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AND PONDKEEPER

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Editorial

TOWARDS the end of the article on experiments with aquaria by Dr. F. N. Ghadially in this issue occurs a note concerning the Animal Cruelty Act and its application to experiments on fishes by aquarists. Technically an offence is committed when any unlicensed person carries out any type of experiment with fishes, even when simple investigations on the effects of administering hormones in food, for example, are undertaken, since fishes (as vertebrate animals) are included within the scope of the Act. However, it is considered unlikely that the penalties of the Act would be exacted for unlicensed work with fishes unless instances of cruelty deliberately imposed under the guise of an experimental investigation became known.

It is interesting to speculate upon the distinction between experiments with a fish that may cause it discomfort or even bring about its death, to elicit new information, and the treatment given by fishmongers to eels, for instance, which often are sliced alive before sale. It is the attitude of the public, which in general is not greatly disturbed by the fates of the lower vertebrate types but which has its vociferous sections for the "defence" of animals such as cats and dogs, that determines what is condemned and what is condoned. And consistency is not a prominent feature of public opinion.

ONCE again the Federation of Northern Aquarium Societies has, with last month's British Aquarists' Festival, demonstrated that there is an approach to exhibiting fishes and aquaria to the public other than that to be seen in the usual type of display made with rows of benches. The new approach has been a successful one, and when the pictures included in this issue are examined it should be remembered that each group of entries from a society consisted of aquaria and fishes individually as well as collectively in competition with other society entries, so that none of the gains to the hobby usually associated with formal "showing" was absent. The benefit of this exhibition technique lies in the brighter and more stimulating presentation that it permits and encourages.

The Experimental Approach to Fish-keeping

by Dr. F. N. GHADIALLY

IN the previous article it was stated that in many biological experiments we divide up our animals into an experimental and a control group. The whole basis of our latter interpretation of the result depends on the two groups being exactly alike in every relevant detail except, of course, for the treatment under investigation received by the experimental group. Unless this can be achieved one can argue that the difference between groups A and B at the end of the experiment was not produced by the treatment under investigation but by this other difference in the composition of the groups. Therefore, not only must the experimenter bear this in mind but at the end of the experiment when he publishes his work he must conclusively show (1) that he had considered all the possible variables, (2) what steps he took to equalise them in the two groups, and (3) how far he succeeded in doing this. Sometimes, as for example in clinical medicine dealing with human beings, these ideals may be impossible to attain, and yet worthwhile information may be obtained by making suitable corrections while doing the statistical analysis. But we cannot dwell upon this point here; let us review a few factors which we must consider when dividing up animals into experimental and control groups.

Genetic Constitution, Age and Sex

The first ideal to aim at is to try and use as far as possible a genetically homogeneous population of animals for these experiments. Try and avoid using unrelated fishes (even though they may be of the same species) obtained from different sources to make up the groups. It is best therefore to divide up fish obtained from a single large spawning into two groups so that the animals in the groups resemble one another in their genetic constitution. If a single large spawning is not available then two or three spawnings may be used, but divide up each spawning into two halves—do not use one spawning as a control group and another as the experimental group. The reasons for this are obvious. No two spawnings are likely to be exactly alike, particularly if they come from different parents. Their rate of growth or their susceptibility to disease or drugs may be quite different, and if we are comparing two foods or two drugs this may materially affect the final result.

Age may materially affect the rate of growth, susceptibility to disease, chances of survival when disease occurs, etc., so one must make certain that the two groups are made up of animals of exactly the same age, or failing that the two groups should comprise equal numbers of animals belonging to each age group.

The same considerations apply for sex. For instance, it is well known that susceptibility to disease, tolerance to drugs, etc., often varies considerably between males and females of any species, and we all know that female fishes as a rule grow much larger than males. If we were comparing the growth-promoting effect of two foods and group A had more females in it than group B and this was not taken into account, the experiment would be biased from the start in favour of group A and the food it was receiving.

These are just a few common factors which I have used to illustrate my point. There are other variables, such as tank size, water chemistry, temperature, light, etc.; all these and any others specially pertaining to the experiment must be considered and equalised between the two groups. Let us see how we can do this.

Method of Random Selection

One method relies on chance to equalise the variables between the two groups. This is suitable only when very large numbers of animals are employed. If we toss a coin nine times our chances of getting heads twice as frequently as tails are infinitely more than our chance of getting the same result were we to toss the coin 900 times. As the number of tosses increases the numbers of heads and tails tend to become equal. That is the essence of this method. This method has been used quite often in clinical trials to assess the value of a new treatment. For example, the first, third, fifth, seventh, etc., patients, as they are admitted to hospital, get the new treatment, whereas the second, fourth, sixth, eighth, etc., patients get the old treatment; such a method avoids the occurrence of conscious bias when dividing humans or fishes into two groups.

Let us now suppose that we have a few hundred fry in a tank and we want to divide them up into groups. Arrange two tanks in exactly the same manner and then catch the first fish and place it in tank A, and then catch the second fish and place in tank B, and carry on in this manner as if you were dealing out a pack of cards. If you were to net and place the first 50 fish in one tank and the second 50 in the other tank that would not be so good. It is quite likely that the first 50 to be caught would be not so big and not so strong as the remainder (that is why they were easy to catch first). They would all go into one group and all the swift-moving alert ones would go into the other group. A simple thing like that could easily make the two groups very different from one another.

Though this method properly carried out can usually be relied on to equalise the two groups when large numbers are concerned, this is not invariably the case. At the end of the experiment the experimenter must show that such a selection did in fact achieve the desired result, and if it did not, what steps were taken to remedy the defect.

When dealing with small numbers such as 50-100 animals, it is best deliberately to set about equalising the two groups and not rely on the first method. Consider as many relevant factors as you can and make certain that at the end of the division they are as far as possible equally distributed between the two groups. Thus see to it that age, sex, length, weight, etc., of the two groups are similar and comparable.

Let us consider a few more problems in fish-keeping that could be solved by the experimental approach.

Examples of Problems

(1) *Is dried food A better than dried food B for promoting growth of fry?* We follow the same set-up as described above. Two groups of young fish obtained by dividing up a single spawning will be necessary; one will receive food A and the other food B. At the end of the experiment we shall kill all the fish, say by dropping them into a 10 per cent. solution of formalin (this would also preserve them) and measure the length of each fish in group A and group B accurately, or we might weigh each fish. We would then calculate the average weight or length for each group. We would apply statistical analysis to find out whether there was a significant difference.

If for instance we find that the group receiving food A

is significantly heavier than the one receiving food B then of course we would conclude that food A was better than food B. If we see no significant difference then we would say that under the present experimental conditions no evidence was obtained to suggest that one food was better than the other. The wording here should be carefully chosen, for it is possible that with a larger number of fish or a different species a small but significant difference may become demonstrable. But under no circumstances must we be led away by the fact that the mean weight of one group is much larger than the mean weight of the other. One or two unusually small or large fish in one or other of the groups could quite easily and seriously upset the mean or average value and lead to entirely erroneous conclusions. Let me illustrate this by a set of imaginary figures.

Table 1

Group A	Group B
14.3	8.1
25.0	7.6
9.7	2.8
6.2	10.3
15.4	5.0
4.3	1.8
2.8	3.6
5.0	6.9
9.0	9.4
—	5.8
—	1.4
91.7	62.7
Average 10.2	Average 5.7

No significant difference between groups A and B.

Here are two columns of figures representing weights, lengths or what you like for groups A and B. You will see that there is a "wide scatter" in these results. That is to say some of the figures are very small, some very large. This is what often happens, as a few fry will grow very fast and a few will remain runts. However, the mean figure for group A is roughly twice that of group B, so some people might jump to the conclusion that there is a real difference, i.e. that group A has fared better and hence food A is superior to food B. I have statistically analysed these figures and know that there is no significant difference between them, and it would be entirely erroneous to conclude that group A has grown better than group B. Such a result could be very easily produced by sheer chance.

In Table 2 there are two more columns of figures; at a casual glance you might say there was not much difference between these two groups.

The mean weight of group A is only a little higher than group B. The difference is perhaps small but once more I know from the result of statistical analysis that there is a real or significant difference and hence such a result as this would suggest that food A is in fact a better growth promoter than food B. The actual way in which we can perform these tests of significance can be found out by looking up the books recommended in the preceding article of this series. Unfortunately the details are too long and would be boring to many readers so I cannot go into them here.

All I would like to say here is that they are not beyond the scope of those who can add, subtract, multiply and divide. To do these calculations without the aid of machines would take many days or even weeks but it can be done.

(2) *Is peat a better medium for culturing white worms than garden soil?* No two samples of peat or garden soil are likely to be exactly alike, so we must not generalise, but supposing we want to try out first, two known samples of peat and soil, we could take, for example, half a dozen exactly similar wooden boxes, and we would fill three with

Table 2

Group A	Group B
11.5	12.2
18.9	17.8
16.1	11.7
19.1	3.7
23.0	17.1
10.9	8.2
22.1	10.9
10.9	5.1
18.4	16.8
30.6	15.2
17.1	1.9
10.3	12.9
9.4	23.2
14.2	17.0
18.5	10.8
5.5	13.6
22.4	15.3
12.6	18.9
24.0	5.9
—	5.7
315.5	243.9
Average 16.6	Average 12.2

Group A significantly larger than group B.

peat and three with soil. Next we would transfer an accurately weighed mass of absolutely clean worms into each box. If we have not the facilities to do this we could with patience count the worms and, say, place 100 in each box. We must make sure that we do not place all the big ones in one box and all the little ones in another. We would feed them all they could eat and look after all the boxes in exactly the same way (here we would not feed equal quantities of food to the two groups as we do not want the amount of food to become a restricting factor). At the end of a month or so we could turn out the peat and soil in a heap on to a large sheet of glass, and with patience we could shift the peat or soil a little portion at a time and separate the worms one by one and count them. Perhaps this sounds silly or too tedious, but it is by doing such "silly" things scientists have built up the fund of human knowledge.

Louis Pasteur, one of the greatest scientific geniuses the world has ever known, once did an experiment which involved this sort of tedious separation. He crystallised some tartaric acid and observed that there were two sorts of crystals, one being the mirror image of the other. He picked out and separated the minute crystals one by one by hand and showed that both were pure tartaric acid. No chemical test could show any difference except that one type of crystal rotated a beam of polarised light to the right and the other type rotated it to the left. He called these two forms D-tartaric acid and L-tartaric acid (dextro, right; laevo, left). This as we know now was a discovery that was to prove of tremendous importance not only to chemistry but also to biology and medicine. But it all started because a great scientist was prepared to spare no pains in investigating what most would have passed over as a trifling unimportant difference.

Once we have counted the worms the same statistical considerations apply as previously discussed and we could reach a conclusion whether in fact the given sample of peat is better, worse or no different than the given sample of soil for growing white worms in. Needless to say we can extend this investigation to other culture media and also to the food one might use for feeding the worms. Thus it would be worthwhile determining whether porridge is better than plain bread for white worms or whether there

is no difference, whether the sheet of glass usually laid on top of the culture does in fact produce better cultures, etc., but to settle all this would need scores of painstaking experiments.

This is where societies can do valuable work with their research groups, by taking on simple practical problems of this nature and tackling them properly and publishing the full results. Very few discoveries are big and shattering. Science is built of thousands of apparently little facts which amount to a great deal when they are all added up.

(3) *Determining the minimum lethal dose.* When treating diseased fishes with drugs the dosage used is of prime importance. Too much may kill or injure the fish, too little will not be effective in curing the disease. Therefore, one of the things that should interest us is—the minimum lethal dose. As its name implies it means the smallest quantity of drug which will prove fatal. In brief this is written as M.L.D. If we know this dose for a given drug then we can make sure never to administer anything like that amount of drug when treating diseased fishes. For a drug to be of any use its therapeutic dose (i.e., the dose at which it cures the disease) must be considerably lower than the M.L.D.

"L.D. 50"

As different individual animals of even the same species differ considerably in their tolerance to a drug, a more precise way of stating the lethal dose is in terms of what is known as the L.D.50. That is to say a dose such that it will kill 50 per cent. of the test animals. This gives us a more critical value. To kill every animal in the group (L.D.100) a considerably larger quantity of drug would be required, particularly if there were some unduly resistant animals in the group. Such a value would reflect the amount needed to kill the most resistant animals in the group rather than what is likely to kill the average run of animals of the type under investigation. At the moment we are quite ignorant of the L.D.50 values of almost all the drugs we use for treating our fishes. Investigations to determine these would place our treatment of fishes on a more sound rational basis. Let us first consider the factors which may affect the L.D.50. (1) Different species and even different individuals of the same species are unlikely to be equally susceptible to any given drug; (2) very young and very old animals are more susceptible to most drugs than mature adults; (3) some drugs may be better tolerated by one sex than by the other; (4) the period of exposure to a drug dissolved in the water will be important. A concentration of drug which a fish can stand for one minute without ill-effects may kill it if it is allowed to act for one hour.

Therefore to be of value the conditions under which the M.L.D. is determined should resemble the conditions under which the drug is to be used when treating fishes.

Let us now take an imaginary example. We have a new drug which we intend to use for treating white spot. We know from the life cycle of the parasite and our experience with other drugs that the fish will have to stay in the drugged water for something like 10-12 days; we want to determine the L.D.50—as test animals let us use adult female guppies, obtained from a single brood. We have 30 such females of reasonably uniform size available. (To be accurate we should note their age and individual length, weight, or both. Let us set up five similar tanks holding 5 gallons of water each at temperature 80° F. without any gravel or plants. Next divide up the guppies into five groups, each containing six guppies—see that the groups resemble each other. (How this should be done was indicated earlier on.) To each tank add a known amount of drug. What sort of dose to use we do not know; this is a new drug so we must take a chance and try to cover a fairly wide range. In the first experiment suppose we put in 1 grain of drug in the first tank, 5 grains in the second, 10 grains in the third, 20 grains in the fourth and 40 grains in the fifth tank. We must now observe for a set period of time, say 10 days, and record the deaths as they occur in each group.

We may find at the end of 10 days that (*a*) all the fish in all the tanks have died. That would mean that the drug was far more poisonous than we imagined. We will have to repeat the experiment with doses smaller than the smallest in this experiment. (*b*) All the fish are alive and well. This would mean that the drug is not as poisonous as we imagined. We will have to repeat the experiment with another series of doses larger than the largest in this experiment. (*c*) We may find that we have hit the right dosage range. For instance, we may find that all the fish are dead in tanks 4 and 5, all alive in tanks 1 and 2 and one fish dead in tank 3. That would mean that the L.D.50 lies somewhere between the dose used in tank 3 and that used in tank 4, i.e. between 2 grains/gallon and 4 grains/gallon.

We can now set up another exactly similar experiment except that we would use the drug in doses ranging from 2 grains/gallon to 4 grains/gallon (total for a 5 gallons tank: 10-20 grains). Thus we could try out 2 grains, 2½ grains, 3 grains, 3½ grains and 4 grains/gallon, respectively. We may now get a result something like this. Two dead in the first tank, two dead in the second tank, three dead in the third tank—all dead in the fourth and fifth tanks. As you will observe, 50 per cent. of the fish died in tank 3, therefore the L.D.50 appears to be approximately 3 grains/gallon. To check our results we must now use, say 50 guppies, and expose them to the dose of 3 grains/gallon. If we find that roughly half the number die in 10 days then we could say that for all practical purposes our value for the L.D. 50 is correct.

If too many or too few die we would have to repeat the experiment with a slightly lower or higher dose. It is worthwhile confirming the findings of the initial experiment on a larger number of fish, as the six animals used in the group are too few to rely on. One or two unduly resistant or unduly susceptible animals in the group can cause confusion. The initial experiments serve only as a scanning technique for locating roughly the L.D. 50. A small number of animals are used to begin with for reasons of economy, of time, effort and money. On the other hand it would in most instances be neither practicable nor valuable to try and locate the L.D. 50 accurately down to the last one-hundredth of a grain. A sensible practical compromise must be struck in each case.

Drugs to be Investigated

Here then is a very valuable field of investigation. We would be glad to know the L.D. 50 value of various common drugs we use such as mercurochrome, quinine, acriflavine and methylene blue, to mention just a few. We would also like to know the L.D. 50 value of numerous common but poisonous household and other substances likely to kill fishes. We could start off by using guppies or zebras and later extend our investigations to one or two other not so common species. No doubt different species would not be equally susceptible to all poisons. In the long run concrete information of this kind would benefit not only aquarists but also the fishes, and the few who die to give birth to this new knowledge would not have died in vain. On the other hand throwing substances like T.C.P., Dettol, hydrogen peroxide, ammonia, etc., into the aquarium just to see what happens is cruel and cannot be too strongly condemned.

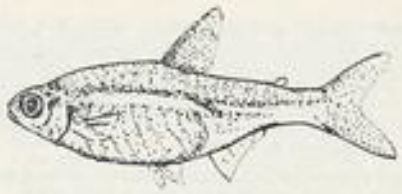
A grave moral responsibility rests on the experimenter working in this field. In investigations which result in the

(*Continued at foot of opposite page*)

TROPICAL FISHKEEPERS' REFRESHER COURSE: *by Pisces*

Glowlight Tetra

(Hemigrammus erythrozonus ex *Hyphessobrycon gracilis)*



ORDER:—Ostariophysi, from Greek *ostarion*—a little bone, and Greek *physa*—a bladder.
FAMILY:—Characidae, from Greek *charax*—a sea fish.
SPECIES:—*Hemigrammus*, from Greek *hemi*—half, and Greek *gramme*—a mark or line, and *erythrozonus*, from Greek *erythros*—red or reddish, and Greek *zone*—a belt or girdle.

MOST aquarists know what they mean when they refer to the glowlight tetra. They do *not* mean a fish which is "translucent grey-green with an iridescent silvery band along the side, in the centre of which is a very narrow black line. All the fins are clear." (*The Aquarist*, June 1954, page 56.) This, apparently is the true *Hyphessobrycon gracilis*, and so I have used the specific name that Fraser-Brunner considers the correct one for the subject of this article.

Many of our popular fishes first impress one by their exotic shapes, their solid colours, or their unusual habits. The glowlight impresses with none of these. It is its transparency, its hyaline appearance of fragility, coupled with an internal glowing reddish line which extends the whole length of its body from the opercula to the extremity of the caudal peduncle which draws so many "Ooh's" and "Ah's" of admiration and astonishment from those who see it for the first time.

Robust Characin

Its appearance of delicacy belies its constitution, however, for it is quite as robust and long-lived as many of its more solid-looking relatives. A native of Brazil, it seldom reaches two inches in overall length. Its discovery was a lucky accident during the fishing of an overflow pool near the Mazaruni river, by an American, Mr. Pinkus.

In my opinion a shoal of glowlights in clear water, against a background of brilliant green plants, brightly illuminated so that a proportion of light strikes the sides as well as the backs of the fishes, rivals a shoal of neons for sheer, unadulterated beauty.

The glowing, lateral stripe will fade unless the fishes are in good condition in a suitable environment. Give them as large an aquarium as you are able, well planted with *Gabomba*, *Ambulia*, Indian fern, and filled with soft rather than hard water. The addition of boiled peat will reduce alkalinity and help to produce favourable water conditions.

Feed well on live foods, choosing those that will live on in the water if not immediately consumed, rather than drown uneaten and start unhygienic conditions. Micro worms are suitable, although not truly aquatic. Experiment shows they can live completely submerged for 21 days or over—ample time for them all to be discovered. Better, of course, are *Daphnia*, *Cyclops*, mayfly larvae, gnat larvae and pupae, blood worms, baby snails, etc. Keep the temperature between 72° and 80° F.

The female will noticeably deepen and become round in body as she swells with roe, and will soon manifest an interest in the male. He may be a little slow at first, but it does not take long for her to convert him to her opinion, and he begins to court her. The love chases in the open part of the aquarium end in among the plants, where the female drops a few eggs at a time until she is spent. This may take several hours, with rests between. The breeding fishes should be shepherded away from the eggs after spawning and either partitioned off (if space is at a premium) or removed altogether.

Immediately an Infusoria culture should be started, for the young fishes will emerge from the eggs in from 24 to 48 hours.

You will be very lucky indeed if you are able to spot the fry. It is far more likely that you will assume the spawning is a failure before it is safe to do so.

The wisest course to pursue is to act as though the fry are there, and regularly introduce Infusoria, to be followed by a little powdered egg or egg yolk. If dried food is introduced use a diffuser just below the surface to keep it gently on the move. The aerator should be just ticking over—not working full out, for this will toss food, water, and alevins above the surface and do no good at all.

With plenty of good food and an average temperature of 75° F., the alevins should grow well, and in a week or two your efforts will be amply rewarded by the beautiful sight of a small shoal of tiny glowlights swimming happily and busily around your aquarium. Avoid the possibility of overcrowding by spreading them around into any aquaria empty of other fishes you may have. Otherwise dispose of some fry for the sake of the others. A few good specimens will be worth a lot more than a whole lot of runts.

The Experimental Approach to Fish-keeping

(continued from the preceding page)

death of the experimental animal, it is our duty to see that such experiments are very carefully planned and performed so that every bit of information that can possibly be extracted is extracted, and that no opportunities are wasted. Only then can there be any justification for doing such experiments. I am sure you will agree with me that this type of experiment is very different in character from a feeding experiment or the effect of peat on plant growth and should not be lightly undertaken or shabbily executed.

In this country it is illegal to perform experiments on living animals unless a licence is obtained from the Home Secretary. Such experiments can be performed by the licensee only on licensed premises, which have to be kept open for inspection. The Animal Cruelty Act protects only vertebrates, hence anybody can experiment on worms, *Daphnia*, etc. As far as fishes are concerned, as no test case has ever arisen it is difficult to foretell what attitude the law would take towards hobbyists experimenting with these animals.

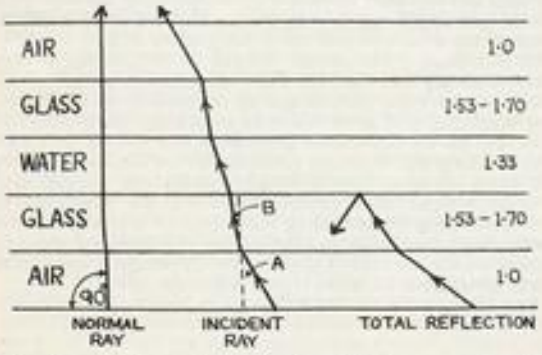
(Next month the method of interpreting results from experiments will be discussed by the author.)

Microscopy for the Aquarist—24 *by* C. E. C. COLE

LIGHT travels in straight lines through any transparent medium of consistent or homogeneous density. This general statement is true for any given bundle of light rays however many media of differing densities lie in its path. Should all the media lie exactly at right angles to the course of light the rays will pass straight through them without the slightest deviation.

Another situation arises if the ray or rays strike a medium of different density at any other than a right angle. Then the ray changes course to a greater or less degree—*but it still travels in a straight line* on the fresh course while within the new medium. If a third medium of yet another density is encountered, direction of travel is again altered. If at any time in its journey the ray passes through a second layer of any of the media, it resumes the course it took while in the first layer of that medium.

A ray striking any medium at right angles to it is called a "normal" ray. Any other is called an "incident" ray, and the angle between it and the normal is called the "angle of incidence." I have endeavoured to construct a composite diagram illustrating as many of these points as possible.



Behaviour of "normal" and "incident" light rays on passing through different media. Figures at the right are the refractive indices of the media. A, Angle of incidence; B, angle of refraction

The phenomenom of direction changing is called "refraction," and according to the amount of deviation a "refractive index" has been allocated to each transparent medium. The less the angle of incidence the less the deviation, of course. When entering a fresh medium of greater density an incident ray is deflected *towards* the normal. When leaving an area of greater density the ray is deflected *away* from the normal.

Air is less dense than water or glass, so that a wide cone of light entering them from air is narrowed to an appreciable extent, once more expanding upon leaving and re-entering air.

There is a limit to the angle of incidence beyond which rays will fail to enter a new medium, and then they will be totally turned back or reflected.

Should two adjacent or consecutive media have the same refractive index it is just as though the two were one and the same, and light rays will pass straight through them both without deviation. This brings us to the practical application of the above established theory.

White-spot (Ichthyophthirius) parasites. Left, normal (⅛ in. objective, × 5 ocular); centre, a cyst "erupts" to start a new infestation (⅛ in. objective, × 10 ocular); right, a parasite after treatment with methylene blue (⅛ in. objective, × 5 ocular)

We are dealing with various media in our pursuit of aquatic microscopy: air, water, glass (both crown and flint) and several transparent mountants for slides—glycerine, Canada balsam, and several proprietary substances. Air is the least dense of all the above, and has a refractive index of unity, or 1. Water has an index of 1.33, crown glass and window glass about 1.53, flint glass from 1.62—1.7, Canada balsam 1.54.

Ideally the mountant of a slide should have the same index as that of the glass from which the slip is constructed. If it has not, and is less, then the cone of light from the object under examination will be reduced. As the N.A. of the objective is dependent upon a cone of light of a definite apical angle reaching it, it may or may not be able to utilise its maximum resolving power.

Particularly is this the case when objects in water are being examined by an oil-immersion object glass of very high N.A. The refractive index of water is, as already stated, 1.33. The index of cedar oil (the usual immersion oil) is 1.52, about the same as that for crown glass. The cone of light is thus narrowed, owing to the water mountant.

This is not necessarily a bad thing, as far as we are concerned. Many of the creatures we shall want to observe are extremely transparent, with a refractive index almost identical with that of glass or water. Light consequently passes straight through them and enters the objective without reproducing their outlines or details. Reducing the N.A. introduces contrast, and although the maximum resolving power of the object glass is no longer being used it is possible to see creatures which were previously invisible.

With mounted specimens of aquatic life, staining by various chemicals emphasises details and introduces contrast. The full N.A. of an objective can be utilised where the mountant is of the same density as the glass.

With live specimens certain chemicals, such as tincture of iodine and methylene blue, are useful for staining cilia and internal organs, but must be introduced with the greatest care and in the minutest quantities. Many small creatures shrink into the smallest possible compass immediately the chemicals reach them, and look nothing like they do when expanded and carrying on normally. Death frequently ensues within a few moments. *Ichthyophthirius* absorbs methylene blue with astonishing rapidity before bursting and dying.

The white-spot disease parasite is one with plenty of contrast, easily observed without staining. A 1 in. objective is quite powerful enough to make outits details. The simplest way to obtain specimens of the free-living, as opposed to the encysted creatures, is to allow an infected fish to flop about out of water upon a flat sheet of glass.

(*Please turn to page* 170)

Electrical Wiring and the Aquarium

by G. P. GLADMAN

IN the September issue of this magazine appeared an article headed "Unobtrusive Wiring for the Aquarium." Being a keen amateur aquarist myself, and also being interested in all things electrical, I read the article with some keen interest. However, it soon became obvious that there were a number of shortcomings in the layout described, some of them a source of danger both to the occupants of the aquarium and of the house.

A great source of danger in the circuit is quickly explained: with the thermostat closed, if both switches are inadvertently closed at the same time, as could quite easily happen in a moment of forgetfulness, a complete short circuit is applied across the mains supply. At the very best, this would result in blown fuses, with the attendant inconvenience; at the worst, say in a house where the wiring perhaps is not at its best, the result could be disastrous. My second objection to the circuit is that when the thermostat is controlling the lights, the only way that the lights can receive their power is via the heater. The disadvantage of this is best proved mathematically, by the application of the fundamental rule of electricity, Ohm's Law.

Assuming that the circuit is using three 25 watt lamps and a 100 watt heater: under normal conditions the current through the heater is 100w/230v = 0.434A. Similarly, under normal conditions the current through each lamp = 25w/230v = 0.108A.

Then the resistance of the heater is 230v/0.434A = 530 ohms, and the resistance of each lamp is 230v/0.108A = 2130 ohms. The resistance of the three lamps in parallel will be I/R = I/R1 I/R2 I/R3 = (I+I+I)/2130 ohms = 710 ohms. Therefore the total resistance of the circuit is 530 ohms + 710 ohms = 1240 ohms.

The current through the circuit is 230v/1240 = 0.185A. The potential difference across the three lamps = 710 ohms × 0.185A = 131.35v. The current through each lamp is: (a) 131.35v/2130 ohms = 0.061A or (b) 0.185A (total current) /3 (no. of lamps) = 0.061A.

As the normal consumption of each lamp is 0.108A (see above) and they are only receiving 0.061A, then 0.061A/0.108A = 57 per cent. of the operating efficiency of the lamps is being obtained; hardly a satisfactory state of affairs!

My third objection to this system is purely a matter of personal opinion; it seems to me to be a simple matter of logic that the top illumination of any aquaria should simulate natural lighting conditions as closely as is possible. Working on this assumption, I try to give my aquaria about 12 hours of continuous light, followed, naturally enough, by 12 hours of darkness. However, if you arrange for the heater and thermostat to control the top lighting, this state of affairs is going to be sadly disrupted. I have proved by experiment (a lamp connected across the heater) that the periods of light and dark can vary between 20 minutes and six hours. Possibly this will do neither the fishes nor the plants any harm at all, but you will have a hard job to prove this to me; I value my fishes too highly to experiment further!

However, it is possible that this principle may find some disciples; partly in the hope that I may be of some service to them and partly to forestall any uncharitably minded person who may accuse me of being capable only of destructive criticism, I submit the circuit portrayed in Fig. 1. It is simple, foolproof and efficient. Switch 1 is an ordinary double-throw switch, and when it has points 1 and 2 closed the lights are controlled by switch 2; when points 1 and 3 are closed the lights are at the mercy of the thermostat. Care should be taken to ensure that the switches are in the "live" leg of the mains supply, as a safety measure.

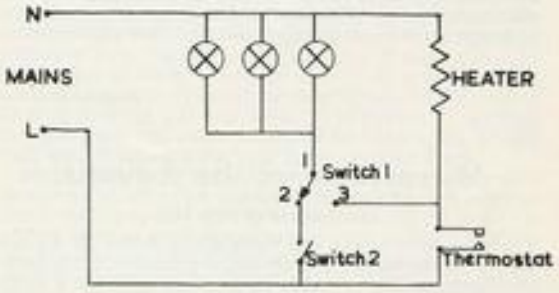


Fig. 1.

My final criticism of the arrangement suggested in the article is this; I am hard pressed to imagine a more inaccessible position for the switches than on the back of the hood (doubly so when they are in such close proximity to open-topped terminal blocks carrying 230 v A.C.) Most aquarists, definitely all those of my acquaintance, prefer to have their aquaria standing as close to a wall as possible, both for the sake of convenience and because the floor is strongest near a wall! Oh, how I would hate to grope amongst wires and potential shocks, my hand sandwiched between the wall and the hood, simply to turn on the lights!

The author's concern regarding the condensation inside the hood is most understandable, if you are going to have all those open connections on the rear of the hood: but if you are going to stop the vapour from escaping so efficiently, how does fresh air reach the surface of the water? The top glasses of my aquaria have a three-sixteenths inch air gap all the way around and I have yet to see any evidence of condensation inside the hoods of my tanks.

Surely, the aim of us all is to have an attractive aquarium with no electrical wiring in evidence. There are many many ways of achieving this end, and probably all of us have different ideas about how to go about it. May I tell you of my solution?

A normal 36 in. stand has a 36 in. community tank on the top and a 24 in. utility (breeding cum hospital cum isolation) tank on the lower shelf. Across the top left-hand end of the stand is screwed the switch panel, illustrated in Fig.2. The

Fig. 2.

panel is made of one-sixteenth inch mild steel, suitably drilled. The six flush-mounting switches (purchased at a Government surplus store) control the following circuits: S1 and S2, lights for both tanks; S3 and S4, the two heater circuits; S5 operates a spare heater and thermostat which can be quickly placed in either tank in an emergency; S6 controls the pump. Above the switches is a small luxury, a neon (not to be confused with *Hyphessobrycon innesi*) indicator, in each of the heater circuits to indicate quickly and easily which are operating. Neon lamps have the great advantages of consuming no current and being extremely reliable.

On the left of the panel is a little idea of my own which may be of interest to fellow enthusiasts. Three tubing clamps are brazed to the panel, and each has a five-sixteenths inch hole drilled 1 in. to either side of it through the panel. The air lines are brought from the pump, via a four-way connector, through to the front of the panel, between the jaws of the clamps, and thence back through the panel to their respective destinations—filters, aerators or what have you.

A 4 in. plywood facia board along the front of the stand serves to preserve the continuity of the lower line of the panel, and to conceal the pump, all airlines and electrical wiring, and also a shelf which holds cleaning implements, dried food and various other impedimenta.

This solution to the problem may not be everyone's idea of the perfect answer to the demands for neatness invariably demanded by "the other half," but I can tell you confidently, and with no little pride, that my intensely house-proud ever-loving approves of the set-up; is there a finer accolade to set upon one's attempts?

Microscopy for the Aquarist

(*continued from page* 168)

The mixture of mucus and water which drains off the fish during its movements will contain any number of the parasites, ranging in size from a mere speck to almost a millimetre.

The encysted specimens can often be removed upon a scale of the fish. If placed in a small container on the stage of the microscope, the creatures will frequently continue to divide and redivide within the cyst, plain for all to see with transmitted light and with a ½ in. or ¼ in. object glass. The eventual escape of the spores is worth watching. One after another they become mobile and break through the wall of the cyst—free to find a host. In a matter of minutes the cyst is empty, but perhaps 2,000 or more new parasites are in the water. At this stage, and for at least a week, they are invisible to the unaided eye.

In my opinion this accounts for the "mysterious" and "unaccountable" appearance of white spot among apparently healthy fishes through the introduction of new, untreated stock—carriers of the invisible young parasites.

Market News

MR. JOE GRASSBY has asked us to bring to the attention of readers that he is supplier of Hykro Flakes to the trade only. In cases of difficulty over supplies he will be pleased to give names and addresses of nearest stockists to enquirers who are not traders. For the trade Mr. Grassby reports that this product is now being supplied in an attractive display carton.

* * *

NEW chairman and managing director of Spratts Patent Ltd. is Mr. A. A. Logan. Mr. Logan has held the appointment of managing director in the firm since October, 1955.

Miniature Fish Tanks

MR. LEN GRIMSHAW, a member of the Leeds and District Aquarist Society, is the maker and owner of some aquaria believed to be among the smallest in the world. In the photograph he is seen holding one 4 in. by 2 in. by 2 in. in size; others he has made measure only 2 in. by 1 in. by 1 in. Each one takes Mr. Grimshaw about 72 hours to machine from a block of brass and to polish, and the materials used cost over seven pounds. The furnishings used when the aquaria are exhibited (as they were at this year's British Aquarists' Festival) include water plants and young guppies, mountain minnow and zebra fish fry, with overhead lighting supplied by flash-lamp bulbs within the covers wired to a transformer.

Photo: "Yorkshire Evening Post"

AQUARIST'S Notebook——

by

RAYMOND YATES

DURING the recent British Aquarists' Festival at Manchester I was kept very busy answering questions put by visitors at *The Aquarist's* stand. By and large the questions asked were much more technical and advanced than hitherto. The absolute beginner type of question was hardly in evidence at all. Perhaps this points to the fact that show visitors to-day are much more knowledgeable than they were. It is certainly an encouraging aspect because this means more real and lasting interest in the hobby. One gentleman went to the length of bringing down some plant leaves in a jar to question me about, a very sensible method of obtaining advice. How often is one asked a question which cannot really be answered because at best one can have but a hazy notion of the tank conditions described. I thought this visitor had the right idea.

Another questioner mentioned his success at using dried duck weed in feeding his fishes (mostly tetras) and this seems to offer possibilities in some quarters. Apparently it proves a very tempting food. One gentleman told me how he used to empty the tea pot into the tank to get spawning keenness, an idea which is not so silly as it sounds. Tannic acid has often been used in Germany for this purpose. Many visitors noticed that small cichlids on sale were quite unlike their parents of adult size. This is very true and has to be experienced to be appreciated. Some young cichlids are very hard to place until they begin to show real growth.

Some interesting points emerged during the show. One society had some really wonderful tanks which stood out from their near neighbours, although the plants, fishes and set-up were much the same. The reason was the lighting, higher wattage lamps giving a very pleasing effect compared with the dimmer lighting on either side. Brightness is a point to consider when showing. Some aquaria were shown as pictures mounted behind large gilded frames of the type used for oil paintings, which have been so eagerly sought after by dealers for mirror surrounds. The effect was very charming and made quite an impression. One dealer set off most of his sale tanks in this way. Another dealer exhibited quite a lot of fighters but made the mistake of putting lights behind the jars in which they were confined. Colour in fighters is very variable. In some it is "in the blood" so to speak and goes right through the fish, light or no light. In others colour is skin deep at best and they present a very dirty look with a light behind them. In general reds prove best and blues and greens worst when subjected to this treatment. A well-known judge told me that he always viewed fighters this way before pointing.

A very welcome visitor to the show was Mr. Michaels, who used to be so well known in the trade in Halifax and the north generally. He now has a motor business in Selby, Yorkshire. Although he is doing very well in his new line he still hankers after his old hobby. So much so in fact that he has founded an aquarium society in Selby which meets on his premises and already boasts 30 members. It is affiliated to the F.N.A.S. Mr. Michaels has lost none of the charm which endeared him to aquarists all over Britain and he told me he would be pleased to see any of his old friends (or any aquarist) who visit Selby. His address is Michaels' Garage (Selby) Ltd., Barlby Road, Selby, Yorks.

Mention of Mr. Michaels reminds me that his business is still carried on in Halifax by Mr. Tony Booth, who has recently had considerable success marketing nylon staple for spawning and filtration purposes. The idea of using nylon spawning "mops" was tried out with great success in the U.S.A., but cost was something of a factor. This new product, called 'Nylon wool,' has made it possible for any aquarist to use nylon for spawning at negligible cost. It looks like a form of cotton wool and can be sterilised by boiling without damage to the texture. It sinks naturally and is easy to wash, consisting entirely of nylon staple of varying lengths all jumbled together as nylon waste. As a filtering medium it is first class. It is cleaned by washing in warm water and can be used over and over again. Unlike glass wool it cannot harm your fingers or your fishes.

Mr. A. Engelke of Manchester captured my interest with an account of his yellow red-eyed leeri gourami, so much so that I made a special visit to his home to see this fish. It proved to be an adult female albino leeri, with the true red eye but also a strong yellow-red overcast tone not unlike the tints shown by the golden rudd. I had never seen a leeri of this type before and cannot recollect having heard of any. Anabantids generally produce some albino varieties, of which the albino paradise is perhaps most common, but in the leeri this seems to be a new departure. Mr. Engelke has bred this fish with a normal male and obtained quite a large number of youngsters, which are now well grown. All turned out normal except one, which has the yellow tinge although the usual eye. It remains to be seen what a further generation will produce in due course. Meanwhile, the parent fish of late seems to be darkening somewhat, although still a yellowish albino variety. Has any reader come across this tendency with the leeri?

The enthusiasm at this show was really tremendous and one minor reflection of this was in the sale of *The Aquarist* pin and button-hole badges. It was very comforting indeed to find so many visitors eager and anxious to proclaim to all and sundry their membership of the hobby by buying and then wearing a badge. I get a lot of letters from hobbyists all over the country, but it is very much more fun meeting them in person. I was more than sorry when the show came to an end. It only remains to remark that that august newspaper *The Manchester Guardian* gave the show a 17 in. column write-up. This was praise indeed.

* * *

A Salford reader recently drew my attention to some ill luck which had befallen him in rearing glowlight fry. It so happened that he had spawned them in a crystal-clear tank (not the accepted method at all) and had noticed that the heater glowed somewhat at night in the dark. Not all heaters glow in this way, but some do. He switched on the lights and discovered quite a number of young fish lying dead on the heater itself. His theory was that the youngsters were attracted in the dark by the glow of the heater and thus had perished. Fry die off for so many reasons that it is often hard to say with certainty just why any particular batch have been lost. In this case only those on the heater died. Snails, of course, often die this way and leave their shells in testimony of the danger of heaters. This particular aquarist has had similar experiences with lemon tetra fry and a second batch of glowlights. It is a hazard worth bearing in mind. A well-planted tank or a heater hidden by rockwork would obviate most of the danger.

Second-hand tanks are often offered for sale at very reasonable prices and some good bargains can be picked up from time to time. On the other hand there are many snags and few dealers will bother with them. When buying a second-hand tank it is important to see it full of water, particularly if it is large, because a full tank exerts the maximum water pressure and shows up any defects. An empty dried out tank will leak like a sieve when you get it home, and you will have a lot of reglazing work to do. Look for heavy rusting of the top framework and for scratches on the front glass. See that the frame is true—a tape measure is more certain than the eye. Ascertain if possible the glass thickness, an important point in large tanks. If you buy the tank have the water left in until you call for it, and go prepared with wooden props to keep the outward pressure on the glass when you siphon off the water. When you get home fill the tank immediately with water and leave it outside for a day or two until you are certain no leaks are in evidence. This period will also enable you to sterilise it with ammonia or something equally strong for safety of your fishes. Before use it will need very thoroughly washing out, and for this a pressure hose is helpful.

* * *

The following 12 rules are regarded as stout nails in the coffin of any society and are reproduced in condensed (and slightly amended form) from the bulletin of the Southport and District Aquarium Society.

1. Do not attend meetings.
2. If you do attend, then arrive late.
3. If weather is unsuitable, stay at home.
4. If, by chance, you do attend, find fault with the officials and other members. Sit at the back and keep up a loud and running conversation with the man next to you.
5. Never accept office. Remember, criticism is easier than being constructive.
6. Get sore if you are not appointed to a committee but, if you are appointed don't attend any committee meetings.
7. If the chairman asks your opinion tell him you have no comments to offer. When the meeting is over tell everybody what should have been done.
8. Don't bother about new members, leave that to others.
9. Start a whispering campaign about finances.
10. Don't pay your subscription until the very last moment; it gives the treasurer extra work.
11. Do nothing more than is absolutely necessary but, when other members roll up their sleeves, howl that the club is being run by a clique.
12. If the club runs its own magazine do nothing to help; it would only cheer up the editor.

The reference to a clique in rule no. 11 reminds me of some notes I jotted down from a transatlantic club magazine years ago, the name of which I cannot recollect. This was headed "Clique," and read as follows: "Word has been received by the committee that your club is run by a clique. Upon investigation we find this statement to be true. Furthermore, we find the clique to be composed of faithful members who are present at every meeting, who accept appointments to committees, etc., who give willingly their time, energies and efforts and who believe that the more one puts into the club the more one will get out of it. There is no question that the enthusiasm, effort and sense of responsibility of these members are of untold value to your club. We therefore suggest you join this clique. It is not difficult to do so. Begin by attending meetings regularly, take a more lively interest in club activities, make helpful constructive suggestions, accept responsibility and serve on committees. Before you realise it you will find you have become a member of the clique and you will be surprised to find how anxious they are to have you."

* * *

Most of us take ourselves too seriously and it is a good thing if we can have a good laugh at ourselves now and then. I had the opportunity the other day when I came across an old autograph album of mine, the entries in which are getting on for 30 years ago. On the very last page of all I came to a poem entitled "In Memoriam," the sad tale of a small pond and a single water lily and the villain of the piece, who, needless to say, was yours truly. Here it is:

An ornamental lake stocked with fish and plants so rare,
The pride of the collection, a lily pure and fair,
Bearing on its stately head a lovely virgin bud,
Which was fated not to bloom but lies rotting in the mud.

Alas, alack, I rue the day I asked him round to tea.
He saw the lake, admired it so, and very keen was he
To inspect the little inmates, and so upon all fours
He peered around, his eagle eye alert for fishes' sores.

He grabbed a net. "Aha," he cried, "there's one there
looking sore,"
And swept the net around just like a matador.
A sudden plunge, a swirling rush, a faint and gentle thud,
The fish I swear was safe away, but my lily *lost its bud.*

* * *

Delegates to this year's T.I.F.A.S.convention in Chicago are loud in their praises of the John G. Shedd Aquarium in Grant Park on the shore of Lake Michigan. Completed in 1929, it cost in the region of £1,000,000 to build over a period of about six years. Readers are probably aware that no admission charge is made for most shows in the U.S.A., and this free-admission idea is applicable to this aquarium also on three days of the week. It is open on Sundays. At the entrance there is a novelty gift counter with the accent on fish, and the large and very detailed illustrated guide book can also be obtained here for one dollar (about seven shillings). The foyer leads to the Rotunda, a pool about 40 feet in diameter with a centre rockery. Six main galleries lead off, these being 90 feet long and 30 feet wide. Some 132 exhibition tanks are on view which vary in capacity from 13,500 to 445 gallons and even as low as 8 gallons in the room given over to "Balanced Aquaria." The large tanks are 30 ft. by 10 ft. by 6 ft. high. In reserve there are nearly one hundred tanks behind the scenes for various purposes. On view are sharks, lake sturgeon, long- and short-nose gar and a large arowana, as well as a shovel-nosed sturgeon. The usual tropicals delight the eye and these include three black piranhas which are about 14 inches long and 12 inches in depth. A pretty catfish is the red-tail catfish (*Phractocephalus hemiliopterus*), too large for the community tank as it is two feet in length. Marine beauties include a dozen queen triggerfish. I am indebted to Mr. R. Taylor of Toronto for the above information.

* * *

At the end of 1955 a German importer discovered some new fishes in a shipment of pencil fish. These turned out to be yet another variety of *Nannostomus* which has been named *Nannostomus espei*. The coloration is not too brilliant; the overall shade is olive brown tinged with yellow and fading to white on the underparts. A golden band runs from the snout, through the eye to the tail. This band is somewhat "neon-like" at times. Below the band are five diagonal black bars which slope backwards. The fins are hyaline, the iris of the eye being golden. Like all pencil fishes they are very active and are not faddy feeders. Temperatures over 72° F. are preferable and a pH around 6.6 suits them very well. Females are plumper and show more subdued colours. The fish is called after the importer, Herr Heinrich Espe.

In the Water Garden in November *by* ASTILBES

THOSE pond owners who breed a specific type of fancy goldfish in the pond will be certain to empty their pond completely each autumn. Many young fish may have been reared in the pond and so it is imperative that all are caught and examined to make sure that no badly shaped ones are left there to breed with the good specimens the following year. Most fancy goldfish breeders do not allow their breeders to remain in the pond during the season but remove them to spawn elsewhere. Other breeders who are trying to keep up a hardy strain of fancy fish which can go through the winter out of doors with safety will allow their fish to breed in the pond and just remove the eggs for safe hatching elsewhere. In these cases it often happens that a few young fish are left behind in the pond, and if they were allowed to stay there and breed with the others the whole strain could soon be upset, if the youngsters were not up to standard.

It always seems a great pity that many aquarists make a pond and then proceed to stock it without any regard to what might happen in the future. They think apparently that they must have representatives from most of the goldfish types, and so the pond receives a mixed bag: common goldfish, comets, shubunkins, fantails, veiltails and moors. They lose sight of the fact that all these fish have been evolved from the common goldfish and so they will all breed together. The result is a crop of utter runts that are useless for either exhibition purposes or future breeding. I know that many people say they do not want to show. That may be, but it must be remembered that runts eat as much food as a good specimen and are worthless, whereas a good type fish will always command a better price and respect when adult. It is far better when a pond is first stocked to make up your mind that only one type of goldfish is to be placed in it. It does not matter what your particular fancy is, but do stick to one kind.

If you must have some variety you can always add some golden or green tench, golden or silver rudd, golden orfe and hi-gois. These fishes are not likely to breed with your goldfish and so the strain will be kept pure. The good strain of goldfish of whatever type may cost a little more when you stock the pond, but remember this: a good trio of specimen fish can cost no more than a dozen imperfect ones but they will have a very good chance to breed, and what they do produce can be worth far more than the runts which have been produced by a mixed parentage. Surely any aquarist worthy of the name would sooner breed pure strains than a lot of rubbish! It is also very bad for the hobby to produce such poor specimens.

You can thin out some of the water plants now if necessary, but a better plan is to wait until the spring so that the effects of winter frosts can be estimated. Many water plants die down during the winter months and so unless the pond is badly overcrowded it will be safer to deal with them after the winter is over.

Great care should now be taken with feeding pond fishes. As the water gets colder their appetites will diminish and so it is of no use continuing to give the same amounts as when the water was warmer. This does not mean that all feeding should stop, but only that no more than can be quickly cleared up should be given at any time. Garden worms are one of the safest foods for this time of the year and if the fishes are well fed they can store up sufficient nourishment to stand them in good stead in the early spring, when so many fall prey to fungus and other diseases.

FRIENDS & FOES No. 51 — Water Mites

HYDRACARINA

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

CLASS:—Arachnida, from Greek *arachnes*—a spider

ON *Daphnia*-hunting expeditions, few aquarists can have failed to catch a number of Hydracarina. There are over 200 species known to zoologists, varying in size from one-twelfth to just over one-third of an inch. Of all shades of colour, from green through brown to bright orange-red, it is these latter bright-hued specimens which draw the eye as they move busily about the pond among the aquatic plants. It would take far too much space if I attempted to give you more than a little information concerning them.

Some species are soft-skinned, some hard, some are round, others oval or almost square, and all adults have eight legs, varying numbers of which are equipped with swimming hairs. The mouth parts are constructed for piercing and sucking juices from their animal victims, for these mites are carnivorous. Their prey consists for the most part of *Daphnia*, and similar small aquatic creatures.

Eggs are reddish and enclosed in a hard, transparent jelly covering. They are laid singly or in groups upon the stems or surfaces of aquatic leaves and submerged stones, or placed in tiny holes cut in the stems.

Water mite (body size about $\frac{1}{20}$ in.)

When hatched the larvae of most species are parasitic, and have only six instead of the adult eight legs. They are choosey, and must find the right host or perish. This creates many snags when eggs are brought home to hatch in an aquarium. Unless the host species is known, failure to rear is practically certain, and there are large gaps in our knowledge as far as this is concerned.

C. E. C. Cole

BRITISH AQUARISTS' FE

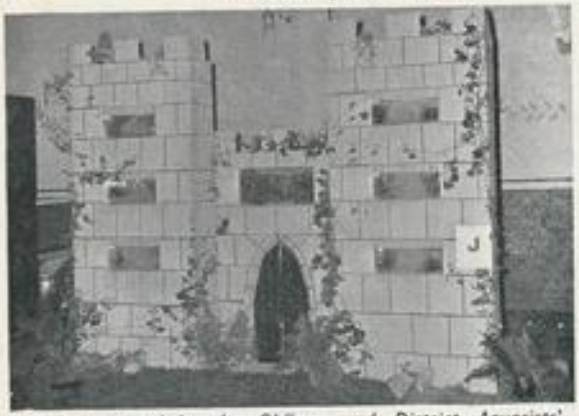
A report on the successful exhibition staged at by the Federation of Northern Aquarium collaboration with The Aquarist. Great i presentation of exhibits was shown by societies as is demonstrated by photographs on

(Photographs, not otherwise acknowledged, by J. L. AN

1ST *"The Galleries" was the title given to the winning entry by Burnley Aquarists' and Zoological Society. Tanks set in the walls were surrounded by gilded picture frames, in keeping with the baronial-hall furnishings of swords, duelling pistols, plaques and spinning wheel*

Photo: Stevenson & Johnson

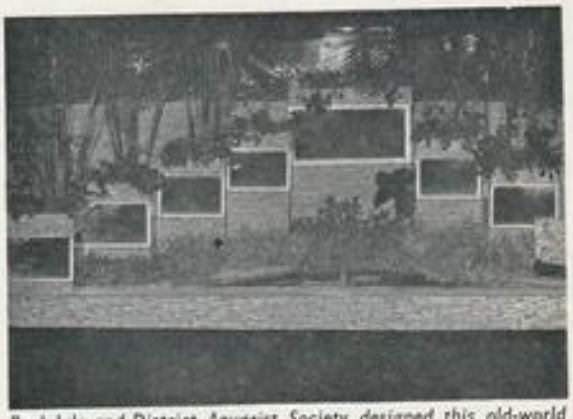
2ND *A room furnished in contemporary style provided the setting for built-in aquaria exhibited by Wombwell and District Aquarium Society*



Aquaria staged by the Oldham and District Aquarists' Society were set in the creeper-clad walls of a miniature castle in an effective manner

IT is hard to find superlatives adequate to describe the 1956 British Aquarists' Festival, which was held at Belle Vue Zoological Gardens, Manchester during the weekend of 6th and 7th October. Undoubtedly this northern gathering surpassed all expectations for novelty and originality, and the wonderful summer-like weather produced a large attendance. Aquarists flocked to the show from all over Britain, from London, Cardiff, Holyhead, Stoke and the Midlands, Leeds, Sheffield, Merseyside, the Lake district, Harrogate, Newcastle and Scotland. Two enthusiasts flew from Glasgow in their anxiety not to miss any of the weekend. One keen long-distance traveller put the thoughts of many into words when he said: "Where else can you get such a magnificent show, plus zoological gardens, public aquarium, amusement park and fireworks all for two shillings?" The entire atmosphere of the show was one of tremendous enthusiasm which augurs well for the future of the hobby in the north.

Once again the accent was on artistic display and no less than 17 of the 35 societies affiliated to the Federation of Northern Aquarium Societies took part. The scenic set-ups each incorporated seven furnished aquaria and the judging (for artistic display) was carried out by ballot form from amongst the visitors to the show. Prizes of £25, £15 and £10 were awarded by *The Aquarist* and the first prize was won by the Burnley Aquarists' and Zoological Society, whose entry represented a baronial hall with tanks set in the walls, masked by gilt picture frames. Wombwell Aquarium Society took second prize with a modern note, a room built in contemporary style with built-in aquaria. Belle Vue (Manchester) Aquarium Society came third with a massive centrepiece about 12 feet high of an octopus on a rock. This attracted immediate attention as it could be seen from any point in the hall. Other excellent layouts were an artist's studio (Swinton), a lighthouse on a rock



Rochdale and District Aquarist Society designed this old-world garden with aquaria behind a pond and fountain. Back lighting upon fluorescent stars gave a novel effect

FESTIVAL

at Manchester
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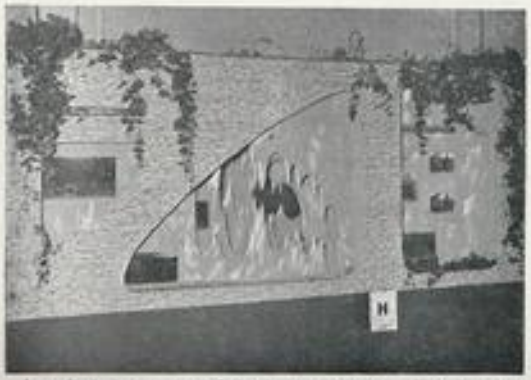
ANDERTON)

Photo: Stevenson & Johnson

3RD *Tanks set within a huge rock surmounted by a large octopus made a setting which gained third prize for Belle Vue (Manchester) Aquarium Society. The lighthouse, complete with flashing beacon, was the tallest exhibit, by Accrington Aquarist Society*

(Accrington), Blackpool Tower (Blackpool), grotto (Bury), Suez Canal (Dewsbury), ornamental fountain (Macclesfield), castle (Oldham), dance band (Urmston) and garden pool and waterfall (Salford). Some unique if more formal displays were put on by Ashton (wall and badge design), a theatrical "curtain up" by Halifax, a black-surround stand by Leeds (which included six miniature tanks down to 2 in. by 1 in.), a garden pool and surround by Rochdale and a decorative stand of more conventional design by Stretford. The standard of fishes displayed was high and in keeping with the general excellence of the exhibits.

An unusual feature was a large pair of *Symphysodon discus* shown by a dealer which aroused universal admiration. These were subsequently purchased by the Belle Vue Zoo and added to their Aquarium, which now has four of these popular but rare fish. Queries about clubs and societies were answered at the Federation stall, and at *The Aquarist* stand Mr. Raymond Yates was kept very busy giving information and dealing with fish-keeping questions.



A realistic impression of depth was given to "The Grotto," with its stalactite and stalagmite formations, by clever use of coloured lights. Entry by Bury and District Aquarist Society

Many callers at this stand asked for Mr. A. Boarder and were disappointed to learn that he was unable to attend owing to illness.

This is the third time that the F.N.A.S. has got away from the old, conventional type of show and there is no doubt that this new form of presentation has come to stay. The F.N.A.S. officials, member societies, club members, traders and the judges (Messrs. W. L. Mandeville, E. Legge and H. Snape) are to be congratulated on an outstanding success.

Results

Best fish in the show: *Aplocheilus lineatus* (Mr. E. Horsfall, Macclesfield). Cussons Trophy. Best furnished aquarium: 1, Bury (79); 2, Belle Vue (78); 3, Burnley (77); St. Martin's Aquaria Trophy. Best six pairs of fish: 1, Belle Vue (499); 2, Macclesfield (498½); 3, Burnley (495). Cash prizes and Hammond Trophy. Artistic display only: 1, Burnley (92), £25; 2, Wombwell (41), £15; 3, Belle Vue (40), £10. Complete display, F.N.A.S. Trophy: 1, Burnley (664); 2, Belle Vue (617); 3, Rochdale (594). Fraser-Brunner Cup. Best pair of livebearers: 1, Stretford; 2, Accrington; 3, Accrington. Belle Vue Challenge Cup. Best pair of coldwater fish: 1, Blackpool; 2, Accrington; 3, Burnley. National Aquarists Society Trophy. Best pair of cichlids: 1, Halifax; 2, Macclesfield; 3, Accrington. F.N.A.S. Trophy. Best pair of labyrinths: 1, Dewsbury; 2, Belle Vue; 3, Burnley. Bland Challenge Trophy. Best pair of fighters: 1, Macclesfield; 2, Leeds; 3, Belle Vue. *The Aquarist* Challenge Cup. Best pair of barbs. 1, Burnley; 2, Ashton-under-Lyne; 3, Oldham. East Lancs. Society Trophy. Best pair of characins: 1, Belle Vue; 2, Stretford; 3, Halifax. F.N.A.S. Challenge Trophy. One pair of a.o.v.: 1, Macclesfield; 2, Rochdale; 3, Halifax. F.N.A.S. Trophy for egglayers: 1, Mr. S. Cass; 2, Mr. H. Lynn; 3, Mr. P. Williamson. F.N.A.S. Trophy for livebearers: 1, Mr. N. Boardman; 2 and 3, Mr. F. Taylor.

Starting a Tropical Aquarium—11

by AQUARIUS

IN the previous article the breeding of the nest-building tropicals was dealt with and now it is the turn of some of the other types of egg layers. A very large section of egg-laying tropicals just lay their eggs and take no further interest in their development. Such kinds as the barbs and danios shed the eggs in the water, usually among water plants. Many kinds of eggs are adhesive and so stick to the plants whereas a few kinds just sink to the bottom sand or gravel, where they develop.

It is not possible to discuss all the methods of breeding the tropical egg layers. There are so many different species that it would take a complete book to describe all the methods of breeding. Again, some breeders find that certain methods they adopt are very successful but others say that they have to use a different method. Some beginners are able to breed the difficult types yet experienced aquarists fail with apparently the same methods. Some fishes will breed best in sunlight whilst others require partial shade. Some like an acid water and others prefer an alkaline one.

The usual breeding procedure for many egg layers is for the males to chase the female fish through the water plants and after some time spent at this the female lays her eggs and the male sheds the milt at the same time. It will be seen by this that it is imperative to have the males present with the females when any egg laying is taking place. It is generally far more difficult to sex the egg-laying fishes than the live-bearers. Some of the egg-layer males can be picked out by their size or colour, but with many species it is perhaps only by the fact that the female fish is fatter than the male that any difference can be seen.

Some kinds of egg-laying tropicals can be bred in a community tank, especially if it is a large one and is well planted with thickets of fine-leaved plants. It is, however, of little use depending on breeding in such a position if many fry are required. Other tanks must be used so that the parents can be removed or separated from the eggs once they are laid. The plan adopted by many breeders is to have special breeding tanks all ready for the fish. Where the eggs are of the adhesive type it is usual to have the tank fairly well filled with plants. These need not be growing and it is generally found that if the tank is free from any soil or compost that things turn out best. A tank should be thoroughly cleansed and then only bunches of clean plants should be placed therein. The water is best left fairly shallow (about six inches) for most species. The fishes are separated and well conditioned. It will be found that garden worms form one of the finest foods for conditioning most tropicals for breeding. If a good-sized tank is used (say 24 in. by 12 in. by 12 in.) it is possible to place a partition in position so that the males can see the females but not reach them. When the females appear to be full of eggs and in good trim the partition can be removed, or the fish can be transferred to the spawning tank. Once the eggs are laid the parents can be removed from the spawning tank or the partition replaced. Most eggs will hatch in about 48 hours if the temperature is about 75° F. Between this and 80° F. will be found suitable for most kinds. Some, like the white-cloud-mountain minnows, will spawn at temperatures just below 70° F.

With many tropicals it will be found that many eggs, although they may have been fertilised, develop fungus and fail to hatch out. This may be due to the fact that the tank was not properly cleaned and that dirty plants have been used. Some breeders find that tap water is best for many egg layers after it has been exposed to the air for a couple of days. Pond water should not be used as it may contain many organisms and pests fatal to the eggs or fry.

Some of the tropicals guard the eggs and fry for some time, and with these types it is imperative that the parents, or one of them, should be left with the eggs and fry. When any of these types of fish have eggs or fry they should on no account be disturbed as this may cause them to neglect to care for their young.

Many breeders fail to get a certain pair of fish to breed and they then give up hope instead of trying a different pairing. There is no doubt that some of the more difficult kinds to breed have their likes and dislikes. Once a pair is found which agree it is well to keep them together. The male and female fish might be quite healthy and able to breed but unless they suit each other little success can be expected.

Once the eggs have been obtained it is necessary to prepare some food for the fry. They will not need artificial feeding until the yolk sac has been absorbed. This is apparent when the fry become free-swimming. Plenty of the right kinds of food should be available and also plenty of space in which they can develop if many fry are to be reared. Without doubt live foods are the best in the early days of rearing. It is possible to rear with artificial foods but there is always the possibility of starting trouble such as fungus among the youngsters if the slightest amount of uneaten food remains to pollute the water.

If sufficient live foods are available the rearing is not difficult. The main point to watch is that food of the right size is given all the time. For the first foods for egg-hatched fry nothing appears to beat Infusoria. Culture of this food was dealt with in a previous article. Always make sure that there is Infusoria in the water you add to the fry tank. Also change some of the water now and then, as Infusoria-charged water can become very foul. The next food can be micro worms or brine shrimps. Grindal worms form the next size of food and after this the fry will be large enough to take *Daphnia*. It is amazing how quickly fry will grow once they are feeding on *Daphnia*. There is an art, however, in feeding with these. When the fry are small the *Daphnia* must always be sifted so that only those small enough to be eaten are given. *Daphnia* take oxygen from the water and so if left in quantities in a fry tank they can soon deplete the water of this necessary gas. Once fry are able to take all sizes of *Daphnia* most of the usual troubles are over. If *Daphnia* cannot be obtained in quantity then mashed or shredded garden or white worms can be used.

If you cannot manage to feed with all live foods it is possible to use dried egg powder, finely ground Bemax and packet foods. It must be realised though that it is often through giving too much dried foods to fry that the water is fouled, and whereas it is quite possible to rear fry with no live foods it is far easier and safer to rear with these.

Cacti in the Fish House

THE necessity for spraying cacti need not arise in a fish house, but in a living room it is a good plan to do this on the morning of a bright day when the plants can be placed out of doors to dry off before being replaced in the room. Any seedlings raised can be transplanted as soon as they are large enough to handle. Do not try to move them too soon, as when small the root system is very fragile, and if broken, the seedling will die. The cotyledon of most cactus plantlets is like a round green ball and bears no resemblance to the usual paired leaf-like structures of any ordinary plant's cotyledon.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

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

Can you give me any idea why I have not been successful in hatching out a spawning of glowlight tetras? The spawning tank is located in partial shade, and the pH of the water is 5.5. The temperature has averaged 82° F. The initial supply of water in the aquarium came from a storage tank outside which is filled by rainwater.

It is possible that the pH of the water was too low (i.e., the water was too acid). A pH of 5.5 is rather unusual. Most acid-water fishes prefer a pH of about 6.5-6.8. And maybe the temperature maintained was too high. About 72° F. suits these fish best. It is assumed that you obtained your rainwater from a clean wooden vessel, and that the rainwater was not derived from a dirty gutter, freshly painted tin roof, or tarred-felt covering. Try spawning your fish in ordinary tapwater strained through peat and allowed to stand for a day or two before introducing the fish.

I have just bought a fish which the dealer told me was called *Plecostomus plecostomus*, one of the sucker catfishes. It seems to eat nothing but the mossy green on the sides of the aquarium, and the sediment and green scum on the leaves of the plants. Can you tell me something about the conditions needed to keep this fish contented?

This sucker catfish will live for a long time if you see that it gets plenty of algae to eat. Without algae or some substitute green food (some individual specimens will learn to eat cooked spinach, crushed lettuce leaf and the like) it will become very thin and soon die of starvation. It will take some other food such as dried food and various small worms, but green food is its mainstay. It is a peaceful fish, and makes a novel aquarium pet. It is not fond of a bright light, and is most active when the light is low, or the tank is in complete darkness. But although it normally shuns bright light, it will disregard the quality of the light when it knows that it is feeding time for the other fishes, and will swim about the bottom looking for tit-bits. Any temperature between 65° and 78° F. seems to suit this species.

I should like to know why a scum has formed on the top of the water in my tank. Will it kill the fishes?

An oily scum or film often appears on the surface of the water in a new aquarium. Sometimes it is caused by traces of oil working out of the mastic or cement. Sometimes the undersides of the frame (round the top) are greasy through handling. It is a wise policy to wash all new tanks thoroughly before finally filling with water. A lot of dust in the atmosphere often accounts for a scum on the top of the water. A well-fitting cover will remedy this nuisance. Although scum should be removed by drawing sheets of absorbent paper across the surface, there is no need to get unduly worried about the effect of slight scum on the fish life. It will not hurt them. But try to find the cause of the scum and remove it as soon as possible.

My angel fish have gone off their feed. Do you think they have contracted some disease?

Unless your angel fish show external symptoms of illness such as closed fins, fungus, bloody streaks on the body and fins and the like, do not worry too much about them. Angel fish are very temperamental, and a sudden shadow passing across their tank is often enough to unnerve them and send them off their food for days. Tapping on the glass of the aquarium, dip-tubing, flooding the aquarium with bright light, and introducing new fishes are among the many causes for angel fish going on hunger-strike and hiding away behind plant life and rockwork. When angel fish appear to be suffering from shock of some kind, the best thing to do is to leave them alone for a day or two. Then when they are seen to be swimming about, try dropping white worms or tiny pink garden worms close to where they are swimming. Once one of the fish starts to feed, the others will pluck up courage and follow suit. If you cannot obtain live food, tempt the fish to eat with tiny pieces of scrambled egg (rinsed in tepid water to remove grease), or tiny scraps of lean steak or washed liver.

We expect to be away from home for a week-end. Will the tropical fishes in my thermostatically controlled aquarium suffer through lack of food during our two or three days' absence?

Your fishes will not come to any harm so long as you do not switch the supply of electricity off. A fast will do them good. But in order to make sure that they are in sufficiently good condition to endure several days without food, see that they are well fattened beforehand on a mixed diet of live food and raw lean offal or red meat.

I have a spare tank measuring 18 in. by 12 in. by 12 in. I should very much like to breed some cichlids in it. How should I furnish the tank to stimulate the spawning instinct?

Your tank is very small for cichlid breeding, though there are a few small species which would spawn in it, namely *Haplochromis multicolor*, the Egyptian mouthbreeder, *Apistogramma ramirezi*, the butterfly cichlid and three-quarters-grown firemouth cichlids. The majority of cichlids like a deep, sandy floor furnished with large pebbles or lumps of smooth-surfaced rockwork. The Egyptian mouthbreeder often prefers to spawn inside a scrubbed flower-pot placed on its side with the opening facing away from the front of the aquarium. It is waste of time to press rooted plants into the sand, for these fishes will soon uproot them. If plants are used to provide shade or shelter for the fishes, keep to *Cabomba* and others which may be left floating in the water.

I obtained a pair of tiger barbs two years ago. They seem to have lost a lot of their colour, and one of them appears to have slight "pop-eye." Is this fading colour and eye trouble a sign of old age?

Under good conditions, tiger barbs should live about four or five years. Yours have reached what we would call middle-age. Although the colours of these fish tend to grow paler with advancing age, your fish should have plenty of life left in them for breeding and should be decorating the aquarium with their presence. Sometimes a partial change of water will act as a tonic, and restore the red and black markings; separation of the sexes for a short while might do a lot of good. As for the "pop-eye," if this condition worsens over the next few weeks isolate the fish in a hospital tank maintained at about five degrees above normal temperature, and add up to five drops of household ammonia to every four gallons of water or *pro rata*. The moment the fish starts to swim in a distressed manner, reduce the ammonia content of the aquarium by taking out some of the water and adding fresh water at the same temperature. When the fish has quietened down, leave it for a time, then net and return to its own aquarium.

I have noticed tiny insects jumping and crawling about on the leaves of floating vegetation and the sides of the tank. Are these small creatures harmful to the fishes? Is it easy to get rid of them?

We think that what you have noticed are the tiny plant pests which flourish in the moist heat of the tropical aquarium, and which feed on algae growing just above the water

line and on the foliage of floating water plants such as water-fern, duckweed, *Salvinia*, etc. These pests do not interfere with the fishes, but they sometimes multiply too rapidly for the good of the above-water foliage, or for the good temper of the aquarist. To control their numbers, draw sheets of newspaper over the surface of the water as often as possible, say, twice or thrice a day for about a week, and wipe the sides of the aquarium above water level with a damp cloth to get rid of algae and decaying fragments of plant life. A shallow tin, containing about a teaspoonful of paraffin oil, floated on the top of the water often helps to eliminate them, especially if you keep the cover well down to concentrate the paraffin fumes in the small air space between water and cover glass or hood.

Some time ago I had a spawning of *Tanichthys albonubes* (the white-cloud-mountain minnow). A number of the fry are more brightly coloured than the rest, and appear to have larger fins than their fellows. One or two people who have seen these fish think they must be hybrids. Can you throw any light on the subject?

It is not uncommon for certain fry in a spawning to differ slightly from their fellows and parent stock. This variation may be brought about by chemical content of the water, or inherited characteristics becoming more dominant in succeeding generations. It is from such fish that professional breeders often improve stock and produce new colour variations.

I have just taken up the interesting hobby of keeping tropical fishes and I wonder whether I am doing right in permitting my livebearers to interbreed; that is to say brothers to sisters, parents to offspring. Will this interbreeding weaken the stock and produce "monstrosities" and sickly fish?

Little if any harm is done if the stock is sound in the beginning and all weaklings, deformed specimens and badly coloured fish are disposed of as soon as they show up in a brood. It is, however, a good idea to introduce new "blood" every now and again so as to prevent a strain of fishes weakening after years of domestication in the unnatural conditions prevailing in the ordinary home aquarium.

Would you kindly give me some idea how many hours a small electric aerator will run on one unit of electricity?

The small electric aerators consume very little electricity, so little, in fact, that only a copper or two will be added to the quarterly account. But if you need more precise information on the subject of current consumption your best plan would be to write to the makers concerned, who should be able to supply you with all the information you may need.

Since joining H.M. Forces, I have had to give up an active interest in the hobby of fishkeeping, but I do enjoy reading books that touch on studying fishes in their natural haunts. Can you suggest any titles of books worth reading to improve one's knowledge of fish life in tropical seas and rivers?

We suggest that you put the following titles on your list of books to read: *Blue Angels and Whales* by Robert Gibbings, *Lady With a Spear* by Dr. Eugenie Clark, *The Silent World* by Captain J. Y. Cousteau, and any of the books written by Dr. Hans Haas, Rachel Carson and Professor William Beebe.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I want to make a pond in the garden with a galvanised bath. How do I treat it and what fish and how many can I keep in it all the year round?

This can hardly be called a pond and you must not expect to have a great deal of success. The smaller the container the more is it affected by sudden changes of temperature, and when it freezes over in the winter it will be difficult to keep the fish safe. A fairly new galvanised container appears to be dangerous to some fishes and it will be safer if you give the whole of the inside a wash over with a mixture of one part of cement to one part of fine clean sand. This should be of the consistency of cream. Once this has set the bath can be washed out well and it should then be safe. I suggest that you try to keep one pair of common goldfish only in the bath; then if you get them through the winter you could add a couple more. There seems little sense in putting too many fish in for a start if you do not know whether your venture will be successful or not.

Are any of these tropicals sufficiently hardy to keep in a cold tank in a living room: guppies, paradise fish, zebras, rosy barbs and white-cloud-mountain minnows?

You are skating on thin ice here. It is possible to keep some of the fishes you mention in an unheated tank in a living room but a great deal will depend on the temperature of the room. If it has central heating and the temperature is not likely to fall below 60° F. at any time, day or night, then I would be prepared to say that all these fishes could be kept in health even if they did not breed. During the summer months the temperature of the water in the tank would almost surely rise well above 70° F. and even at times to 80° F. From my own experience with the fishes named I think that their hardiness will prove to be in the following order: first paradise, then white clouds, guppies, zebras and rosy barbs. You must also remember that it will be safer to use fishes which have not been kept at high temperatures; try to buy them from a supplier who has allowed the temperatures to drop occasionally so that the fish have not been kept at exactly the same temperature all the time. It would be a safer plan to start such a tank in the early summer, when it is possible that the tank water is well over 70° F. for most of the day. I have had paradise fish alive at temperatures under 40° F., but they are safer if they do not fall below 50° F. White-cloud-mountain minnows can also stand cool water as they come from mountain streams in nature.

I have found a number of light-green insects in a form of foam on plants. What are they and could they be used for fish food?

The insects you describe are members of a large family known as Circopidae and are parasites on many plants. There are many kinds and certain plants have their own types to prey on them. The insect larvae lives in a froth which it makes by piercing the skin of the plant and using the sap. When adult it takes the form of a greyish grasshopper-like creature which can jump vigorously when disturbed. The popular name for this insect is the frog-hopper and the froth is "cuckoo-spit." I do not think they would be a safe food for your fishes as some of them might have fed on plants which could be dangerous to fish. They are small and their food value would not be high. I rate a garden worm much higher in value and safety.

I am having trouble with a 24 in. by 12 in. by 12 in. tank. It has been set up for three weeks and there is a lot of suspended matter in the water which I cannot seem to clear, what can I do?

The first point I should like to make is that many tanks do not settle down until they have been running for a month or two. The treatment of your tank depends on what is causing the trouble. If you can put some of the floating substance under a microscope you may be able to find out what it is and then act accordingly. It can be Infusoria, uneaten food or fine silt from the base compost. The best and surest way to get the water clear in a freshly

set-up tank is to stop feeding dried food to the fishes for a fortnight; you will be surprised at the result.

I obtained some water plants for my tank from a river. After a time they all died, why was this?

There are several reasons why your plants could have died. In the first place they were used to a certain type of water which perhaps you were unable to provide. Secondly, they may have had no roots. You pushed them into sand and expected them to take root; instead they rotted and died. The base of your tank may be clear glass, and few plants like to have to grow their roots towards the light. The compost in your tank may be unsuitable. It is an easy task to root your plants in small containers first, and then the whole root system together with some of the soil can be buried in the sand. I consider that at least a little loam should be placed at the bottom of a tank when it is set up. This can have a covering with coarse sand so that it does not discolour the water. Too much should not be used as then the water plants will find so much nourishment that they do not need to search in the tank and so clear up the waste matter from the fishes.

I have had a tank in use for about two years and the plants have mostly done well and the fishes have remained healthy. I had to discontinue using the tank for some time and now when I have restarted it the water will not remain clear for more than a day or two. The conditions are the same, why should I get trouble now?

It is a fact that almost any tank will need some little time to get established. Tanks can be set up for a display by experts and look perfect but if left for several days it is probable that many such tanks would become cloudy. This cloudiness can be caused by Infusoria, which in turn may be due to something decaying in the water. The trouble may be uneaten food or dying plants. If left alone and very little or no feeding is done it is quite possible that the water will clear itself in a week and remain all right afterwards. The surest way to keep a freshly set-up tank clear is to plant up well and then leave it for some days before fishes are put into it. This will ensure that no feeding is done and will give the plants a chance to settle down and start to grow. They can then assist in keeping the water clear.

Thirty-sixth Anniversary of the Pennsylvania Association

Discussion of the age of aquarium societies that has taken place in our pages recently has prompted Mr. WM. I. LAWRENCE, president of the Pennsylvania Fish Culturists' Association, to send us this article on his society's history.

AS far back as 1919 it was felt that the existing societies of that time, that is, the active ones (Philadelphia Goldfish Fanciers Society, the Aquarium Society of Philadelphia and the Kensington Goldfish Society), did not give sufficient recognition to the rapidly growing interest of exotic fish enthusiasts. They felt that they should have a group of their own, or at least primarily for them. Interested individuals induced Mr. J. Louis Troemner to undertake the task. Much of his spare time for several months was occupied in laying the groundwork for the new society and in working out the details incidental to the actual start. A preliminary organisation meeting was called at Grand Fraternity Hall, Philadelphia, Pa., on 8th November, 1920. At this time 35 active and one associate members were present or had pledged membership. Mr. H. G. Burrows was elected temporary chairman. Constitution and by-laws were proposed for an organisation to be known as "The Aquarium and Goldfish Fanciers of America." The meeting proceeded to the election of officers: for president, Mr. J. Louis Troemner; for vice-president, Mr. George B. Smith; for secretary-treasurer, Mr. R. L. Harding. Mr. Troemner's efforts in the society were so successful that he was kept in office continuously until his death on 27th November, 1951.

The first regular meeting was held on 13th December, 1920, at which time the name of the month-old society was changed to the Pennsylvania Fish Culturists' Association. The Founder membership included most of the active fish men of the city at that time and was a composite of the three organisations in existence at that time.

In November, 1925 the society moved to new quarters at Batley Hall, and in the early part of 1929 it again moved to the Academy of Natural Sciences. In ten years after the formation of the society the membership included 75 active, 200 associate and about 500 corresponding members. These memberships were spread throughout the world, even as they are to-day.

Of those who became members of the society on the night of 8th November, 1920, to the best of my knowledge, only Mr. Franklin Barrett and Mr. Wm. T. Innes survive.

In February, 1921, the first publication was issued. It was an eight-page booklet 3½ in. by 6 in. Later this was changed to its present size, and at times contained 24 pages.

The society, during its first 20 years, held a number of public exhibitions at Horticultural Hall in Fairmount Park and at the Academy of Natural Sciences. These exhibitions were attended by thousands of enthusiastic aquarists from as far north as Toronto, Canada and throughout the United States.

The society has the distinction of having never missed a meeting; nor has it failed to issue its monthly magazine *The Fish Culturist*, which is undoubtedly a record for any aquarium society.

The Fish Culturist has been a medium for placing reliable information in the hands of its members and others interested. The magazine has been of sufficient scientific accuracy to be accepted for reference by the Academy of Natural Sciences and other similar organisations.

From time to time the following well-known writers have contributed to *The Fish Culturist*: Dr. George S. Myers, Dr. Henry W. Fowler, Dr. C. W. Coates, Mr. Wm. T. Innes, Dr. Myron Gordon, Herr Fritz Mayer, Mr. Henry A. Nichols and many others including officers and members of the society.

In October, 1922, Mr. Wm. T. Innes delivered what is, to the best of our knowledge, the first lecture on the aquarium to which admission was charged in the history of the fish fancy in this country. Mr. Innes spoke on "The Home Aquarium." During the summer of 1923, Mr. Innes broadcasted through radio, giving the "listeners-in" an idea as to what exotic fishes are and the many advantages to be had through keeping them. This probably also was "a first."

The society feels honoured in naming several members of over 30 years of continued membership: Mme. Paul P. Cret, Mr. Harry A. Lindaman (who served as secretary for a number of years and is now Superintendent of the Fairmount Park Aquarium), Mr. Paul S. Mory (who joined the society 33 years ago). Mr. Mory, in the summer of 1928, accomplished what hundreds of experienced experts had come to despair of, both here and abroad. He successfully bred *Rasbora heteromorpha* and also succeeded in raising several of the young.

our readers write

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

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

Oldest Society

CROYDON would appreciate sending, through you, most friendly greetings to Mr. R. B. Dickson on taking over the secretaryship of the Scottish Aquarium Society and many congratulations indeed to that society, now, I gather, in its twenty-ninth year and gallantly approaching its thirtieth.

Do I not sense a material difference between our two organisations, however, in that the Scottish has the honour to be a national society with headquarters in Glasgow, the subscribers—I quote—"drawn from a wide circle throughout the country" possibly thus consisting of members whose prime allegiance is to other and local societies and clubs? Croydon, on the other hand, is only comparable to one of these individual and purely local societies.

Moreover, Croydon Aquarists actually came into being back in 1870 when they were a section of the Croydon Natural History Society. By 1931 this Section had grown sufficiently large to become completely independent of the parent body and has met ever since, without a break.

Therefore, whereas as an organised body of aquarists' Croydon can claim to be 55 years old, its silver jubilee is really a celebration of 25 years complete independence.

Although the chances of my being in the neighbourhood of Glasgow are extremely slight, if the opportunity does occur I should be delighted to be able to attend a meeting of the Scottish Aquarium Society and make personal acquaintance with Mr. Dickson and members. A hearty invitation is also extended to him or any of his fellow aquarists to similarly attend one of Croydon's humble little gatherings.

E. T. FARRANCE, *Secretary*,
Croydon Aquarists' Society.

WITH reference to Mr. R. B. Dickson's letter in your September issue, concerning the respective ages of the Scottish Aquarium Society and Croydon Aquarists' Society. The letter had the heading of "Oldest Society." I am a life honorary vice-president of the S.A.S. and so can take an objective view of this matter. I was a member of an aquarium society years before Croydon and Scottish were started. This society was well established when I joined it in 1922 and was the British Aquarium Society, which held its meetings at the Sea Anglers' Society premises in Fetter Lane, London.

ARTHUR DERHAM,
Watford, Herts.

For a translantic contribution to this discussion see page 179.
—EDITOR

Cryptocoryne Losses

I WAS extremely interested to read of Mr. Thompson's experience with *Cryptocoryne cordata*, as at the moment I am having the same trouble with plants which, like his, have been established for about three years. The leaves are attacked at one or more spots round the edge, which soon spread, resulting in the collapse of the leave into a decaying pulp. This decay extends down the stem but does not seem to damage the crown as it continues to grow, though all new leaves quickly show the same symptoms.

My *Cryptocoryne* consist of a clump of roughly three dozen crowns of mixed *C. cordata* and *C. Willissi* planted in a 36 in. by 18 in. by 18 in. tank but so far only the *C. cordata* have suffered, the *C. Willissi* continuing to flourish as strongly as ever. Similarly, a large quantity of *C. Becketti* are also untouched.

I have carefully checked on any change of conditions during the month prior to the infestation—if such it is—and only can account for the following: firstly, a small quantity of aquarium peat was introduced into the filter (which contains nothing but glass silk), without altering the pH value of the water to any degree; in any case I have always understood that *Cryptocoryne* prefer soft water, and mine is distinctly hard. Secondly, two new *C. Willissi* were planted about a fortnight ago. These appeared to be healthy plants and are growing well. Personally, I do not think that the addition of peat in such a small quantity could have any adverse affect, and I therefore agree with Mr. Thompson's suggestion that these plants are liable to attacks from some communicable disease and that the new plants which were introduced into my tank in some way conducted some disease spores which are fatal to *C. cordata*, and perhaps other varieties, but which *C. Willissi* and *Becketti* are able to resist.

No doubt you will receive other letters on this subject, and I look forward to reading them with considerable interest.

L. H. JEAPES, Coventry.

Catching Earthworms

THE common earthworm is generally acknowledged to be one of the finest foods for the majority of aquarium fishes, but many aquarists may be unaware of this reliable and trouble-free method of obtaining worms especially in dry weather.

Select a bare patch of earth and empty a bucket of cold water over a square yard or so. Allow this to soak in and then empty another bucketful containing about one-quarter of a teaspoon of potassium permanganate crystals dissolved in it on the same spot. After a few minutes any worms in

the area will appear at the surface and can be placed in water to wash off the chemical. They can be kept in a tin or jar of damp soil in a cool place until required. Even in a backyard his method will bring worms from the spaces between paving stones.

J. G. EUSTON,
Manchester, 19.

Endorsement Scheme

WITH reference to the "endorsement scheme" of the F.B.A.S. for manufacturers' products, mentioned in your October issue, may I suggest what I think would be the ideal arrangement. This is for *The Aquarist* to introduce its own equipment review.

Manufacturers could submit products voluntarily to your journal and only products so submitted would be criticised. Critics could be chosen by *The Aquarist* and would remain anonymous. Their criticism would be accepted by readers in the same way as one would accept a newspaper's approval scheme for household articles. I would assume that critics would be practising aquarists and that one would have engineering capabilities and the other be qualified in biological matters. No charge would be made to manufacturers for this service. Details of the latest in the aquaria world would then be available to everyone, particularly to those who do not belong to any society.

This service would not stop the F.B.A.S. going ahead with their scheme, but I do think that the scheme I have described would have a more general appeal. It is up to readers to state which type of scheme they prefer.

MASON SMITH,
Cambridge.

Apparatus received from manufacturers by us in the past has been reviewed in our columns and the invitation to makers to avail themselves of this facility is always open. The fact that few new products are submitted voluntarily in this way causes us to query whether the majority of manufacturers are really interested in such "schemes" at all.—EDITOR.

I SYMPATHISE with Mr. Derham (*The Aquarist*, October) up to a point. If the F.B.A.S. panel's names, qualifications and methods of testing articles are not published, how are we to know whether they are a crowd of foolish quacks or brilliant ichthyologists and engineers?

A. G. LYMAN-DIXON,
Berks.

Livebearers

I WOULD like to correct an impression made by "Aquarius" in his article in the September issue. In this article he states that livebearers are guppies, mollies, platys, swordtails and mosquito fish. Further on he advises the removal of a livebearing female when it shows a distended belly. I would like to point out that if the mollie is included in this category the inexperienced aquarist would suffer continual losses of both gravid females and half-developed young which the female would drop prematurely. The one thing an aquarist should not do is to move gravid female mollies or to confine them in breeding traps as this species will not stand such treatment when near to dropping youngsters.

R. JEFFERS,
Widnes, Lancs.

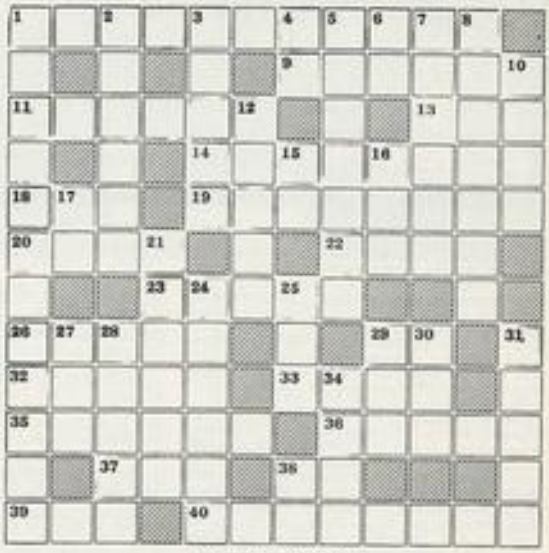
Spawning Records

I HAVE bred Siamese fighters for a number of years and two years ago counted 615 from one spawn at four weeks old, which I felt must be a record. However, I have this week counted 821 from a single spawning at 3½ weeks old. Can anyone record a larger spawn than this?

H. C. PARSONS, Nr. Aldershot.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1 Large sky-blue labyrinth fish (5 in.) (4, 7)
9 Sole, Ma, for a dancer with veils (6)
11 Strainer (6)
13 Count your salary, the paymaster is short (3)
14 One who nets small edible crustaceans (8)
17 Cost, insurance, freight, commercial abbrev. (1, 1, 1)
19 Colloquial term for sticklebacks (8)
20 Their supposed eggs were sold as goldfish food (4)
22 Deeds confuse cats (4)
23 Fat (5)
26 *Aequidens* (5)
29 Don't half strike the note (2)
32 Rustless metal used for fishing rod rings (5)
33 Sour (4)
35 Single out fireplaces (6)
36 Viper (5)
37 Optic (3)
38 Most men are entitled to this (2)
39 Sicken (3)
40 Genus of flowering water plants, including lotus (8)

CLUES DOWN

1 Natterjack toad (8, 4)
2 Raise up (6)
3 Visitor received and entertained (5)
4 You and I (2)
5 Frog family (7)
6 Little Albert (2)
7 In this case the mop precedes the pet (6)
8 To dip (7)
10 Goes wrong (4)
12 German river (5)
15 Rural dean (1, 1)
16 Member of Legislative Council (1, 1, 1)
18 Not out (2)
21 Severely (6)
24 Whalebone (6)
25 A great deal of salt water (3)
27 Study in a concrete tank (3)
28 Could be *Pterophyllum eimekei* or one of the heavenly host (5)
29 Performed (3)
30 Unusual (3)
31 Probably the best of the *Vallisneria* (5)
34 Cyprinidae (4)
38 Decoration for "other ranks" (1, 1)

PICK YOUR ANSWER

1. Members of the cyprinodont family are found throughout Africa with the exception of: (*a*) Cape of Good Hope; (*b*) Egypt; (*c*) Madagascar; (*d*) Nigeria.
2. Spatula loach is the popular name of: (*a*) *Botia hymenophysa*; (*b*) *Lepidocephalus thermalis*; (*c*) *Micreglanis parahybae*; (*d*) *Sorubim lima*.
3. *Aequidens latifrons* (the blue acara) was named by: (*a*) Bleeker; (*b*) Day; (*c*) Linne; (*d*) Steindachner.
4. In Japan the moor goldfish is known as: (*a*) demekin; (*b*) kingyo; (*c*) ranchu; (*d*) shukin.
5. In the wild *Macrognathus aculeatus* (the arrow nose) grows to a length of about: (*a*) 6 in.; (*b*) 10 in.; (*c*) 14 in.; (*d*) 18 in.
6. *Proserpinaca* (mermaid weed) is indigenous to: (*a*) East Africa; (*b*) North America; (*c*) South America; (*d*) West Africa.

G. F. H.

(Solutions on page 183)

News from AQUARISTS' SOCIETIES

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

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

THREE COUNTIES AQUARIA SHOW

THE third Three Counties Show was held at High Wycombe where there were 254 entries.

The High Wycombe Trophy was won by Mr. R. Keeping (*Best fish in Show*). The Reading Cup was won by Mr. F. H. Watts (*Individual Furnished Tropical Aquarium*). The Wendy Cup was won by Mrs. Steele(*Individual Furnished Coldwat r Aquarium*). The Reading Shield was won by High Wycombe and District A.S. The Oxford Shield was won by Reading A.S.

Results were:—

Common Goldfish: 1, Mr. L. Franklin, 2, Mr. L. Blake, 3, Mr. A. W. Luker, 4, Mr. F. H. Watts. *Shubunkins:* 1, Mr. E. J. Steele, 2, Mr. A. W. Smith, 3, Mrs. Steele, 4, Mr. J. S. Bird. *Fantail and Veiltail:* 1, Mr. A. Shaw, 2, Mr. A. W. Smith, 3, Mr. G. B. Scott, 4, Mr. A. Shaw. *A.O.V. Goldwater:* 1, Mr. A. W. Smith, 2, Mr. J. S. Bird, 3, Mr. E. J. Steele, 4, Mr. A. W. Smith. *A.V. Swordtails:* 1, Mr. E. H. Chatfield, 2, Mr. I. G. Flintham, 3, Mr. F. H. Watts, 4, Mr. H. J. Pitts. *A.V. Platy:* 1, Mr. E. H. Chatfield, 2, Mr. W. R. Dolton, 3, Mr. T. J. Mansbridge, 4, Mr. A. A. Checketts. *A.V. Mollies:* 1, Mr. I. G. Flintham, 2, Mr. H. G. Rundle, 3, Mr. W. R. Dolton, 4, Mr. C. G. May. *A.V. Male Guppy:* 1, Mr. W. H. Lock-Bowers, 2, Mr. L. Wright, 3, Mr. W. H. Lock-Bowers, 4, Mr. D. L. Edmonds. *Fighters:* 1, Mr. F. H. Watts, 2, Mr. W. R. Dolton, 3, Mr. H. G. Rundle, 4, Mr. H. G. Rundle. *A.O.V. Labyrinths:* 1, Mr. S. Frayne, 2, Mr. S. Frayne, 3, Mr. M. Gibbs, 4, Mr. S. Frayne. *Danios, Rasboras & Minnows:* 1, Mr. B. A. Ling, 2, Mr. R. Milton, 3, Mr. D. L. Edmonds, 4, Mr. B. A. Ling. *Barbs:* 1, Mr. B. A. Ling, 2, Mr. L. Blake, 3, Mr. L. Blake, 4, Mr. T. J. Mansbridge and Mr. W. A. Bone. *Catfish:* 1, Mr. J. R. Thompson, 2, Mr. G. Parker, 3, Mr. W. R. Dolton, 4, Mr. P. Churchill. *Hyphessobrycon Species:* 1, Mr. F. H. Watts, 2, Mr. R. Milton, 3, Mr. S. Frayne, 4, Mrs. Frayne. *A.O.V. Characins:* 1, Mr. R. A. Keeping, 2, Mr. S. Frayne, 3, Mr. H. G. Rundle, 4, Mr. L. Blake. *Cichlids:* 1, Mr. W. R. Dolton, 2, Mr. B. A. Ling, 3, Mr. L. Blake, 4, Mr. A. Ainsworth. *A.O.V. Tropical:* 1, Mr. A. Ainsworth, 2, Mr. L. Franklin, 3, Mr. W. A. Bone, 4, Mr. W. A. Bone. *Club Furnished Tropical:* 1, High Wycombe A.S., 2, Reading A.S., 3, Oxford A.S. 4, Oxford A.S. *Club Furnished Coldwater:* 1, Reading A.S., 2, Harrow A.S., 3, Oxford A.S. 4, Oxford A.S. *Individual Furnished Tropical Aquaria:* 1, Mr. F. H. Watts, 2, Mrs. Watts, 3, Mr. R. Milton, 4, Mr. F. H. Watts. *Individual Furnished Coldwater Aquaria:* 1, Mrs. Steele 2, Mr. A. W. Luker, 3, Mr. V. H. Lewin, 4, -Mr. A. Bowbet. *Breeders (Livebearers):* 1, Mr. I. G. Flintham, 2, Mr. W. H. Lock-Bowers, 3, Mr. W. H. Lock-Bowers, 4, Mr. H. G. Rundle. *Breeders (Egglayers):* 1, Mr. L. Franklin, 2, Mr. W. A Bone, 3, Mr. W. A. Bone, 4, Mr. C. G. May. *Breeders (Coldwater):* 1, Mr. M. Gibbs, 2, Mr. A. W. Smith, 3, Mr. E. J. Steele.

* * *

AN inaugural meeting was held by the **Bristol Coldwater Breeders Group** at the Old Duke, Queen Charlotte Street, Bristol recently. The attendance was good and the evening was a success. The object of the Group is to discuss ways of improving the coldwater fancy. Meetings will be held on the first Friday of each month, and an invitation is extended to all serious coldwater breeders to attend.

* * *

THE **Chester and District Aquarist Society** reports that a joint show held by themselves and the local Cacti Society proved a great success, and will be repeated next year. Their experience this year also proved that Club shows can be successful both in obtaining new members, and also financially without the large expense of open shows and the problem of the hire of tanks. Meetings have been increased to fortnightly. An inter-club visit is being arranged with Merseyside A.S. early in the New Year and recent inter-club shows have been held with Warrington.

* * *

THE **Exeter and District Pondkeepers' Society** recently presented a tank of tropical fish to the Children's Ward of the Princess Elizabeth Orthopaedic Hospital. Maintenance will be done by the club members.

* * *

MEMBERS of **Leicester Aquarist Society** were given a talk recently by Mr. Welch of Nottingham the subject being "Fancy Goldfish." Among other events there has been a film show by Mr. W. J. Braund, the title of the film being "Under the Red Sea.

* * *

AT the third A.G.M. of the **Yeovil and District Aquarist Society** it was proposed to hold more inter-club shows in the coming year as these have been found to stimulate interest among the members. An invitation to all pondkeepers was also to be encouraged. The secretary is Mr. D. H. Silver, 24, Seaton Road, Yeovil.

* * *

ILFORD **Aquarists' Society** were given a lecture by Mr. A. Leutscher at their last meeting. He spoke of reptiles and their habits as pets, and his exhibits included lizards, toads, terrapins salamanders and a king snake. New members will be welcomed and should contact the secretary, Mr. V. Price, 1A, Horace Road, Barkingside, Essex.

* * *

AN aquaria exhibit showing 40 species of fish and several other items aimed at interesting the public in the hobby was displayed by the **Brockley Breeders Circle** at a Cage Bird Show held at Catford Stadium recently. A small marine section proved a strong attraction and a new experiment was to show a film among the exhibits—by means of a back-projection. This was also very popular although the screen was not perfect. However, the idea lends itself to further experiments.

* * *

LARGE bunches of luxuriant and well-coloured plants were exhibited by Mr. T. A. Mear, Chairman of the **Burton-on-Trent and District Aquarists'** Society when he recently addressed **Derwent Aquarist Club** on his own experiences in growing aquatic plants. He told, how he had used with great success, garden fertiliser and builders' sand, and declared that the usual compost and fish droppings were not enough to feed plants as they should be fed. He also stated that no bad effects on the fishes had been experienced, nor clouding of the water.

Photos: J. L. Anderton

Two exhibits at this year's British Aquarists' Festival. Left, an aquarium "swing band" entered by Urmston and District Aquarist Society with framed aquaria. ("The time has come the walrus said to speak of many things . . . Of the golden guppy rhythm band And the rosy barb that swings, Of the tunes the talking catfish croons And why they sound like 'Bings'.") Right, Ashton-under-Lyne Aquarium Society's exhibit incorporated part of "The Aquarist's" badge design

The Post Office Research Aquarist Society held its third annual show in conjunction with the Horticultural Society. This was essentially an exhibition comprising some 30 species of tropical and coldwater fishes in furnished tanks. The centre-piece of the show was a realistic garden pond complete with a running stream

THE **Medway Aquarist Society** concluded its show year on a successful note with two wins, a second and a third in the inter-club furnished aquaria competition.

WALTHAMSTOW & DISTRICT AQUARISTS' SOCIETY SHOW

Tropical Furnished Aquaria.—1, Stoke Newington & District Aquaria Society 81 points, 2, Leyton Aquarium & Pond Society 75 points, 3, Forest Gate Aquarist Society.

Individual Furnished Aquaria (Tropical) 1, A. R. Chandler, 2, Mrs. P. Penton, 3, W. Izod.

A.V. Guppy: 1, and 2, G. E. Tansley, 3, W. E. Hadkiss, 4, Mrs. P. Penton.

A.V. Swordtail: W. Weigold, 2, H. Tisbury, 3, A. R. Chandler, 4, Miss I. Heath.

A.V. Platy: 1, H. Tisbury, 2, W. H. Snaith, 3, Mrs. E. Franklin, 4, H. R. Penton.

A.V. Mollie: 1, A. G. Walker, 2, J. Morrice 3, A. Elderfield, 4, Mrs. E. Franklin.

Siamese Fighters: 1, V. Jones, 2, W. Izod, 3, A. H. Pringle, 4, P. H. Gerkin.

A.O.V. Anabantids: L. G. Coombs, 2, H. R. Penton, 3, G. Mills, 4, J. R. Haley.

Characins: 1, W. H. Snaith, 2, A. G. Walker, 3, Miss I. Heath, 4, G. Howe.

A.V. Barbs: 1, J. R. Haley, 2, J. L. Sheen 3, G. Mills, 4, W. Weigold.

A.O.V. Carps: 1, T. V. Hill, 2, W. H. Snaith, 3, E. Mann, 4, A. G. Walker.

A.O.V. Tropical: 1, L. G. Coombs, 2, D. E. Goodbody, 3, G. Mills, 4, H. R. Penton.

Breeders (Egglayers): 1, D. E. Goodbody, 2, V. Sones, 3, G. Howe, 4, J. L. Sheen.

Breeders (Livebearers): 1, J. Morrice, 2, C. R. Boceman, 3, Mrs. E. Franklin, 4, E. W. Bartlet.

Coldwater.—Individual Furnished Aquaria: 1, P. Franklin, 2, V. Sones, 3, A. Pringle.

Bristol Shubunkins: 1, 2, and 3, P. Franklin.

Common Goldfish and London Shubunkin: 1, A. Pringle, 2, W. Patrick.

Fantail Goldfish: 1, W. R. Carn, 2, D. E. Goodbody, 3, P. Franklin, 4, T. Longstaff.

Veiltail Goldfish and Blackmoors: 1, T. Longstaff, 2, 3, and 4, F. T. Barry.

A.O.V. Goldfish: 1, and 2, H. Tisbury.

Coarse Fish: 1, 2, and 3, W. E. Goodbody.

Breeders Class: 1, and 2, H. Tisbury, 3, F. T. Barry.

COVENTRY POOL & AQUARIUM SOCIETY SHOW

DETAILS of the awards at the annual show of the **Coventry Pool and Aquarium Society** are as follow:

Furnished Coldwater.—1, Mr. Glover, 2, Mr. Farren, 3, Mr. Grant, V.H.C. Mr. Benger.

Common Goldfish.—1, Mrs. Bradbury, 2, Mr. F. Dean, 3, Mr. Stone.

Shubunkin.—1, Mr. Benger, 2, Mr. Randall, 3, Mr. Benger.

A.O.V. Twintail.—1, Mr. Benger, 2, Mas. Court, 3, Mr. Benger.

Blackmoor.—1, Mas. Court.

A.O.V. Coldwater.—1, Mr. Dean, 2, Mr. Dean, 3, Mas. Court.

Furnished Tropical.—Mrs. Court, 2, Mr. Grant, 3, Mr. Page.

A.V. Guppy.—1, Mr. Stock, 2, Mr. Page, 3, Mr. Page.

A.O.V. Livebearers.—1, Mrs. Court, 2, Mrs. Court, 3, Mr. Stock, V.H.C. Mrs. Court.

A.V. Characin.—1, Mrs. Court, 2, Mr. Dean, 3, Mr. Grant.

A.V. Barb.—1, Mr. Randall, 2, Mr. Grant, 3, Mr. Benger.

A.O.V. Egglayer.—1, Mr. Dean, 2, Mr. Fullarton, 3, Mr. Ellis, V.H.C. Mr. Benger.

Breeders Egglayers.—1, Mr. Grant, 2, Mr. Randall, 3, Mr. Grant.

Breeders Livebearers.—1, Mrs. Court, 2, Mr. Page, 3, Mr. Stock, V.H.C. Mr. Cleaver.

Junior Coldwater Furnished.—1, Mas. Court, 2, Miss Randall, 3, Mas. McNeil.

Junior Tropical Furnished.—1, Mas. Copson, 2, Mas. Matthews. *Special Awards.* Best Furnished Aquarium—Tropical or Coldwater, Mr. Glover. For Best Tropical Furnished Aquarium—Any Size, Mrs. Court. For Best Fish in Show, Mas. A. Court. Best Team 6 Fishes—Egglayers, Mr. Grant. Best Junior Coldwater Furnished Aquarium, Mas. A. Court. Best Junior Tropical Furnished Aquarium, Mas. Copson. Best Team 6 Fishes—Livebearers, Mrs. Court. Best Coldwater Furnished Aquarium, Mr. Glover. Best Coldwater Fish in Show, Mas. Court. Best Tropical Aquarium up to 18 in. by 10 in. by 10 ins. Mr. Page. For Best Guppy in Show, Mr. G. Stock.

Association of South London Aquarist Soc.

WE regret that through pressure on space it was not possible to publish the results of the A.S.L.A.S. annual show in our October issue. We feel, however, that the efforts of this progressive group should be on record. The results of the competition were as follow:

Inter-Club furnished Aquaria (Tropical): 1, Study, 2, Surrey, 3, Clapham. *Inter-Club furnished Aquaria (Coldwater):* 1, Surrey, 2, L.T.E., 3, Kingston. *Individual Furnished Aquaria (Tropical):* 1, H. Groves, 2, D. W. Huggett, 3, J. Stewart. *Individual furnished Aquaria (Coldwater):* 1, C. R. Parslow, 2, L. E. Lane, 3, W. Leach. *Common Goldfish:* 1, F. J. Henson, 2, W. Leach, 3, E. Pilsbury. *Bristol Shubunkin:* 1, W. Walters, 2, D. Morris, 3, D. Morris. *Fantails:* 1, S. J. Freeman, 2, Nichols, 3, Nichols. *Veiltails:* 1, C. Rosewarn, 2, C. Rosewarn, 3, D. Morris. *A.O.V. Fancy Goldfish:* 1, S. J. Freeman, 2, E. T. Farrance, 3, R. G. Mealand. *A.O.V. Coldwater Goldfish:* 1, Nichols, 2, R. Mayersbeth, 3, C. R. Parslow. *Guppies—Male, Scarf & Veils:* 1, L. Stevens, 2, P. Pavitt, 3, E. Quick. *A.V. Female:* 1, K. Fawcett, 2, L. R. Somers, 3, P. Pavitt. *A.O.V. Male:* 1, P. Pavitt, 2, P. Pavitt, 3, K. List. *A.V. Platy:* 1, H. Secombe, 2, A. Kimber, 3, R. Walford. *A.V. Swordtail* and *A.O.V. Livebearer:* 1, G. Gale, 2, W. Dickenson, 3, R. Yexley. *A.V. Betta:* 1, K. Fawcett, 2, H. Groves, 3, R. C. Leck. *Gouramis:* 1, 2, and 3 R. Walford. *A.O.V. Labyrinth:* 1, R. Walford 2, H. R. Silverton, 3, R. Walford. *Cichlids:* 1, R. Walford, 2, L. Ayres, 3, F. Henson. *A.V. Catfish & Loach:* 1, K. Fawcett, W. Morrish, 3, S. Strelley. *Barbs—(Cummingi, Gelius, Oligolepis, Titteya, Vittatus):* 1, K. Fawcett, 2, F. Orson, 3, W. Morrish. *Barbs—A.O.V.:* 1, C. Stoker, 2, F. Orson, 3, C. Stoker. *Characins A.V. Hyphessobrycon and Hemigrammus:* 1, G. Stringer, 2, G. Stringer, 3, F. Orson. *A.O.V. Characin:* 1, H. Rundle, 2, F. Beasley, 3, C. Stoker. *Danios, W.C.M.'s,* and *Rasbora:* 1, S. Strelley, 2, C. Stoker, 3, K. Fawcett. *A.O.V. Tropical Fish:* 1, W. Hall, 2, R. G. Fowler, 3, L. Dixon. *Breeders Class—Tropical Livebearer):* 1, R. Yexley, 2, F. Lawrence, 3, L. Ayres. *Breeders Class (Cichlids and Labyrinths):* 1, R. Walford, L. Ayres, D. Huggett. *Breeders Class—A.O.V. Egglayers:* 1, F. Orson, 2, J. Collinson, 3, C. Brightman. *Breeders Class—Coldwater Single Tails:* 1, 2, and 3, D. Morris. *Breeders Class—Coldwater Twin Tails:* 1, 2, and 3, C. Rosewarn. *Plants A.V. Vallisneria* or *Sagittaria:* 1, R. G. Mealand, C. R. Parslow, 3, R. G. Mealand. *A.O.V.—Submerged Aquatic Plant:* 1, H. Groves, 2, N. Hill, 3, R. G. Mealand.

Special Awards.—Ron Gregory Cup—S. J. Freeman (Best Coldwater Fish). Wimbledon Trophy—H. Secombe (Best pair Livebearers). Alf Sayle Cup—G. Gale (Best pair Mollies). Billings Cup—K. Fawcett (Best Tropical Catfish). B. M. Austin Cup—H. Rundle (Best Fish in the Show). Breeders Circle Cup—R. Yexley (Best in Tropical Breeders Class). Peter Hewitt Plant Cup— H. Groves (Best Plant in the Show). A.S.L.A.S. Inter-Club Trophy—London Transport Executive (Aquaria Section) highest number of points.

Changes of Secretary

CHANGES of secretaries and addresses have been reported from the following societies: **Feltham and District Aquarist Society** (Mr. L. Bowd, 15, Welwyn Avenue, Bedfont, Middx.) **Sutton and Cheam Aquarist Society** (Mr. Ronald W. Kelsey, 70, Shanklin Road, Belmont, Sutton, Surrey).

Crossword Solution

B	L	U	E	G	O	U	R	A	M	I	■			
U	■	P	■	U	■	S	A	L	O	M	E			
F	I	L	T	E	R	■	N	■	P	M	R			
O	■	I	■	S	H	R	I	M	P	E	R			
C	I	F	■	T	I	D	D	L	E	R	S			
A	N	T	S	■	N	■	A	C	T	E	■			
L	■	■	O	B	E	S	E	■	■	S	■			
A	C	A	R	A	■	E	■	D	O	■	T			
M	O	N	E	L	■	A	C	I	D	■	O			
I	N	G	L	E	S	■	A	D	D	E	R			
T	■	E	Y	E	■	M	R	■	■	■	T			
A	I	L	■	N	Y	M	P	H	A	E	A			

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