white, are usually at their best from June to September. The *Dianthus* varieties in reds, pinks and whites are good from June to August, while the *Erysimum*, yellow and lilac, are a feature from April to July. Don't

leave out the *Helianthemums*, red, pink, yellow or flame, for they are in bloom from June to August. Include if you will, the lovely *Lithospermum* because of its beautiful blue flowers which are at their best from June to early September.

The baby *Phloxes* are in flower in May and June and may be had in pinks, mauves and whites. The *Saxifrage* varieties give that lovely mossy appearance and bloom from April to late July most years. Plant both the *Sedums* and *Sempervivums*, which flower largely in July, and remember the various *Thymes* because of their scented foliage. The blue and pink *Veronicas* flower from June to August most seasons, while for an orange splash have that awkwardly named plant *Zauschneria*, which blooms in August and early September.

Some who are reading this will say—"I have an old wall already—what can be done about this?" Well, here the problem usually is to make the necessary cracks with a hammer and chisel in order to be able to insert the compost. If the wall is fairly dwarf, its top can be made into a small strip bed, as it is called, by the judicious use of stones, and then the John Innes Compost can be placed in position to the depth of about six inches and plants can be grown here. I have known however, the necessary cracks and crevices to be prepared, the soil to be filled in and then suitable annual seeds to be sown where desired. The following annuals are quite suitable for the purpose: *Brachycome*, *Dianthus Hedderwigii*, *Felicia*, *Bergerima*, *Nemesia*, *Ursinia* and *Eschscholtzia*. The seeds can be sprinkled over the compost in April and can be lightly pressed into position. It is better to sow few seeds so as not to have to thin rigorously, and whatever thinning is done must take place when the seedlings are very small indeed.

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 a very light, thin oil should be used for this purpose. I always use typewriter oil which is excellent, gives no trouble and a small bottle, used once a week, lasts a very long time indeed.

RAYMOND YATES

by L. R. BRIGHTWELL

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 heart 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 carcase 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 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 lit in a wall, as all aquarium tanks, no matter where, should be. This is the only way to concentrate lighting and the visitor's 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 question adapts itself to the surface film. Here children can see more detail the private lives of insects they have already seen 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 screen 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 pot snail embryo looks upon the screen) and finished up with "George" as a grand finale. George is a demonesque nymph and he made his bow magnified to about twice the 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 little marine tank the property of Mr. R. Fitz-Gerald. 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



Photo :

John Clegg

A practical lesson in "pond-hunting" in the grounds of the Haslemere Educational Museum

series of field biology classes of four days each was started and amongst the many attending were students from Bishop Otter Training College, Chichester, the Forest Institute, Portsmouth Teachers' Field Club, Swanley Horticultural College, and the Leicester and Litchworth Museums. In the recent evacuation period over 4,000 children used the museum, and an average year sees some 5,000 young visitors representing about 170 parties. Support comes from many quarters.

Members paying ten shillings per annum are a great

stand-by, and this carries such privileges as free admission and the use of the library. The ordinary admission is 3d. for adults (it is worth far more), 2d. for children, whilst Scouts, Guides, etc., in uniform, enter free. But with all this it is not easy to keep abreast of modern rates of living and every possible support is needed and deserved. But come fair or foul the Haslemere Educational Museum is likely to survive all hazards. It is self-supporting and therefore self-respecting . . . and above all it is very much alive!

NEWS FROM THE 1000 AQUARIUM:

An Unsolved Problem

by L. R. BRIGHTWELL



Night-marauding marine dogfishes

AT a recent Home Counties inland aquarists' show there were four entries in the marine aquarium class; the year before there had been only one. Every club should be able to count nowadays upon at least half a dozen marine enthusiasts. Private investigators have done somewhat almost as whole-time marine biologists to solve some of the endless mysteries connected with quite common sea animals. One such problem is now exercising naturalists

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 indeed 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 operculum, if one uses a very sharp knife, so it does seem likely the dog fish neatly shears away this tit-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 carcase 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

THE Belgian Congo has come very much into the aquarium limelight during the past few months. We have had the curious inverted catfish (*Synodontis nemurus*), the beautiful little characin *Nannothrips nana* and its larger relative *Alestes longipinnis*, all from the Congo.

Another very interesting immigrant from the Congo was recently brought to our notice by Mr. Kenneth Cooke, of the West Surrey Club, who sent a specimen to the British Museum for identification. This was a characin also, but it would be a pardonable error to mistake it for a garfish, as will be seen from the accompanying sketch. The long jaws are armed with close-set rows of teeth are of the saw-fishing type and this, coupled with the streamlined body, suggests that it is in the habit of chasing the fry of other fishes. Perhaps this is the reason why Mr. Cooke was unable to get his specimens to feed, for they refused the ordinary live-foods. But a Dutch correspondent told him



Belonophago hutsebouti

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 *Belonophago hutsebouti*. A second species, *B. tinanti*, 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 "... spent an idle day describing their appearance and forms together with the art of keeping them as pets, dividing the several matters into paragraphs, ..." 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."¹

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 the sun; or it may 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 it 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 in the water, most of it can be removed by holding the finger under the tap and squirting 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. So may be added: three teaspoonfuls of sodium chlor (common salt), one of potassium sulphate and one magnesium sulphate, to every ten gallons.

Fresh water may be either neutral, acid, or alkaline. The neutrality of water, 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 some would have us believe. The pH value is defined as "... a number used to express the concentration of ionised hydrogen 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 water is a constituent contain free, positively charged hydrogen (H⁺) ions and negatively charged hydroxyl (OH⁻) ions. When the numbers of these two ions present in a liquid are exactly balanced the liquid is said 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."² Absolute neutrality has a pH value of 7.07 (usually taken as 7.0). The addition of acid increases the H ion concentration, consequently the pH of all acid solutions is less than 7.07. The addition of alkali increases the concentration of the OH ions, and decreases that 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 -0.3 to 14.5. Natural waters are seldom more acid than pH 4, more alkaline than pH 9. Rain water usually varies between pH 6.5 and pH 6.8, according to the locality. In industrial districts the pH value is likely to be low as the water absorbs acid gases from factory smoke and the like. Aquarium 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: 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.I. "6676" Indicator or Johnson's Comparator Test Paper

(Continued on next page)

¹ Chang Ch'ien-te, *The Book of Vermilion Fish (Chu sha yu p'u)*. A little monograph, on the care and management of goldfish in bowls was written in 1596, but remained unpublished until 1911. A copy reached Cambridge in 1946, and my friend, Dr. A. C. Moule, kindly furnished me with a translation. Chang's text, together with Moule's translation and much other matter about goldfish in China was published in *Tsing Pao* Vol. XXXIX, Liv. 1-3 (Leiden, 1946).

² T. Tusting Cocking, "pH Values: What they are and how to determine them" (British Drug Houses, London, 1938).

may be used. The pH of the water is indicated by certain color changes.

In theory, then, it is easy enough to test water for pH value. In practice, however, complications arise; for water extracts alkali from glass (with a consequent rise in the pH value of the water in a new aquarium) and even in an old aquarium, from which the alkali from the glass has previously been extracted, it is necessary to take into consideration that as water at a low temperature is saturated with carbon dioxide, and some of this is lost as the temperature

rises, there is a resulting increase in the pH value of the water. Finally, there is a greater acid content in the morning than at the end of the day, after the plants have had the opportunity to absorb the carbon dioxide. This means that as the pH value of water rises with a rise in the temperature and progressively during the hours of daylight, to obtain the most accurate result, tests for pH should be taken at the same temperatures and allowance made for the length of time that the aquarium has been lighted.

To be continued.

Baby Terrapins

by J. FRANCIS

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

Although often recommended for the tropical aquarium this is not the best home for them; they are best kept apart from fishes, whose fins they may nip. They do need warm water, however (70°-80° F.), and in unheated surroundings they cease to feed and very soon die. Terrapins are omnivorous, and their quarters should be arranged so that a nest of sand (which may be planted with pincushion moss) or stepped stones, provide an exit from the water for resting—a favourite pastime of the baby terrapins. A suitable mat of bark on the water can also be used. The water must not be more than six inches in depth, and old worn or damaged aquaria make useful aqua-vivaria for them.

Just as important to warm water is the provision of overhead lighting. In winter an electric lamp should be switched on over the terrapins for several hours each day, and in summer every opportunity of placing the animals in the open in sunlight should be taken. Water plants weighted with lead strips, and floating plants such as duckweed can be provided, for although mainly carnivorous,



Quite a small glass dish makes a home for these youngsters basking on a stone

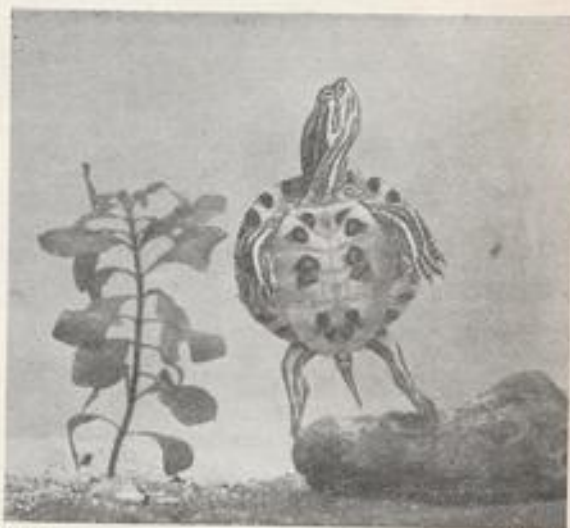


Photo:

W. S. Pitt

The under surface of this elegant terrapin is seen in a graceful below water pose

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 shrimps and garden wood lice. 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 suppurating 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.

News and Reviews

HOLLAND

LAST November's issue of *Het Aquarium* opens with an article on that peculiarly shaped Gymnotid fish *Eigenmannia virescens*, a species 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 dorsal fin nor 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. virescens* 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 aquaria. 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 re-imported to Holland. According to its importer the waters 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 *Ambulia*, 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 poising against the glass where, with total loss 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 *Hygrophila polysperma*, 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 (*Tanichthys 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 silvery with eleven vertical bars on the long elegant body. There is one dark spot on the tail and there are golden spots on each side of the upper jaw. In behaviour it resembles *Dan malabaricus* but it has been noticed to be predatory towards 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 a similar body in Holland. 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 deficiency of the vitamin. The fishes require plenty of natural food; body-builders together with the vitamin to take them past the first difficult post-hatching stage.

A description was given in the December issue of the Rotterdam Aquarium Exhibition held in the Rotterdam Zoo. This event attracted over 40,000 people, with thousands 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 has received from visitors. 160 tanks from five gallons to 500 gallons capacity were beautifully displayed in a hall the middle of which had a natural shallow pond of spacious design containing flamingos and other aquatic birds, adding to the impression of being in tropical surroundings.

W. J. VAN DER KOLK

U.S.A.

POPULARITY of water fleas (*Daphnia*) as live food means that tried methods for culturing them are always in demand. Here is a method described in 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 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 cloth. Stand the filtrate in the cleaned container for another four to six days; it should develop a dark reddish brown colour, and is then 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. Cultures for use are kept in one pint jars, each started off with five *Daphnia* placed in the medium. It is claimed that the medium lasts about eight weeks (it loses its dark colour when used up) and that ten pint jars produce about 750 young fleas a day. These must be removed daily with a glass pipette to keep the cultures going, and if desired, the young fleas can be grown to a larger size in separate jars for five or six days.

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

period of several weeks until about two-thirds of the tank water is replaced is recommended to secure good growth of *Bombus*, *Cabomba*, *Ludwigia*, *Cryptocoryne* and *Myriophyllum*, all of which like a fairly soft water.

The best method of removing snails from a tank in which they are becoming a nuisance is to bait a net with lettuce leaves and place it below the water surface. To this tip, given in the same journal, is added the reminder that the snails trapped in the net when it is pulled out can be crushed to provide a useful food for fishes.

BELGIUM

THIS month sees the first issue of a new aquarium monthly in Belgium—*Notre Aquarium* (M. Luc Copin, 73, Rue Gretry, Liege; price 2/6). Its contents include articles on swordtails and their hybrids, *Barbus semipinnatus* and replies to aquarists' queries. In lay-out and typography it is very similar to America's *The Aquarist*, and being the only journal published in French from Europe, it should find a wide circle of readers as a self-titled "Revue mensuelle pour la vulgarisation de l'aquariologie."

NEW ZEALAND

AN unusual malformation of goldfishes was reported in an issue of *The Dominion Aquarist and Pondkeeper* last year. One breeder found that several of his fishes had blister-like growths on the under sides of their lower fins. As these fishes took in mouthfuls of water so the blisters ballooned out and then deflated in rhythm with their respiration. The structures do not appear to be due to disease but are probably abnormalities that have arisen during breeding just as telescope eyes and lion heads are. In view of the position of the "blisters" it is possible that they may be related to thyroid gland disturbance, and it would be interesting to know if giving iodine by feeding with fresh marine fish brings about any change.

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 biochemical research. These antibiotics such as streptomycin, chloromycetin, gramicidin, aureomycin, have not yet been applied as cures for fish diseases sufficiently thoroughly for their value in the aquarium to be assessed, although several enthusiastic reports have been made from aquaria, where they are more readily available to aquarists than in shops.

Last month an interesting note on the use of penicillin in the aquarium appeared in *Nature*. Dr. H. K. King of the University of Liverpool reports using it successfully in the treatment of an epizootic infection of young axolotls. Many deaths of eight weeks old specimens occurred two days after an unusually large number of people had visited the laboratory. Penicillin was added to the aquarium water—50 units to a millilitre (2,200 units/gallon)—and after 24 hours, when the losses ceased.

Similar losses of edible frogs in a shallow tank were cured by adding 20 units of penicillin to a millilitre (2,200 units/gallon) of the water. In both cases a diplo-diplococcus was observed microscopically in the animals that may have been the causative organism. Antibiotics are not cheap and are difficult to obtain, but with further trials they may prove to be highly useful curative agents for certain bacterial ailments.

OUR READERS

Write—

Oxygenation of Water

WITH reference to your Editorial in the November issue wherein you quote the findings of Mr. James Atz and Mr. Mogens Hojgaard, the results of whose experiments must 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 equally be 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 introduced in this way 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, 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 aquarist'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 aquaria 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

My son was persistently asking me for some fish in a tank, and on mentioning the subject at work, I found that one of my lads made a hobby of fish-keeping. On asking him what they were fed on, he told me among live foods were the Infusoria for small fry and *Daphnia* for larger fish. I found that Infusoria were cultured in a jar, with water, potato and banana skins, which to me is impracticable, messy and not a clean method.

With the facilities at my disposal in a Bacteriological Laboratory I thought that a few experiments could be tried to find a better method of culture. In the first place I cultured the water that was brought in, to prove the presence of bacterial organism (on which the Infusoria feed) and found by sugar fermentations methods and chemical tests that *Bacillus aerogenes* appeared to be in highest concentration. The next step was to produce a pure culture of the organism on plain agar, and there was my inoculum ready for use. The point then was to prove that the Infusoria (from pond water), liked this in a pure state.

Using four boiling tubes of ordinary tap water these were my findings after a few days:—

1. Water + Infusoria : no growth
2. Water + Infusoria + Starch : growth
3. Water + *aerogenes* + Infusoria : growth
4. Water + *aerogenes* + Infusoria + Starch : maximum growth

Showing preparations from these tubes and from tube (3) in particular under the microscope (by the hanging drop method), I was told that the Infusorians were the largest that the lad had ever seen. The starch appeared to help quite a bit and I added this in lieu of the potato that they seemed to relish.

Offering this as grounds for further work, also as a starting point for thought on the matter, I make the suggestion that many of our friends could go deeper into it.
G. E. FARRIS, A.M.I.L.T., Hadleigh, Essex.

Combing out Algae

I have experienced considerable difficulty in removing the algae growing around the sides of my pond I have been using an ordinary large comb (9 ins. to 12 ins.) for the job. This has been found much more effective than a stick worked around the growth which I believe is the method usually employed to remove algae. I am of course aware that algae is a good food for fish but it can prove very unsightly in an ornamental pond when it turns brown.

F. PALMER, E. Dulwich, S.E.22

I find the easiest and quickest way to remove blanket weed from the roots of floating plants is to hold the plant in water and comb the roots with a pocket comb. All the weed gathers on the teeth of the comb and the roots are not harmed.

G. MILLWARD, Oldbury, Nr. Birmingham.

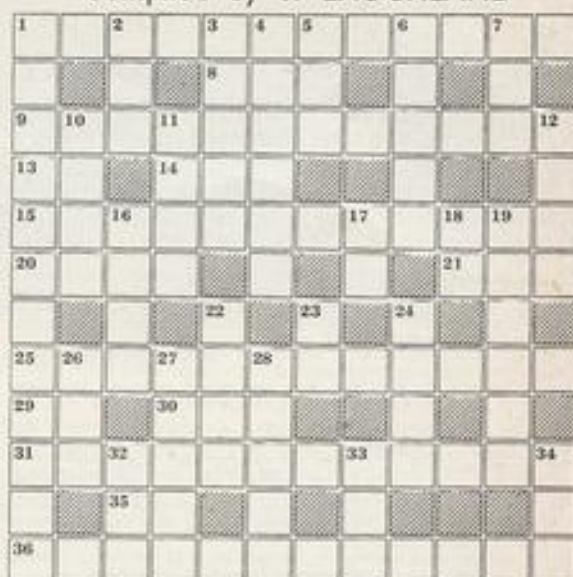
Junior's Letter

ALTHOUGH I have kept common goldfishes and fan-tails for some years past it was not until last February that I was bought a tropical aquarium for my birthday. A female swordtail produced many young and I was soon crowded out with only one tank. At last, in desperation, during a day when the water in my pond was fairly warm I released several very young swords in it in May. I brought them in during late October and placing them in my aquarium I was surprised to see that they were twice the size of their brothers and sisters left in the tank. Their scales were much brighter and the swords of the males at least twice the length of the others.

A copy of *Casson's Book of Tropical Fishes* has been sent to G. D. Owen (aged 13) of Aylesbury, Bucks, for the above letter entered in our Junior's Letter Competition.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- 1 Popular tropical water plant (12)
- 8 This Latin prefix means three (3)
- 9 Underground cell begins this plant (12)
- 13 Artistic distinction of *Ranunculus* (1, 1)
- 14 Conger, perhaps (3)
- 15 This order includes carps and characins (12)
- 20 A lovely fish or cleaner (4)
- 21 Consume a varied tea from great fish (3)
- 25 *Trichopterus leeri* (5, 7)
- 29 A corps of beam (1, 1)
- 30 "Arm" of the water boatman (3)
- 31 More commonly lighting to the aquarist (12)
- 35 The acidians provide the consequent in a co-relation expressing quantity, degree, etc. (2)
- 36 Fish fossils (12)

CLUES DOWN

- 1 Order of toothed carps (12)
- 2 Marine flat-fish (3)
- 3 British fish-eating animal (5)
- 4 April ox loses its head, becomes confused and tedious (6)
- 5 "Ich" produces eruption (3)
- 6 All urchins are not sea urchins, but contain the roll or pitch (5)
- 7 Run for water vessel, perhaps (3)
- 10 The *Acara* should provide this skin eruption (4)
- 11 To the breeder this sounds like a fruitful union (4)
- 12 To send out (4)
- 16 Harp's hall home upset ran away from *Ranunculus* (4)
- 17 Sire of *Paschax Mackii* (2)
- 18 This means you! (2)
- 19 King of fishes (6)
- 22 Bivalve shellfish (4)
- 23 End of the imago (2)
- 24 Aquarium planting medium (4)
- 26 Grown up eiver (3) (4)
- 27 A sea current (5)
- 28 My rig is upset and dirty (5)
- 32 Harry returns a note (3)
- 33 The whole of the *Allis shad* (3)
- 34 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. (d) Sulphate of lime.
2. How many teeth has a goldfish? (a) Two. (b) Four. (c) Eight. (d) Sixteen.
3. On which Cyprinodont do the scales normally stand out, like a fish with dropsy? (a) *Pachypanchax playfairii*. (b) *Rivulus cylindraceus*. (c) *Fundulus pallidus*. (d) *Epiplatys chapera*.
4. The popular name of *Carassius auratus* is: (a) The goldfish. (b) The rudd. (c) The crucian carp. (d) The roach.
5. 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) Gouramies. (d) Paradise fish.
6. 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. P. 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. Perrett of Mid-Somerset Aquarist Society at the December meeting of the **Bristol Aquarist 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 Aquarist Society** staged some tanks at the annual local show of Chester Cage 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 Aquarists Society** heard a most interesting and instructive talk by Mr. Dacre 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 of 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.

ERTH and District Aquarists' 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, Berkeley Avenue, Bexleyheath, Kent, and to accommodate the expanded membership the new meeting place is The Coffee Tavern, Nudgey Road, Belvedere, Kent, with meetings on the second Monday of each month at 8 p.m.

SPECIAL evening meeting during December for the **East London Aquarists' 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 Cairo and visits to many "fairy-tale towns." Many slides were shown of the wonderful and sometimes weird inhabitants of local seas, of the sharks which abound there and of the beautiful coral fishes. Officers of the Federation of British Aquatic Societies and the Committee of Ilford Aquarists' Society were present by invitation and all joined in a hearty vote of thanks to the lecturer.



Photo:

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

INAUGURAL meeting of the **Greenock and District Aquarist Society** was held in November last, when over three dozen members were present. A short talk on the simple principles of aquarium keeping was given, following which many questions indicating enthusiasm of the audience were asked. Officers and a committee were elected. Meetings are to be held on the third Thursday of each month at the Y.M.C.A. Hall, West Stewart Street, Greenock, and the secretary is Mr. D. O. Carr, 13, Finnart 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, Ilford Broadway. Secretary is Mr. J. P. Keene, 11, Southwold Drive, Barking, Essex.

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

TWICE monthly meetings, on the first and third Tuesdays of each month, are now held by the **Hornsey and District Aquarist Society**. Membership is to be limited to fifty, and subscriptions are raised to 10/- (adults) and 5/- (juveniles) a year.

NEW headquarters of the **Ilford and District Aquarists' and Pondkeepers' Society** are at Newbury Hall, behind the St. George Hospital, Perryman's Farm Road, Newbury Park, Ill. 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, 27, Elgin Road, Seven Kings, Essex. A for the best Home Aquarium was awarded to a member winner of society's competition held last November.

MEETINGS of the **National Aquarists' Society** are now held at the Horticultural Hall, Westminster, normally on the second Monday of each month at 7.30 p.m. Recent society activities have included a lecture by Mr. D. Law on fresh water plankton, a lecture by Mr. W. H. Cleveland on aquatic plants, and a table show to be held this month. Plans for the society's 1951 show are progressing.

KINGSTON and District Aquarist Society is to hold meetings twice monthly, on first and third Thursdays, during the year. In addition to lectures and table shows the planned activities for 1951 include visits to breeding establishments and public aquaria, *Daphnia* hunts and, it is hoped, several film shows.

A GROUP of aquarists from the **Walthamstow and District Aquarists' Society** visited the **Leyton Aquarium and Pond Society** as a "brains trust" at a recent meeting. A table show moon plays was also held. Two furnished aquaria were exhibited at local church bazaar for publicity purposes.

FIRST annual general meeting of the **Nelson and District Aquarists' 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 ward of the Birmingham General Hospital by the **North Birmingham Pond and Aquarium Society** is to take place towards the end of this month. A junior's section has been formed in the society and meetings are now held at Bepron's Cafe, Perry Barr, Birmingham. Aquarists in the area are invited to attend a lecture on the breeding-rearing of popular tropicals on 31st January.

REMOVAL of the meeting place of the **Plymouth and District Aquarists' and Pondkeepers' Society** to 50, Ebrington Street, Plymouth is notified. The secretary's address is Miss D. N. G. 21, Lester Close, Higher Compton, Plymouth, Devon.

SEVEN aquarium societies in Scotland are listed in the **Scottish Aquarium Society's** November 1950 *Scottish Aquarium News*. An article on the Madagascar Lace plant mentions that Glasgow one of the localities where this plant can be seen growing in profusion in the Glasgow Botanical Gardens, and the soft slightly acid water there seems to suit it very well. At the society's meeting early this month Mr. M. Campbell was scheduled to speak on gadgets for the aquarist. Next month Mr. B. C. Kos is to give some personal observations on breeding.

AT the annual general meeting of the **Scarborough Aquarist Society**, "Scalare" Miss A. C. P. Fenton, 57, Eastborough, Scarborough was elected secretary. Over thirty members have now joined the society.

ESTABLISHED last year, the **Smethwick and District Aquarist Society** now reports good progress with increasing membership. Talks have been given by members and outside lecturers are engaged this year. A library of aquatic literature has been started. Popular meetings have included a table show of guppies and a table film show.

A.T.A. Annual Dinner

The annual dinner of the Aquatic Society of London held last November in London proved a most successful event. Many well-known names were present, and in addressing a toast, Captain L. C. Betts, Chairman, stressed the importance of the work of the Association, and that any other factor at this stage, the knowledge that this side of the Atlantic should be of more interest to new members to join. Mr. H. G. Gilling responded and took the opportunity of thanking Mr. Smith for his efforts in organising such an excellent evening for A.T.A. members and their guests.



Photo:

Cecil Walden

News from Aquarium Societies—continued

Members of the **Southern Amateur Aquarists' Society**, the secretary of which is now Mr. C. H. Gilling, 4, Normanton Street, Brighton, Sussex. A fully furnished aquarium supplied from members' voluntary donations is to be located in the children's ward of the Brevendon Hospital. Last month an interesting lecture on Infusoria and crustacea with illustrations was given by Mr. Nickolls.

An interesting outing of members of the **Tyneside Aquatic and Biological Society** last year was a visit to the public aquarium at the Dept Marine Laboratory. Feeding time was observed and the various ponds and tank servicing apparatus inspected. An octopus, a two-year-old lobster and a five foot conger eel were popular exhibits.

Successful 1950 evening meetings of the **West Greenwich and District Aquarium and Pondkeepers Association** were held up with lectures on livebearers and cglayers, with a discussion on difficulties in breeding fishes in the latter group following. In December a lecture on line-breeding preceded the society's annual meeting at which new officers were elected.

Members announced for this month by the **West Bromwich Aquarists' Society** in their circular are on fish foods and electrical equipment. Thirty-seven members are now on the roll. Meetings are to be held every first and third Monday each month at 7.30 p.m., 11, Michael Street, West Bromwich. The secretary is Mr. A. S. Toward, 6, Florence Grove, Stone Cross, West Bromwich.

FEDERATION A.G.M.

The annual general meeting of the Federation of British Aquarists Societies coincided with the twelfth anniversary of the Federation's foundation, and the advances made through the years were the subject of favourable comment. Some of the original documents of the Federation that had been in the keeping of East London's society were presented to the chairman and read to delegates. Mr. Gilling took the chair from Captain L. C. Betts, who is retiring after two years of office; he was given a hearty vote of thanks. Mr. H. Gilling was appointed treasurer and Mr. S. T. Jelly appointed secretary. Mr. R. O. B. List remains as secretary. Substantial progress has been made in 1950, twenty new member societies having affiliated with several others awaiting acceptance. Further progress for show fishes have been evolved and adopted from the work of the League and Show Standards Committees, and a new show classification for aquatic plants prepared. The F.B.A.S. Information Stand has been valuable work at the major shows held last year, and the greatly increased demand for judges and lecturers had been met, matters for which appreciation was voted the thanks of the Federation.

FINS AND FEATHERS

The unfortunate advent of inclement weather marred the Water Life Exhibition organised by the F.B.A.S. at the Cage Birds Show at Olympia in London last month. Difficulties were experienced in transporting crates and labour troubles were believed to be responsible for the unfinished appearance of the stands. The Exhibition received better support from traders, only two aquarium suppliers having been present there.

AQUARIST SOCIETY OF INDIA

WE have received bulletins (*The Indian Aquarist*) from the Aquarist Society of India (251, Hornby Road, Bombay 1), and the contents indicate that India possesses a very active and keen group of aquarists. Meetings are held regularly and large attendances (70 to 100 people) are reported. In the November bulletin is listed thirty-five species of water plants found locally and exhibited at a recent lecture. Hints are also given on making collections of pressed (between sheets of blotting paper after their immersion in boiling water) and preserved (in 5 per cent. formalin) plants. The society has started a small store for the sale of aquarists' requisites and has marketed its own dried fish food. As an article in the bulletin discloses, Indian aquarists have the advantage of being able to collect many interesting exotic fishes from local waters, including barbs, gouramies, glass fishes and puffers.

New Societies

AQUARISTS in the Catford (London, S.E.6) area are forming an organisation to be known as the **Catford Aquarium, Reptile and Pondkeepers Society (C.A.R.P.S.)** Acting secretary is Mr. J. W. Davies, 40, Sandhurst Road, Catford, 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. Aquarist Club** are invited to communicate with the secretary, Mr. A. Tobin, 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. R. E. Billings, Trevelga, 7, St. Gothard's Road, West Norwood, S.E.27.

Crossword Solution

M	Y	R	I	O	P	H	Y	L	L	U	M
I	A	T	R	I	U	R					
C	R	Y	P	T	O	C	O	R	Y	N	E
R	A	E	E	L	C	M					
O	S	T	A	R	I	O	P	H	Y	S	I
C	H	A	R	X	A	E	A	T			
Y	R	C	G	C	G	L					
P	E	A	R	L	C	O	U	R	A	M	I
R	E	O	A	R	I	O					
I	L	L	U	M	I	N	A	T	I	N	G
N	A	S	M	L	L	A					
I	C	H	T	H	Y	O	L	I	T	E	S

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1 (b), 2 (c), 3 (a), 4 (c), 5 (d), 6 (b), 6 marks—There's glory for you! 5 marks—Excellent; 4 marks—Very good; 3 marks—Good; 2 marks—Fair; 1 mark—Poor; 0 marks—Lchabod!

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- ★ 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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WANTED WIRELAND, Mendip and other stone, suitable for ponds, lawns, walls, paving. London stock to suit all requirements, large and small parcels. Descriptive price list on application. Fitzpatrick, Garden Stone Merchants, 455, Old Ford Road, London, E.3. Telephone 2891.

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WANTED over aquarium with Black Magic Aquarium Cement—the best—10/- per lb. Post paid. 1s. 8d. a pound, postage extra. Herdmann, 25, Seagrave Street, Bishop Auckland.

WANTED aquatic plants. Spatterdock 3s. Alisma natans 9d. each. **Wanted** calliostichus 1s. per bunch. H. A. Perry, 563a, West Street, London.

WANTED plants, 3s. dozen, post paid. R. L. Yonge, 46, Kingsway Gardens, Glasgow, W.2.

WANTED 18 x 10 x 10 tanks. Rust proofed one-inch iron and **Wanted** steel. Almost new. Reflector and heater with each. Plants included. Few other sizes. Wood, Burnside, Weeton, Leeds.

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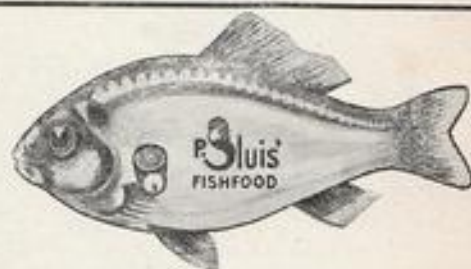
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