

The AQUARIST AND PONDKEEPER

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Editorial

"The continuing development of atomic energy will produce progressively greater amounts of radioisotopes, and with them greater amounts of radioactive waste material. Since the oceans cover 71 per cent. of the earth, and ultimately receive the drainage from the land, they are the principal reservoir where radioisotopes will finally accumulate."

THIS quotation is from *The Biological Effects of Atomic Radiation*, a publication from the National Academy of Sciences, U.S.A. It concerns a problem that is worrying many authorities, and not only because of experimental tests with atomic weapons. Whether the horrors of atomic warfare ever come upon us or not, the use of atomic power has already arrived and will undoubtedly increase here and in other countries. As by-products of this peaceful use of atomic energy large quantities of dangerous radioactive materials are produced, and methods for disposal of these are already being investigated. Since it has been shown that an event taking place in the sea in one part of the world is ultimately capable of affecting waters everywhere, the oceans cannot safely be used.

Surface waters are in continuous motion and, in the course of years, can spread harmful materials to all parts of the world. With this facet of the problem must be considered the fact that living creatures of all kinds in the sea can concentrate and transport these materials from place to place as well. Tests made so far reveal that no "lasting damage" has been caused to populations of marine organisms by the radioactivity induced in those parts of the sea where atom-bomb tests have been made, but the amount of radioactivity concerned is only a small fraction of that which could result in years to come from dumping of power-station wastes. Scientists have found themselves hampered by the paucity of knowledge of the habits and inter-relationships of many marine organisms, and the furtherance of research into such matters is being urged. At least the threat is well recognised, and it is to be hoped that the ingenuity that is providing atomic energy for us will also ensure that the advent of this is not a mixed blessing.

pH Made Easy

by H. J. VOSPER and C. TRATT

WITHOUT going into the question of the importance of pH to the aquarist, it must be admitted that very few of us are familiar with the true meaning of the term. Perhaps ideally one should be conversant with chemical parlance and be able to read equations fluently, and occasionally it must be agreed that some "experts" find the use of technical terms an easy method of disguising their own deficiency. It must be possible to reduce things to more manageable proportions, however.

First there are two terms which require explanation: **IONS**—"The products of electrochemical decomposition appearing at the electrodes." Those particles which move towards the negative pole are called cations and those moving towards the positive pole are called anions. Another use of the term ions is for the electrified particles which, under certain conditions, endow gases with conductivity. We may say that an ion is an electrified atom. **HYDROXYL**—A simple indivisible group of atoms (known as a monad radical) formed by the combination of one hydrogen atom and one atom of oxygen.

Water contains free, positively charged hydrogen ions (H+) and negatively charged hydroxyl ions (OH-). When the numbers of these two sets of ions present in a liquid are entirely balanced then the liquid is said to be neutral. If there is an excess of hydrogen ions then the liquid is acid; and if there is an excess of hydroxyl ions then the liquid is alkaline.

The neutrality, or degree of acidity or alkalinity of the liquid thus depends on the balance which exists between the two concentrations of hydrogen and hydroxyl ions.

One litre (approximately 1.76 pints) of pure water contains one ten-millionth of a gram of ionised hydrogen and an equivalent amount of ionised hydroxyl. The concentrations being thus equal, the water is neutral.

If one were to multiply the two concentrations together one would arrive at a certain figure—and it so happens that this figure is always the same (at 18° C. it is 10 to the power of minus 14.14, and there is no need to make a note of this). Thus it may seem that if the concentration of one of the ions is known then the other is readily obtained. In fact, attention is usually centred on the hydrogen ion concentration.

It is not easy to translate equations into prose, nor are such equations easy to follow if one is unused to them. Thus at this point, we may content ourselves with the knowledge that a mathematical process enables a certain figure to be obtained and that this figure is termed the pH value (the index of the hydrogen ion concentration with the negative sign of the value changed to a positive).

We noted above that when the two concentrations are exactly balanced we have absolute neutrality. In pure water the concentration of each ion is 10 to the power of minus 7.07, and thus such water has a pH of 7.07.

The addition of acid increases the hydrogen ion concentration, thus the pH of all acid waters is less than 7.07; the addition of an alkali increases the hydroxyl ion concentration, and thus the pH of alkaline waters is greater than 7.07.

The range of pH values extends on either side of 7.07 by an approximately equal amount. The highest concentration of hydrogen ions is around 2 grams/litre (pH 0.3). The lowest concentrations of hydrogen ions are about pH 14.5.

The complete range forms a scale. The simplicity of it is that whole numbers indicate one-tenth of the concentration of the previous whole number. This is sometimes further explained by saying that pH 4 is ten times as acid as pH 5.

	pH	Ionised hydrogen/litre (gram)
Acidity ..	0	1
	1	0.1
	2	0.01
	3	0.001
	etc.	etc.
Neutrality ..	7	0.0000001
Alkalinity ..	12	0.000000000001
	13	0.0000000000001
	14	0.00000000000001

(Note that the pH number equals the number of decimal places.)

Values between whole numbers are expressed as decimals, each increase of 0.1 pH being a 20.5 per cent. decrease in hydrogen ions on the preceding pH number.

pH	Ionised hydrogen/litre (gram)
0.0	1
0.1	0.794
0.2	0.635
etc.	etc.

In conclusion we must note that the concentration of ionised hydrogen is the factor on which the acidity depends, and the "pH value" is a number used to express that concentration. The pH value does not show the amount of acid present but only the amount which is ionised.

Cacti in the Fish House

ADULT cacti can be repotted as soon as they show signs of growth in the spring. Remove all the old soil and any dead roots. Use clean pots and make sure that there is proper drainage. The soil should be very porous and the John Innes potting compost no. 8 can be used if one-sixth of a part of sharp, washed river grit is added. The potting soil should be just damp when repotting and the plant will not need to be watered for about a week. Once growth is seen enough water must be given to ensure that the plant is never too long without water in warm weather, but the soil must never be watered until it has again dried out.

CUTTINGS can be taken from many kinds of cacti when they are in good growing condition. These should be dried well, so that a skin forms over the cut part, before they are placed in contact with damp sand or soil; if this is not done rot will set in. Off-sets can be broken off and rooted easily by placing them on top of washed river grit and seeing that some dampness is available from below. Once rooted they can be potted.

THE AQUARIST

Catching and keeping 'em in Malaya

by A. H. DUTTON

MALAYA, with its immense variety of waters, appears to offer unlimited scope to the enthusiastic aquarist. In particular it gives one the thrill of catching the expensive varieties so often sighed over when scanning the price lists, and who is going to worry over the loss of, say, a *Monodactylus* or a *Scatophagus argus* when all you have to do is go out and catch another one?

Jungle streams and rivers, tidal reaches along the coast, mining pools, irrigation ditches and so on are all teeming with brightly coloured fishes of all shapes and sizes. *Rasbora heteromorpha*, *R. kalachroma*, *R. daniconius*, *R. maculata*, *Barbus pastipentazona*, *B. everetti*, *Sphaerichthys osphromenoides*, scats, monodactyls, all these for the taking together with many others which would make this article look like a list of Malayan tropicals and cut out my "word-age."

Wiles of Catching

For most of the fish it is only necessary to use a hand net; mine was about 2 ft. square with a handle 4 ft. long. With some types, the speedy, "brainy types," it was necessary to wade with two or three others holding a net spanning the pool, then trapping the fish against the bank and picking them out with a dip net. The commercial collectors mostly use this system. Aquarists know that different methods of catching their fishes have to be used in their tanks; similarly when catching them in their native habitat, but with infinitely more patience required. The odds are on the fish!

From the above list the easiest types to catch were the *R. maculata*, *R. heteromorpha* and *R. daniconius*. A slow steady approach with the net, under them and then up, and there they were. Scats were tricky. Although in groups of 20 to 30 it was difficult to trap more than two or three in the net. More often than not you get none at all. They will open up the group as the net approaches and your net will just pass through the lot of them. The scat shows little or no fear, just an amused contempt. They are back in their shoal before your net is out of the water. They are found in salt and brackish waters but I usually caught those in brackish waters as they are already partly conditioned for fresh water.

The barbs are all very cautious fishes. Again, they occur in shoals, but usually they avoid any unusual thing in the water and would swim and move all round the net without coming over the main body of it. Eventually I worked out a system where my net was partly buried in the mud and thus concealed. When the barb moved over it I had him. But holding the net in position and keeping ready for the jerk up was an awful strain at times.

Sphaerichthys osphromenoides was easy to catch provided he was not frightened. If anything startled him it became a case of "there he is, there he isn't." He would dash for weeds, rushes, etc., growing at the sides of the stream and just disappear. I can confirm that *S. osphromenoides* is a



Photo: Laurence E. Perkins
Scatophagus argus, the "scat", is a Malayan species found in both salt and brackish waters. It grows to a large size (10 inches) but small specimens are easily kept in home aquaria with one-fifth of sea water in the tank, and they show many amusing tricks of behaviour and apparent intelligence.

mouth breeder. I have caught one with eggs in its mouth. Unfortunately it died before any of the eggs hatched.

There is an interesting side-light on the guppies now swarming all over the country. I cannot confirm the story. The guppy is not native to Malaya, of course, but it is reported that a number of aquarists freed their fish before fleeing from the Japanese in 1941 and 1942 and that the guppies survived and bred all over the country. It is an undisputed fact that they are there, anyway.

No Heaters Required

Keeping fishes in one's home presents no difficulty at all. Firstly, you require no heating apparatus. The temperature varies between 80° and 90° F. all the year round. Food is in abundance. *Tubifex* and mosquito larvae are the chief foods given. *Daphnia* will not live out there but are not needed anyway. My biggest bugbear was green water. The sunlight is so intense that great care had to be taken to place tanks away from it. Aquatic plants ran riot but the local ones are not too good in a tank. Nearly all the plants I have seen in aquarists' tanks have been the good old standbys *Vallisneria*, *Sagittaria*, etc.

Fancy goldfish enthusiasts would be in heaven out there. All types regarded as rare here, are to be found everywhere. The Chinese are very fond of goldfish and love keeping them. Many make a small income out of breeding goldfish but very few people breed the others. I had no difficulty in breeding any fish out there, and I include the imported tropicals too. I am only surprised that no one has yet opened a large-scale breeding establishment in the country. If I had the capital to do it I would be back in Malaya like a shot!

Microscopy for the Aquarist—29 by C. E. C. COLE

LAST month we noted how an incorrect setting of any of the components in the "optical train" caused marked deterioration of the image quality.

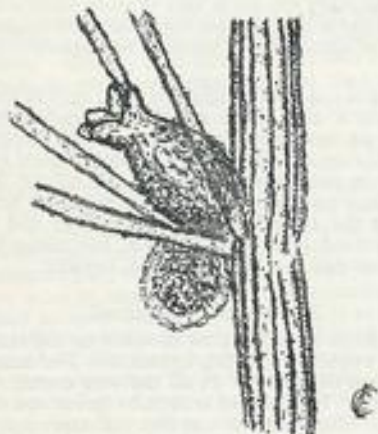
I mentioned that sometimes a slide was too thick to enable the light source to be accurately focused upon the object. It must be understood that the object, according to its nature, is at varying distances from the base of the slide. The average condenser (substage illuminator) is so computed that it focuses an image of the light source at near enough $1\frac{1}{2}$ millimetres ($\frac{1}{16}$ in.) above its upper lens surface. Obviously then, any object mounted at a greater distance than this from the underside of a slide cannot receive the best illumination even though the upper lens of the condenser actually touches its under side. We can, of course, turn the slide over and thus bring the object within the focal length of the condenser, but by doing so, we may then experience difficulty in focusing the objectives, especially those of short focal length, and these are the very objectives for which we require the condenser. We are thus in a cleft stick; an improvement in one direction is cancelled by a deterioration in another.

When purchasing slides it may happen that all those of a particular subject are too thick, and then we can only select the best of what are offered, provided we consider the subject worthwhile. Check them in the shop if possible.

Not only can a slide be too thick—it can also be too thin. The test for this is fairly simple.

Thin Slides

Having focused the image of the light opening in the plane of the object, we leave the condenser setting un-



A drawing of the alga *Chara* as seen with a $\frac{1}{2}$ in. objective and $\times 8$ ocular

touched and move the objective up and down slowly while watching the image of the light opening. The object image deteriorates immediately we rack either up or down, but the opening image remains sharp for a fraction longer.

If it deteriorates quicker above the object plane than below it the slide is too thin, but if it stays sharp for an equal distance both above and below it is the correct thickness.

Whereas we can do nothing about a too-thick slide we can, if prepared to take the trouble, sometimes remedy a too-thin slide by building up its thickness.

First, however, try unscrewing the top lens of the

condenser slightly. Nothing else may be necessary, but if this will not suffice, and you are determined to have things right or burst in the attempt, you will require the following:

1. A quantity of cover glasses (1 in. no. 1); these are sold by the quarter ounce.
2. Several small, wide, corked, flat-bottomed glass tubes; those $1\frac{1}{2}$ in. by 2 in. are ideal.
3. Small bottle of Canada balsam, with dropper, or a mountant of similar refractive index (1.526).
4. A small quantity of 3 per cent. solution of sodium metasilicate, or of one of the modern detergents.

Cover glasses, particularly no. 1, are very delicate things to handle, and although there is a fair number in a quarter of an ounce you can hardly hope to get through without breaking quite a few. The first thing you will discover is that when you think you have picked up only one it is extremely likely that you are handling three or four. The solution of metasilicate is for washing them free of grease, after which they must be dried before use.

Cleaning Cover Glasses

Two-thirds fill one of the short tubes with solution, place the cover glass or glasses you intend to clean in them, cork the tube and lay it on its side. The cover glasses (slips) will rest across the lower half of its width, the solution flowing freely over upper and lower surfaces. Gentle rocking will clean the slips without breakages.

Tilt the tube so that the liquid is beneath the lower edge of the cork, and remove this. Empty the liquid into another tube very gently, to avoid the cover slips falling out.

The slips can now be lifted out (with the tube in a horizontal position) on the blade of a clean penknife. Place the empty tube down on the table and lift an old, well-washed piece of soft linen. Place the slips or slip in this for drying and polishing. I find the best method is to support one side of the slip with the first finger, and close the thumb lightly over it. By making a circular movement of the thumb, above, and the finger beneath the slip, and exerting only light pressure, the drying and polishing is quickly and efficiently performed.

The slide which has to be built up should have the underside cleaned by a rag moistened with the cleaning solution, and then dried thoroughly and placed face down on the table. With the dropper place a bead of mountant in the centre. With extreme care a slip can be transferred upon the penknife blade and placed upon the bead. Gentle pressure will spread the mountant to the outside edges of the slip, and the job is complete. If the mountant is too stiff, warm the container before use, until it flows freely in the bottle. This will minimise breakages. It would be a pity to get right to the last operation and then spoil everything.

Next month we will talk about another even more important point we shall have to watch to get the best out of our apparatus.

Erratum

ON page 252 of the February issue the strength of a solution of methylene blue used for treatment of gill fluke infestation was incorrectly given as 95 per cent. The strength should be 5 per cent. and apologies are offered to readers who have tried to obtain the stronger solution without success.

AQUARIST'S Notebook



by

RAYMOND YATES

SOME interesting notes on the effects of pollution on fishes are given in the *Report of the Water Pollution Research Board* (1955) issued by the Department of Scientific and Industrial Research (published by H.M.S.O. at 4s.).

Toxicity tests are made by observing the periods of survival of fishes in several dilutions of the toxic material, bearing in mind that temperature, pH value and concentration of dissolved oxygen are among the factors which affect the results. During a test, fishes consume oxygen by their respiration, and this must be replaced by bubbling air through the test solution. This results in a loss of volatile substances which may affect the toxicity of the solution either because they are themselves toxic or because their loss alters the pH value. An equilibrium rate of air flow can be introduced, however, to offset this difficulty. Tests show that chlorine is removed less rapidly than carbon dioxide, the rate of removal of the latter being substantially the same as that of oxygen from a super-saturated solution. The rate of loss for substances such as hydrogen sulphide, sulphur dioxide and ammonia are less than that for chlorine.

Tests for fishes are based on an oxygen concentration of 80 per cent. of full (saturation) value. Small fishes are best for tests and the white cloud mountain minnow has proved useful because it consumes oxygen at the rate of only about one hundredth part of that for a young trout, yet lives healthily at 65° F. Tests with two small tropicals (harlequins and *Barbus cumingi*) show that they are about as susceptible to potassium cyanide as rainbow trout or the English minnow. Some fishes demonstrated considerable tolerance to very low amounts of dissolved oxygen. Tench at about 64° F. and with oxygen only 0.8 per cent. of saturation value were tested and half of a batch of these fish survived for over seven and a half hours. It appears that where fishes are exposed to low oxygen for a week the concentration at which all of them die is about 70 per cent. of the minimum value at which they all survive. The range of oxygen concentration covering complete survival and complete mortality is comparatively small; in terms of percentage saturation with oxygen it is smallest for those species of fishes which are most resistant to oxygen lack.

Most detergents contain tetrapropylene benzene sulphonate, which is toxic, although only three out of seven common ingredients for domestic synthetic detergents proved toxic in some tests. The toxicity of many poisons is increased as the concentration of dissolved oxygen is reduced. Some preliminary experiments were made to determine the effect on fishes of small concentrations of metals, mainly iron, zinc, copper and nickel, and in every case the toxicity was most marked where the dissolved oxygen content was low. Rainbow trout lived for 73 minutes in one solution at 25 per cent. of normal oxygen saturation but for 2,040 minutes at 40 per cent. oxygen saturation. Roach are much more resistant to adverse changes in their natural waters than trout; perch are usually rather similar to trout, but occasionally they prove much more resistant.

The following fishes were used for experimental purposes, apart from those already mentioned: guppy, zebra, danio, *Aphyocharax rubripinnis*, *Mesogonistius chaetodon* and *Melanotaenia nigra*. I am indebted to the Controller of H.M. Stationery Office for official permission to quote from the *Report*.

Mr. E. G. Green of Toronto tells me of his success with the dwarf cichlid *Nannacara taenia*, after three years of

selective line breeding. He has almost succeeded in producing a solid metallic-blue male with bright-yellow dorsal, anal and caudal fins. The females offer the major challenge as they are reluctant to give up their dark stripe and bar markings. Mr. Green had no success in spawning this species when only a single pair was placed in an aquarium, but found that the pair would spawn if more of their species were introduced to the tank. This does not mean that they are community spawners, however.

Best results are obtained with six fish, three males and three females, in a 10 gallons tank with plenty of rooted plants and subdued lighting. A few flat stones are helpful but "hide-outs" made from upturned flower pots or rock caves are quite unnecessary, although suggested in some books. If these are used the spawning could occur without the knowledge of the aquarist. Water of pH 6.8, which is neither too hard nor too soft, should be provided at a temperature of about 68° F. Feed well on live food and scraped liver for 14 days or so until a female takes on a darker shade. Remove two gallons of the tank water and replace with warmed tap water, then increase the tank temperature to the 75 to 80° F. range. Within two days a spawning should result and all the fish except the "mother" should be removed. She is the one who guards and fans the spawning.

The eggs hatch about the third day and fry are free swimming a week later, when they are able to take freshly hatched brine shrimp. Line breeding under these conditions is done by having a selected pair which are isolated in separate containers and conditioned. The other unconditioned fish are introduced to a tank along with the selected pair and, in the raised temperature, the selected fish seek each other out and spawn.

It is interesting to record that Mr. Green won a second prize with these fish in the Canadian National Aquarium Exhibition last autumn. The fish are not often offered for sale in England although another variety (*N. anomala*) is relatively common. My own experience with *N. taenia* is that they are very keen on staking a claim to some part of the tank, and can be very vicious indeed with even large fishes which venture too near. For this reason they are not a community fish like some of the other dwarf cichlids.

I suppose most aquarists at some time or another dream about fishes. Perhaps most dream of success at shows or possibly see themselves as originators of wonderful new strains. It would be quite a subject some night at the club to talk on "My wildest fishy dream." Now and again I find myself in this never-never fish land but it is only on very rare occasions. The dream is almost always the same, insofar as I invariably find myself opening some shed or room which has been out of use for some time, and find therein a tank or tanks of really wonderful fishes which I had forgotten all about. Although these dream fishes have been left to look after themselves for months they are always in perfect condition and the water is crystal clear, and I wonder how on earth I could have been so stupid as to forget I had them.

Alternatively, I sometimes find myself in some well-known town where I suddenly remember there are two or three dealers' shops. I make my way there and discover the most wonderful and unusual fishes on sale at absurd

prices, practically being given away. Be that as it may, I never manage to buy any in these dreams, but months afterwards I go through the same old round again. Whatever the origin of dreams it seems to be mere wishful thinking as far as aquarists are concerned. I have yet to hear of any in the nightmare class. Has anybody any experiences to relate in this line?

Clubs who think they have experienced show difficulties should read a letter sent to the Portsmouth Club from the Singapore Aquarists' Society. Two nights before the members were due to set up stands rioting broke out, and they found themselves building road-blocks instead. The day before the show was due to open a curfew was in force from 6 p.m. to 6 a.m., but this was lifted two days later and police permission obtained to open the show. Five days late in opening, and the attendance was poor for obvious reasons, but a visit from the Commissioner General and a four-page publicity supplement in the local press brought the crowds. One attraction, a Californian sealion, got lost on the way from Germany and was at last traced at Delhi, so that it arrived on the last day, the glad news being put out over the local radio with the result that still more people came. Details of the show indicate that there were 40 furnished aquaria, 428 pairs of fishes, 24 marine and 60 freshwater display tanks and five trade stands. The attendance was some 20,000, with receipts of £950 against expenditure of £820.

It is surprising how few hobbyists even know what bloodworms are, let alone what they look like. This is a pity, because they are certainly one of the very best foods for larger fishes and, moreover, a food that is available almost everywhere for those who care to look. Perhaps one reason for their not being so well known is that they are of no use for feeding fry.

Bloodworms are not worms at all, but the larvae of a midge which are a delightful blood-red owing to the haemoglobin in the blood. This enables them to live in very stagnant and even foul water, and there is no worry at all about keeping them in a jar of water for a considerable time. They do not need frequent changes of or running water, as is essential with *Tubifex*. These jointed larvae live on organic matter in the mud at the bottom of ponds, often stagnant ponds filled with dead leaves, but they can move rapidly through the water with a bending or looping motion. Most fishes eat them with relish but I have never found *Corydoras* to touch them; I don't know why.

It has been suggested that as bloodworms possess mandibles they could eat their way out of a fish which failed to "chew" them up. I have heard this tale before but have never seen any actual instance, nor do I think it likely. Very few fishes except cichlids "bolt" their food, so there is little risk. Perhaps paradise fish could be affected, they seem to have an unending appetite and I have seen worms eat their way out of paradise fish on several occasions, but they weren't bloodworms.

Bloodworms are rather more than half an inch long so are only fit for larger fishes. When chopped up the blood will soil your tank water, and my own view is that chopped bloodworms are not attractive to most fishes. On occasion this live food can be bought from dealers; if the opportunity comes don't miss your chance to try a very satisfactory food. I have noticed one odd thing in use: the colours of black widows fade after eating bloodworm but return within 12 hours.

Condensation can be a great trouble in a fish house and some hobbyists install a paraffin heater to minimise the effects. This also warms the air and reduces the electricity bill. However, I heard recently of a rather nasty accident

which is worth mentioning as a warning to other aquarists who use this heating. A paraffin heater was knocked or kicked over by accident in a small fish house roughly 8 ft. by 6 ft. which contained 12 tanks of varying sizes. Just exactly what happened next is not quite clear, but I understand that the aquarist had great difficulty in opening the door, which had stuck, and he was liberally splashed with paraffin. He sustained a nasty gash on the arm from broken glass. The fish house itself was not gutted, owing to a concrete floor and the presence of asbestos sheeting, but every tank was broken or cracked and the fishes were lost. The total loss was considerable. Where there is any risk it is as well to check on all safety aspects. It could happen in your fish house; it is not always the "other fellow."

The Hook of Holland Aquarium Club recently sent me a copy of their monthly magazine *Onze Liefhebberij*, which could be translated as "Our Hobby." This is a good effort and serves to show how similar aquarists are the world over. A recent lecture to the club was entitled "Which fishes should I keep in my tank?" One reads that *Tubifex* can be obtained on Wednesday evenings at 8 p.m. An effort on behalf of the Hungarian relief organisation realised 25 guilders.

The magazine is now in its third year, but the club is five years old. The secretary works for the Zealand steamship line and this has its advantages, as some of the ships' officers are briefed to pick up items of aquatic interest whilst in England, including *The Aquarist*. The hobby in Holland suffered greatly during the late war period. It is good to hear again of Dutch enthusiasm.

We have all listened to speakers at club meetings telling of their success with this fish or that, and there are numerous articles constantly appearing in the aquatic press which give us chapter and verse on how to do this, that or the other in the fishy line. What we never hear is anybody getting up and talking about their failures. I don't see why not. After all, most of what we learn is the result of trial and error, and a wise man can profit from the mistakes of others. Some years ago a certain club found their speaker had not turned up to talk on "Breeding neons," so another member took over and gave a very interesting and amusing talk on "How not to breed neons"—based on bitter experience.

Some people are well known in the hobby and are often thought of as "experts," whatever this term may mean. You can be sure, however, that they have had many failures and, in some directions, consistent failure. Talks on such lines will often bring forth from other members many interesting side lights on the topic. The speaker can always be sure of a good laugh and has the sympathy of his audience who, almost to a man, have tasted defeat themselves. For my own part I have never had any success with the leeri gourami or harlequins (just a long record of abject failure), although others find these fishes simplicity itself. In the plant field I have never had any success with *Ambulia* or *Myriophyllum*, although I have had very "green fingers" with all the others.

The American market continues to turn out something new in the hobby almost every month. Dealers can now obtain a range of attractive price signs to attach to each tank, which show a picture of the fish in colour, the name, type and price. A new form of Perspex fish trap is available which works on the old basis of ease of getting in but not in getting out. They are excellent for trapping small fishes in well-planted tanks or rearing ponds. A special type is available for surface breathers. In the medication section polythene bottles of "cures" allow correct dosages to be squeezed out in drops.

The Amateur Tropical Fishkeeper

by JOHN W. LANGTON

M.B.E., B.Sc., M.I.Mech.E.

(Photographs by the author)

LET me say clearly at the outset that this opus holds no message for the expert or the professional or even the amateur about-to-become-expert tropical fish keepers. It is written simply for the humble and lowly new starters.

I started keeping tropicals about two years ago, and before this time and during it I have listened to many experts, and have read a number of books on the subject. In many cases I found that neither books nor experts were able to get down to my level, so I thought that from my lowly position I might be able to touch on a few points which might assist other spirits in similar case.

I have now two tanks, one the usual 18 in. by 12 in. by 12 in. and the other 44 in. by 18 in. by 24 in. deep. I have not much in particular to say about the first, it was bought complete, ready for the contents. General remarks about its maintenance are covered in the text. Its subsequent embellishment was described in a previous article in *The Aquarist* (June, 1956).

The larger tank was more of an original conception, as will be gathered from the dimensions. My first battle with the experts was on this particular point, when I was told that such deep tanks have every disadvantage under the sun. Now the idea of having a tank like this in the first place was to provide a unique underwater picture, and I wanted a picture of reasonable size and proportion to decorate one side of our sun room. A tank of half the depth, say, in miniature cinematograph proportions, had no appeal then or now. Propped up at eye level on iron stands, to me they look horrible. I have come to the conclusion that few experts are interested in the total decorative appearance of a tank. However, I can assure my humble friends that my two years' experience with a deep tank has not shown up any trouble.

Since I could not easily buy a tank this size, it had to be made from pre-stressed angle iron, size 1 in. by 1 in. The



Appearance of the larger aquarium referred to in the article, the opened cover to which is shown in the other picture on this page

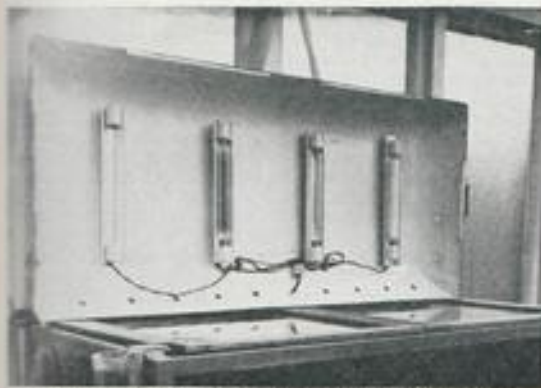
glass is three-eighths thick at the sides and two—three-eighths at the base. It is better to get a professional glazier to fit the glass, our own first attempts were not too successful. Leaning heavily on wood—we have not had any leakage troubles, but I would say that the tank has not been moved since installed.

Across the centre at the top is an angle tie and in the two recesses so provided are dropped the covering glasses. These glasses are mounted in teak frames, and so can be handled without trouble or cuts. Over the top of the glasses is the sheet-metal lid which carries four strip lights. The lid edges are just turned in and the lid then just rests on the top of the angle frame. To restrict its sideways movement, we have angle brackets in the wooden frames. When feeding the fishes, we just lift the lid on a piece of wood and lift up a glass cover. Quite easy. For tank cleaning, the lid rests on its edge at the back of the tank.

Heating

The heating is by three of the usual type heaters, controlled by an outside thermostat. These heaters, etc., have been working quite satisfactorily for the whole of the period without the slightest trouble. We have a thermometer at the front, remote from the thermostat, and so far as I can tell there is about 3-4° variation. The heater cuts in about 78°, and out at about 81° F. The electric wiring goes through direct from the plug to the heaters, and the lights and air pump are on separate switches. On this subject of electric, I would fervently support the advice of the experts here to switch off the plug *always* before inserting hands into the tank. So much for the essentials. Those I have, have served quite well, but now with a little experience I am on the point of re-wiring and improving in many ways. I want to rewire through a small distribution board, and to give a much neater job here. I hope also to make some embellishments generally to create a better picture effect, and to hide the angle and sheet-metal cover, especially after the embellishing of the small tank.

Now to pass on to the tank contents. It took me quite a time to appreciate the high virtues of well-sloped gravel. The text-books did say slope the gravel, but I did not grasp how much it should really be sloped to get the best effect. Bags of slope you amateurs, and wash, and wash, and wash



Strip lights mounted in the cover provide the illumination over this aquarium

the gravel before inserting. I suppose there is a difference between washed and unwashed gravel as bought from the dealer, but do not let the term washed gravel fool you. It still wants washing, and some!

I have used a reasonable amount of stone on top of the gravel (keeping in mind the load on the base glass) and with a deep tank, I need it. However, Mr. Knock's article in the October, 1956 issue of *The Aquarist* has fired my desire to improve. Mr. Knock—my thanks. A certain amount of re-vetting the stone layout periodically, with the necessary spring cleaning, is well worth while.

The plants grow without much trouble. The number of varieties should be kept down, and by experiment one can find two or three which flourish best in the particular circumstances. It is pretty obvious that the prevailing conditions vary with each tank and each *situ*—I find it difficult to grow *Cabomba* in the small tank, but it flourishes in the large one. In this now I have mainly *Cabomba*, hair grass and Amazon sword plants. These grow well, and are not too acceptable to any of the fishes as salad. Some varieties I have had to dispense with for this sole reason.

Although my two tanks are in the same room, they get a different measure of light. Even so, I never have to use artificial light at any time of the year for plant stimulation. We seldom use the room after dark. In summer the main problem with the large tank is to keep down the algae, and the green off the glass, and some covering up is necessary. Incidentally, one side of the large tank and the back is semi-permanently covered in. I can remove the covering but have not yet found the necessity.

Aeration and Filtration

For quite a time I had no aeration or filter plant. I started with a small cheap baby pump, and regretted it 24 hours later. Since then I have tried several, and my advice to my amateur friends is to buy the best—which is the dearest at the time but the cheapest and most satisfactory in the end. Piston pumps with metal pistons and no leathers I have found by far the most satisfactory. My present pump runs 24 hours a day, seven days a week and has done so for a considerable time without the slightest trouble or the slightest noise.

Our filter is an outside one, picking up at the front corner and delivering back into the far corner. The circuit is a bit long, through a Perspex pipe running across the back of the tank, alongside the covers, and under the lid. We have tried many set-ups in this filter business, and our existing result is the best we have had. The filter is firstly nylon wool (which gets the main mulm), the usual filter wool, then gravel. This filter must be as efficient as possible, or the aeration stone soon becomes clogged and pretty useless. We have experimented quite a bit with these stones, because the volume of the water dealt with depends on them entirely. So far we have not found a better medium than the filter stones available at the usual dealers. (If any peeping expert reading through this to scoff, knows of a better answer, I hope he will tell me.)

The end of the siphon pipe we enclose in a Perspex ring, which prevents the fishes from moving it into the gravel and blocking it. The ring serves somewhat as a small dustbin, the catfish activities brush mulm into it, and a little movement over the gravel floor of the ring lifts it out.

At one time we had an inside filter in the small tank, but discontinued it because it did not seem to be really necessary. Since we now use the small tank as a nursery for small fishes to grow up to a reasonable size to enter the bigger tank, and since the numbers are not great, we find they thrive quite well without aeration.

This system does keep the tank very clean.

The larger tank has always been a community tank, and most of the residents have been there throughout the tank's life. The selection includes mainly a number of angels,

now of pretty large size, gouramies (blue, lace and kissing), glass tetras, hatchets, a few catfish, with a few odd specimens of various types—about 30 in all. All are of good size, and one of our difficulties is always to get larger fishes. Small fishes do not thrive very well, hence the use of the small tank as a nursery. Our experience with a black shark and Siamese fighters was not a happy one.

Our main requirements in fishes are that they should be decorative and of size that they can be seen. Rare fishes with the main virtue of rarity do not interest us; it might be highly social to be able to point to two black angels at, say, £25 the pair (in which case why not have a little price tag on each tail?) but most of our visitors like the tank and fishes for the same reasons as we do, it is an interesting, decorative, pleasant and relaxing picture, to which rare fishes would not necessarily make an increased contribution. I wonder how many other fish-keepers think the same?

Most of the tropical-fish books give fearsome lists of fish maladies and their cure. I have taken the advice on several occasions without real success; the best results I have had have been to prolong life only for a short period, and we wondered then if we were doing the best for the fish. We rather think that if the fish is really ill then quick extinction of life may be doing it the best service.

On the subject of food: the fishes seem to thrive mainly on dried food, relieved by *Daphnia* in summer, and odd treats like cooked fish, various meats (corned beef is well liked), eggs, etc. Worms we do not like handling.

Maintenance

The principal maintenance in both tanks is to siphon out on the gravel once a week. After a cycle of various gadgets, I have got back to a plain rubber tube and an oval bath. The mulm accumulated in a week is slight, especially in the larger tank, and a weekly siphoning to remove the mulm alone is not necessary. However, I do think that the small change in volume of water—about 15 per cent. in the larger tank, 50 per cent. in the smaller tank—is good for the fishes, so I carry it out as routine.

Apart from high summer, the kissing gouramies do a considerable amount to keep the front glass clean, the back and one side I leave. The best instrument for cleaning the glass (again after having tried quite a number of gadgets) is a safety-razor blade in one of the holders. The very sharp edge I just rub off, so that the glass is not scratched. The glass should be cleaned first, and the scrapings allowed to settle before beginning siphoning. No food residue is ever left in the larger tank, but there is a tendency for this in the smaller tank, so I siphon up some gravel here each time and wash it and replace it. Plant trimming, etc., follows.

I fill the tanks up directly from the water supply through hose. Originally I checked with a thermometer before running in, now I can tell by the feel on the hand near enough. I run the water over my hand into the tanks, which avoids plant displacement, and distributes the water. On no account allow the water to be poured on the glass.

The filter is changed about three times a week. The nylon can be washed, and the other part of the filter completely changed once a week. Brushes for the piping can be obtained from Kleen-eze. The filter stone now lasts about three weeks.

The all-in time for weekly maintenance is about 1½ hours. If the experts did read this, I expect they would find all kinds of sins and omissions. Against this, I can only say that we have two pleasant living pictures which give little or no trouble. I cannot tell if the fishes are happy or not, but they mostly live and thrive; some time we hope to have the largest angels in captivity in this country!

My final message is to keep on simple lines, keep the tank clean, find out what plants and fishes thrive in your circumstances, stick to a routine, and do not buy gadgets.

The Pond-side Iris

by WILLIAM J. HOWES

(Photographs by the author)

THE yellow iris (*Iris pseudacorus*), or yellow flag as it is commonly called, is a native to Britain, throughout which it is very widely distributed, growing in marshes, ditches, along the banks of rivers, streams and around the edges of lakes and disused gravel pits.

This iris is a perennial and grows anything up to four feet in height. From the end of May until well into August the iris displays its large, golden-yellow flowers. Indeed, this is quite a long flowering period, as will be realised when you consider that the cultivated varieties of the garden have a flowering period of about three to four weeks.

Long Flowering Period

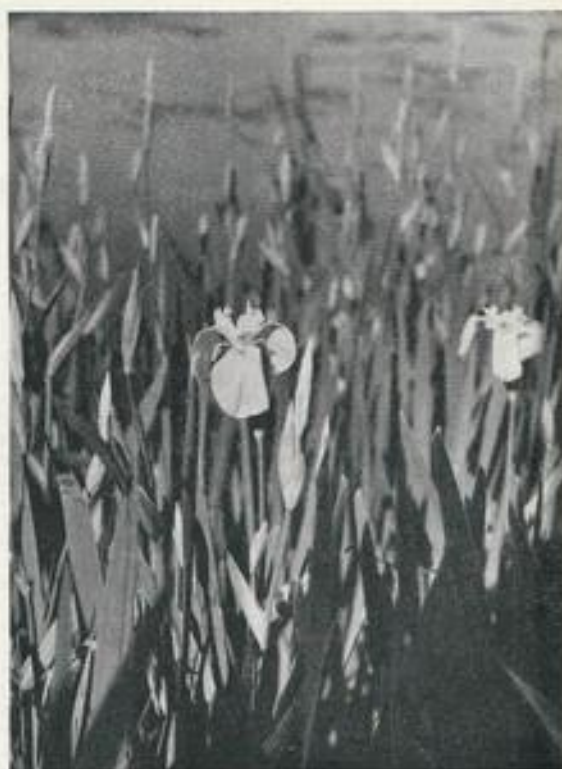
Because of the yellow iris's long-flowering value, many aquarist-pondkeepers when out on a collecting expedition endeavour to gather some of the plants for setting in the margins of their garden pools. Often they will introduce them even to odd corners of the garden, where they will do quite well provided the soil is sufficiently damp.

The yellow iris has underground stems called rhizomes, and these continually stretch out beneath the soil, or in the water, and keep throwing out roots at intervals. They produce shoots which grow up into the air and produce stems, leaves and flowers. The plant is therefore capable of increasing at an alarming rate. Because of this it is not advisable to introduce the flag to a small garden pool unless it is to be kept under strict control!

I have some growing in the margins of my pool, as it is my opinion that, especially when in flower, it makes an average pond look far more natural than one planted with



Perch spawn found draped around the stems of reeds and yellow flag iris at a river's edge



Yellow iris (*Iris pseudacorus*) is a useful and decorative marginal plant for the pond

the cultivated varieties. Moreover, the large yellow blossoms of this long-flowering wild iris are very beautiful and increase the attractiveness of any pool.

There are usually several of these large flowers on one stem, though they generally bloom one at a time. Its leaves are numerous and generally grow about four feet long, and each blade is about an inch in width.

Clumps of iris growing in shallow water attract fishes, frogs and toads. In the spring frogs like to shed their masses of spawn between the leaves, and this no doubt protects much of it from the many creatures who search for it as food. Sometimes toads will also lay their strings of eggs between the leaves of the yellow flag. I know a small natural pond which has a great mass of yellow iris growing around its edge, and at the right time of the year a search will reveal some milky-white "necklaces" of perch spawn draped over the submerged leaves.

A cautious approach to the water during the spring will reveal moorhens searching among the new season's growth of yellow iris for these tasty items of food. These water-birds will make short work of any spawn they find.

Various species of fishes will be seen patrolling the fringe of a bed of wild iris, for they know that the submerged portion of the plant harbours many creatures in the tadpole stage of life, and the fishes feed on these. But the many leaves which shoot straight up from the rhizomes afford a haven of security for fish fry, for the tough leaf bases cannot be pushed aside easily by larger fishes. Therefore, provided its vigorous growth is controlled, this handsome pondside plant is as useful as it is decorative.



BOOK R E V I E W

All About Guppies by Leon F. Whitney and Paul Hahnel. Practical Science Publishing Co. Inc., Orange, Connecticut, U.S.A. (Obtainable in Britain from Peter Hobson, 79, Southbrook Road, Countess Wear, Exeter; 12s. 6d.)

IT is a safe bet that of all the hundreds of tropical fish varieties which are available the guppy is the one fish which every aquarist has kept. Almost always this is the fish which introduces the hobby to the beginner. We owe quite a debt to the humble guppy, who has helped in no small way to popularise the fancy. Guppies have many advantages over other aquarium fishes, they are small and cheap, are livebearers which breed rapidly, they stand inbreeding, are polygamous, show a wide tolerance to varied environments and to irregular feeding, they are never finicky or timid or pugnacious, they are subject to few diseases and, perhaps best of all, they produce frequent mutations.

This book really sets out to tell the reader all there is to know about the guppy, and in the course of 128 pages, with 18 photographs and 21 diagrams, it covers a general review, anatomy, equipment needed, feeding, heredity, practical breeding, diseases and ailments and concludes with one of the most complete bibliographies on the guppy ever presented, this extending over 120 references of which a mere half-dozen are British. At present there are no American show standards so British standards are set out in great detail. Breeders will be particularly interested in the section on heredity, which covers inheritance, birth marking, telegony, blood theory, germ plasm, mutations, linkage, crosses, sex chromosomes, sex-limited characters, hormones, inbreeding, outcrossing and line breeding. Although dealing entirely with the guppy, there is much in this book of interest to any aquarist, as much of what is written can apply to most other aquarium fishes. Written for the layman and not the expert, this book was first published in 1952 and its popularity has been such to call for the enlarged second edition under review. There are few faults, but in the very detailed diseases and ailments section some of the "cures" are not described in sufficient detail for a beginner to risk their use.

The book contains many unusual little tips such as, for instance, how to deal with polluted water due to overfeeding. The reader is advised to change most of the water, use aeration or dissolve a small amount of aureomycin in the tank water to kill the bacteria. The amount suggested is 50 mg. to five gallons of tank water. The authors have made a nice gesture in the dedication of the book, which runs "To our wives, who have so patiently tolerated our mutual hobby, and, to their great credit, actually encouraged us in it." A really first-class revised edition.

RAYMOND YATES

Waterweelde

A DUTCH-language aquarium magazine under the title *Waterweelde* is issued monthly by the Unie van Aquariumhouders, and is now in its seventh year of issue. It is well printed on excellent paper and illustrated with numerous first-class photographs (many by Timmerman). Most issues run to 20 or more pages plus cover (advertisements are restricted to the cover, a welcome change

to the American type of magazine which tends to interpolate too many advertisements with the reading matter), the annual subscription being Fl. 6.50. The articles are well written and informative, although almost always they mention fishes by names unfamiliar in this country. The accent is mainly on particular species, so that sample articles are headed "Neons," "Blind Cave Fish," "*Labo erythrus*," "*Limia nigrofasciata*," "*Loricaria parva*" and "*Hyphessobrycon callistus*," all being taken from one issue, plus six other articles including club news, etc. The advertisements give the impression that fishes are cheaper in Holland than in Britain, and one is struck by the fascinating names the dealers use for their shops: Rasborn of Arnhem, Zilvertetra of Amsterdam and Danio Rerio of Delft, to mention a few. There are also several advertisements for aquarium insurance. If any Dutch-speaking readers are interested (in England or U.S.A.) I shall be glad to put them in touch with the editors if they will write to me c/o *The Aquarist*.

RAYMOND YATES

All About Breeding Tropical Fishes by Earl Schneider. Practical Science Publishing Co. Inc., U.S.A. Dollars 1.75.

THIS fine book forms a companion book to *All About Aquariums* by the same author, of 128 pages with nearly 40 photographs and diagrams. The first 40 pages deal at length with conditioning, feeding, pH and water hardness problems from a general angle, and are a mine of information. Successive chapters thereafter deal with livebearers, egg layers, non-adhesive and adhesive-egg scatterers, bubble-nest builders, parental-care fishes, catfish, goldfish, egg-laying tooth carps, neons and harlequins and unusual fishes. A detailed index of fishes by scientific and common names provides useful data on size, sex differences, breeding behaviour and specific points about each species.

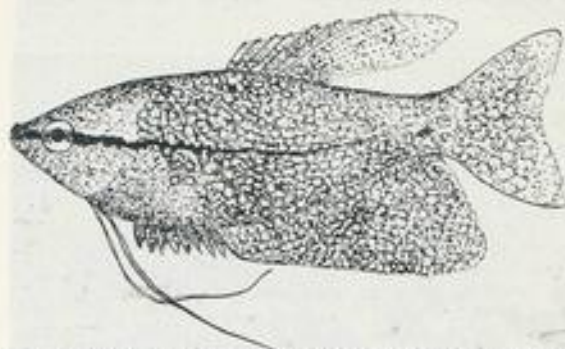
Mr. Schneider mentions that he considers many failures with neons are due to the fish being unfit for breeding because of the presence of one of the two neon diseases, neon tuberculosis or the other wasting disease, microsporidiosis, caused by the parasite *Plasmodium hyphessobryconis*. It has been suggested that 90 per cent. of all neons fail to survive a year in captivity owing to these two troubles. The author has kept these fish for over five years and suggests that their life span would probably be extended in captivity if aquarists would take care to see that they are not kept with large fishes which harass them, or crowded with fishes which "hog" all their food. Streptomycin sulphate in a concentration of 150 milligrams per gallon (U.S.A.) is put forward as a possible cure for neon tuberculosis. Many imported neons seem to be females, and the author sexes these fish by profile. The stomach of the male comes straight back from a narrow jaw, whereas that of the female comes down a bit before carrying back.

The author tells of three successful methods for breeding *Daphnia*. "Place two pounds of garden soil and six ounces of finely divided horse manure (8 to 15 days old) in a 9 in. by 12 in. battery jar. Cover this with 2½ gallons (U.S.) of strained pond water. Keep this mixture at 59° to 68° F. for three days. Then strain it through a fine piece of nylon cloth. The resulting mixture should be diluted with more strained pond water. The extent of the dilution depends on the density of the solution. A dilution of 1:2 to 1:4 is satisfactory. Stir the solution, allow it to settle for an hour, and add the *Daphnia*. A second less odorous method involves the use of ordinary yeast. Crumble one fourth of a cake into a jar containing a few ounces of water. Cap the jar tightly and shake it until you have a fine, uniform suspension. This suspension is added to a 15 gallons tank of water, which is then seeded with *Daphnia*. This feeding is repeated every five or six days. In the

(Please turn to page 14)

The Pearl Gourami

(*Trichogaster leeri*)



ORDER: Percomorphi, from Greek *perke*—a kind of perch, and Greek *morphe*—form or shape.

FAMILY: Anabantidae, from Greek *anabaino*—to go up.

SPECIES: *Trichogaster*, from Greek *trichos*—a hair, and Greek *gaster*—belly. *Leeri*, from Leer.

THE pearl gourami, or "leeri" as it is popularly called, is not one of our toy fishes, for it grows to an overall length of from four to five inches. Nevertheless, it is extremely popular and most aquarists fall under its spell at one time or another. Small wonder, for it is both beautiful and docile, a good neighbour with interesting habits.

When in first-class condition it literally sparkles as it turns in the light. There is nothing hurried about its movements, and this gives a false impression of sluggishness. On occasion, when it is startled or the aquarium is accidentally and suddenly jarred, it can move swifter than the eye can follow, taking immediate cover behind rocks or in a thicket of plants. Try to catch it in a net, ready for an exhibition, shall we say, and see what a dance it can lead you! It will back and back as the net approaches until you are certain it is trapped. Then—whoosh! It is gone! After three or four unsuccessful attempts, everything in the tank is uprooted, and the water cloudy with stirred-up detritus, while from behind a rock the wary eye of the gourami is peering, waiting for the next round and confident of victory. At such times even the oldest of aquarists gets a little testy.

Method of Netting

Far better is the introduction of *Daphnia* into the net, which can then remain until the gouramies are engrossed in catching the hopping live food and are in position over the net.

More often than not they can then be lifted out easily and without fuss, provided that the net is moved slowly and very gently. Like other gouramies, pearls are credited with a liking for *Hydra*, but, in my experience, will eat them only if they are very hungry and no other food is forthcoming. It seems not so much a matter of choice but of necessity.

The male possesses a characteristic large and pointed dorsal fin. When young, however, this does not easily distinguish him from the female. There is no mistaking the sexes of mature specimens, particularly when the breeding season approaches. The female remains the same overall colour—greenish background overlaid with a dense covering of pearly spots, but she swells with roe until she might be said to be suffering from gout. The male's colour intensifies, and he becomes suffused with red over the lower front half of his body.

Now he becomes a suitor, trying to interest the female in his activities. A great deal of his time is spent in blowing a bubble nest beneath the leaves of floating plants, or in one corner of the aquarium from which he can keep careful watch for real or suspected bubble breakers.

Eventually he persuades the female, who often seems

slightly bored with the whole business, to inspect the nest, and they embrace. He gives her a real squeeze as he wraps his sinuous body round hers, and a number of eggs are exuded from her body, to be caught and blown into the nest, where they remain supported by the bubbles. Time and again this action is repeated until the female is spent.

Unlike most other gouramies, the male is a little more considerate of his spouse when the spawning act has been completed. He shows less tendency to bully her and drive her away, although he keeps a watchful eye upon her near approach.

Tolerant of temperature, enjoying a range of some 20° or more, the pearls will breed most readily from 75 to 80° F., and at this temperature the eggs hatch in about 48 hours.

Father waits on guard outside the nursery for his offspring to fall out of bed. If they do, he catches them in his mouth and puts them back. Mother just isn't interested and, if she has not been removed after the spawning, moves around the aquarium freely except for a little uncertainty as to the reactions of the male.

Care of the Fry

For the first three weeks after the eggs have hatched, care should be taken to keep the aquarium close-covered, as draughts across the surface of the water can cause many deaths of fry. About this time they develop the labyrinth, the accessory breathing chamber which enables them to supplement air from the water with atmospheric air gulped in at the water surface.

Because many newcomers to the hobby believe that the air-chamber is present when the eggs hatch it is as well to emphasise that this is not the case, and that overcrowding of the fry will result in death or stunting of growth.

First foods should consist of water green with free-floating, microscopic algae, and the smallest infusorians, usually obtainable from fresh cultures. For the reasons stated above (that the fry require plenty of oxygen) tipping in large quantities of foul water, at a different temperature from that of the aquarium, should never be done. Fix a light over the cultures of live food, and remove a drop or two of water from the surface in a fountain-pen filler, or a pipette. Such surface drops will contain most of the infusorians in the culture and least polluting material.

Several years ago, I saw a pair of pearl gouramies which were a wonderful golden hue all over their bodies. I often wonder what happened to them, whether they bred and, if so, how the offspring turned out. They put the other fish of the same species completely in the shade. W. T. Innes says that sometimes pearls develop large golden areas, of a transient nature. Did those I saw revert or were they "fast colours?"

Aquarium Breeding of European Newts



Nuptial display of the male crested newt before the female.
His splendid tail is flaunted above her

DISTANCE lends enchantment, so goes the saying, and something of that sort accounts for pictures of the breeding habits of European newts coming all the way from the west coast of Canada. I was inspired by a kind of nostalgia for the pets of my boyhood days, to obtain newts from England. But once I had secured them, I was determined to get them to breed. In fact, I derive little pleasure from the keeping of any pets, unless they can be persuaded to reproduce themselves.

The interesting courtship and oviposition habits of these particular animals came as a surprise, and led naturally to a determination to obtain photographs of the whole process. I had kept the same species before, as I have intimated, but in those days I had neither the facilities nor the patience, to persuade them to breed in captivity. My ideas of newt-breeding habits were derived from the much less-engaging Pacific newts, native to Vancouver Island.

The most surprising part of the business is the courtship "dance" of the male newts. I had not even read about that before. One hears often about the leaf folding of the ovipositing female, a stunt which, as I have recently learned, is not even peculiar to the European newts. The courtship display comes in for much less attention, though it is described and figured in a comparatively new book, Malcolm Smith's *British Amphibia and Reptiles*.

Courtship Dance

The position assumed by the male crested newt is well shown in the photograph. The hinder part of the body is elevated, the back arched, and the tail directed towards the female. While maintaining this pose the tail is rather slowly waved back and forth. At irregular intervals there occurs a much wider and more rapid sweep, and the tail then usually strikes the female on the head. The climax of this business, we learn from the literature, comes when the male drops a spermatophore, and the female moves over to pick it up. I have never been fortunate enough to witness this part; in most cases the female is evidently not receptive, sometimes the male never releases his spermatophore. It seems likely that only one or two matings are needed to fertilise the female for the season, and since the proportions of the sexes are about equal, it is evident that many of the displays serve merely to work off excess of energy.

Newts are sluggish animals anyway; even the non-receptive female is in no hurry to move. Even if she swims a short distance, the male follows at once, and immediately

by **RICHARD GUPPY**

(CANADA)

(Photographs by the author)

resumes his position directly in front of her nose. When struck with his tail, she pays no attention. Whether receptive or not, she apparently regards this as just something she has to put up with. This is somewhat disillusioning to the observer, who is predisposed to the idea that the tail whacking serves to disclose whether she is sufficiently hypnotised.

The above account refers particularly to the crested newt, *Triturus cristatus*. The palmate and common newts also display to the females, but the procedure is rather different. The male does not raise up his hind end, but remains in normal crawling position. The tail is doubled, so that the tip lies near the hind feet, and the terminal half is undulated very rapidly, the motion resembling a pennant whipping in the breeze.

A female newt will always disclose when she is ready to oviposit, by her actions in "smelling" the leaves of water plants. She works over them with the tip of her nose, exactly as if trying to get a scent. It seems probable that she does actually learn the condition of the leaf, since except



Female crested newt "smelling" water cress leaves before choosing one for egg laying

in cases of extreme urgency, or when there is absolutely nothing else handy, fading or yellowed leaves are avoided. I have very frequently seen newts test finely divided foliage, such as that of *Myriophyllum*, and then leave it after merely going through the motions of grasping and folding. This is not to say that the abandonment of a leaf before completing the act of oviposition can always be so easily explained, but I am confident that they much more often give up the less-suitable foliage. I have therefore arrived at the conclusion that newts can detect a faded leaf by "smelling," but that folding must be attempted before they can decide whether the size and shape are suitable. This again applies chiefly to the crested newt; the smaller species will use almost any plant.

Plant Cradles

For the purpose of obtaining pictures, small, weighted sprigs of watercress were dropped into the tank, near the front glass where they could conveniently be photographed. The crested newts patronised these plants almost exclusively, even though the tank was well supplied with *Myriophyllum*, *Elodea* and *Nitella*. Later, by accident, I discovered that they actually preferred single floating leaves, and some that I kept outdoors fancied scraps of anything I threw into the water, such as *Polygonum*, chickweed and buttercups. Just what these large newts use in a natural state I cannot guess. The palmate and common newts are happy with *Elodea*, starwort and duckweed. They will gather together several of the latter tiny plants, and conceal an egg among them.

Malcolm Smith tells of a colony of crested newts that lived permanently, summer and winter, in a concrete reservoir. There being no plants at all available, they affixed their eggs to twigs. I have noticed that the total of eggs laid in a day, by a single newt, varies from one to 20 or so, the smaller lot being more usual. On days when many ova are produced the amphibian is much less fussy;



The feet are also used in selecting a suitable leaf for egg laying



Crested newt depositing an egg in a leaf

being in a big hurry, she is liable to make mistakes. Sometimes the eggs get stuck to her hind feet. In the palmate newts' tank there were often some eggs loose on the bottom, I siphoned these out, and most of them developed normally.

I remarked earlier that the leaf-folding habit is not confined to the *Triturus* newts. It is very strange that so interesting a procedure should have escaped the notice of American writers, but such appears to be the case. Having read in literature on the species nothing at all about leaf folding, I was not surprised when my American green newts, *Diemictylus viridescens*, attached all their eggs to water-crowfoot, in the axils of the leaves. This appears to have been due to the absence of any more suitable plants. The following autumn I planted *Myosotis* around the pond, and during the spring many of these plants were partially submerged. Nearly all the eggs that year were neatly folded in *Myosotis* leaves, exactly as crested newts would have done. However, the rough-skinned Pacific newt, *Taricha granulosa*, which is very common here, and resorts in hundreds to my large natural fish pond, definitely never folds leaves. A related species, *T. torosa*, is said to deposit five or six eggs in a clump, thus approaching the all-at-once spawning of frogs and certain salamanders.

Newts by Mail

It seems probable that readers of *The Aquarist* will be interested to learn how I managed to import these newts, and the condition under which they bred. They all arrived from England by ordinary surface mail, taking three weeks on the trip. Containers were aluminium cans, six inches in diameter and two inches deep. Only a few very small holes were allowed for ventilation. Some travelled safely with no outside wrapper, but a carton slightly larger than the can, with some packing such as Excelsior, was later decided on as a worthwhile improvement. Wooden boxes, tried at first, were a failure, as the newts arrived completely desiccated. Another cause of losses was filling for the cans which matted or wadded on the journey. Moss was found to be ideal for the purpose, the can being loosely but completely filled. I would like to take this opportunity to record my indebtedness to Mr. H. R. Neville of Rugby, to

the success of my plans.

Although I had crested newts from England a year in advance of any others, I have never been able to get these to breed, though I have tried them both in tanks and a small pond. Later I received some more of the same species which came originally from Italy. These appear to be the sub-species *carinifex*. They can be distinguished from the British race only by the presence, in females and immatures, of a fine, green dorsal stripe. It is claimed that *T. c. carinifex* is stouter than the type, but my specimens, of both races, vary so much in girth that I cannot see how this distinction can be applied.

These Italian newts co-operated with my plans at once, and appear in all the pictures. Palmate newts, *Triturus helveticus*, were also persuaded to breed without much difficulty, but were too small to photograph successfully with the equipment then at my disposal. The common newts, *T. vulgaris*, were involved in most of the accidents occurring in transit, and I have been able to try them for only two seasons. The first year I obtained a few young, but last spring only six or seven eggs were laid. These were evidently fertile, as development started, but none hatched. It should be noted that I tried the American newts in tanks for two years without success, but after they were introduced to a small pond, breeding began the following spring. The difficulty of preparing enough ponds, with fencing to discourage wandering, has up to now prevented me from trying this experiment with the common newts.

My fishes, being less adaptable, get the best tanks. The newts make do with what is left. The palmates seem well content in a home-made tank of wood and glass, 12 in. by 12 in. by 7 in. At one time there were seven newts in this little aquarium. The crested newts have a conventional metal-framed tank 18 in. by 10 in. by 12 in. A maximum of five were kept in this. Three extra adults, which arrived later, were consigned to an old sink. Though 5 in. was the greatest depth I could manage in this receptacle, the newts bred in it anyway. I have never used the device

building up rockwork in a tank to make it a combined aquarium and terrarium. My objection to this plan is that one would need a huge aquarium to provide the newts with any reasonable space for disporting themselves in the water.

It is easily possible, by watching the amphibians and anticipating their needs, to move them from vivarium to tank at the appropriate times. No doubt a certain amount of coercion may be used to get them started in the water. I do not think this is harmful. Most likely under natural conditions newts depend on chance for finding a suitable pond, and cannot always enter or leave the water exactly as the urge takes them. In cases where a captive specimen refuses after a reasonable time to take to the water, and persists in climbing up the corners of the tank, it is evident that it simply does not intend to breed. Such individuals are best returned to the vivarium.

Book Review

(continued from page 10)

third method mix one-half ounce of cotton-seed meal and three ounces of garden soil. Stir this into a quart of strained pond water and allow it to stand for five days. Strain the solution through a fine nylon cloth and dilute it, 1 part to 100 parts of filtered water. Check the pH, and, if necessary, adjust it with bicarbonate of soda to 7.2 before adding the *Daphnia*. A temperature between 60° and 70° F., strong light and heavy aeration are recommended when using any of these methods. Other substances that have been used to advantage are dried blood, sardine meal, cooked oatmeal, chicken manure, dried skim milk, dried brewer's yeast, soya bean meal, sugar, molasses and vitamin B tablets."

From the foregoing, readers will see that this is a book with many new angles. The author is both a hobbyist and a professional dealer. He knows what his readers want to know and he writes in a style which makes reading a pleasure.

RAYMOND YATES

FRIENDS & FOES No. 55

Water Beetles (continued)

COLEOPTERA

FAMILY Dytiscidae

THE larvae of the beetle *Dytiscus marginalis* are called "water tigers" because of their utter savagery. When newly hatched (from eggs laid 10 or more days before) the larvae are very tiny. Growth is extremely rapid, however, and within three months the larvae may be two inches in length.

They hang suspended from the meniscus of the water, breathing atmospheric air through two spiracles at the tip of the abdomen. A pair of sickle-shaped mandibles are opened wide, remaining so until an unsuspecting creature approaches near enough to seize. The mandibles pierce the flesh of the victim, and a digestive fluid is pumped through them into its body, reducing the flesh to a soupy mess, which is then withdrawn into the intestines of the larvae. They feed, reject the empty skin of their prey, and wait. Again and again in the course of a day they destroy, never fully satisfied. No wonder they grow quickly.

In the autumn months the larvae get sluggish, and



"Water tiger"—larva of the water beetle *Dytiscus*

climb out of the water, dig small hollows in the muddy banks above the water line and pupate, emerging as adult beetles the following spring.

Pupae are seldom discovered without searching in the right places, and this has given rise to the belief among some aquarists that there is no pupation. One aquarist went further, and maintained that water tigers were, well—just water tigers, and had no connection with beetles at all!

C. E. C. Cole

Plants are worth as much care as fishes!

by E. E. TOLEMAN

MANY aquarists devote much time to keeping their fishes in good health but expect their plants to look after themselves, and as a consequence their tanks are far from being the attraction that they should. What can be more attractive than healthy fishes in clear water in a tank of well-grown plants—but how often is this achieved? If only aquarists would devote as much attention and thought to their plants as they do to their fishes then this desired state would soon materialise.

First let us consider what conditions aquatic plants need to grow well. Briefly, these are suitable water, compost, light and temperature. Most plants that are grown in aquaria are not too fussy about the pH of the water, and it may vary considerably without noticeable difference to their growth; similarly with regard to hardness, only very hard or very soft water is inimical to growth. In fact, it may be said that if the common run of aquarium fishes thrive in the water then there is every reason to expect the plants to do the same. There are, of course, exceptions, but in the majority of cases failures are usually traced to sources other than the water. Few submerged plants will grow successfully in clouded water, and some resent salt, where this has been added. Certain of the chemicals used for disease control will affect plants, and may even kill them.

Nourishing Compost

When compost for tanks is mentioned, most aquarists have very definite views—either for or against, and no half measures! But for a decorative tank where plants count as much as fishes, then it is hardly fair to expect the plants to thrive without something more to grow in than the usual aquarium gravel. Perhaps the most suitable medium is loam, peat and coarse sand in equal proportions; all to be partially sterilised before use, which can be done by baking the materials in an oven. The loam should be reasonably free from undecayed vegetable and animal matter, and the peat of a horticultural grade, with no additions of inorganic manures such as are often found when it is sold as bulb fibre. Some aquarists prefer other mixtures, and many achieve good results with them, but experience has proved to the author that the mixture recommended is suitable for a very wide range of water plants, including many not generally available to aquarists.

Too much compost is to be avoided, and in most tanks from one to two inches placed where the plants are to grow is sufficient. This should be covered with the usual fine aquarium gravel to a minimum depth of one inch, to keep it from becoming mixed with the water and causing cloudiness. Obviously, where fishes that have digging habits are kept, such as cichlids, then the use of compost is precluded, but in many such cases the fishes themselves will not tolerate plants in their tank anyway.

Light is probably the most important factor in aquarium-plant growing, and maladjustment of this is the cause of the majority of failures. It must be realised that most of our aquarium plants grow in their natural state in shallow water, and the intensity of light under such conditions is considerable. To provide an equivalent amount of light in aquaria is not easy, and in a few cases is almost impossible, but it may be stated that where natural lighting of sufficient intensity can be provided then one is well on the way to

success. Artificial lighting presents more problems, and it is usually a trial-and-error process to find out the optimum amount of light required for individual tanks. Too much light will result in unbalanced growth, often accompanied by excess of algae, and too little in retarding growth, often to the point of the plants dying.

Varying Light Requirements

Some plants have different light requirements from others, and this is one reason why one species will grow and another fail in the same tank. An example of this is where a plant such as *Vallisneria* growing rapidly will bring about conditions that are detrimental to a slower-growing *Cryptocoryne*. Thus plants of habits as nearly similar as possible should be grown together, and not indiscriminately mixed. It is preferable to have only one type of plant in a tank, because then when optimum conditions of light have been ascertained the plants are in competition only with their own kind, but in a decorative tank this single-species planting is usually neither feasible nor desirable.

One common cause of failure is to expect plants to grow in foul compost, a state generally associated with overfeeding with fine dry foods. When the compost and gravel is black the plant roots will rot away and the plants die. Fishes that have scavenging habits, such as catfish and loaches, are very useful in helping to keep the gravel clean, but, of course, they cannot dispose of unlimited quantities of waste food. The Malayan snail is also useful, but these and scavenging fishes do sometimes uproot plants that are not fully established, and therefore should not be introduced until the plants have had sufficient time to settle down.

Temperature is important, but most plants have a fairly wide temperature range, and it can be said that the temperature usually maintained for tropical fishes is suitable for most plants. One important point, often overlooked, is that several of the plants grown in tropical aquaria are not tropical plants at all in their wild state, but come from temperate zones. Examples of these include species of the following genera: *Bacopa*, *Myriophyllum*, *Sagittaria* and *Vallisneria*. Others, although grown as submerged aquatics in aquaria, are in fact really bog plants. Into this group come *Acorus*, several species of *Echinodorus*, *Cardamine*, *Cryptocoryne*, Indian fern, *Ludwigia* and *Marsilea*.

Thus it will be seen that to mix these plants in the confined waters of an aquarium is to subject some of them to undue competition from others, a further reason why some of our plants grow and others do not. When the plants are growing really well they rapidly take up more than their share of the available water space, and for this reason regular pruning, especially of the rampant-growing types, must take place.

Health of Plants

Submerged aquatic plants are remarkably free from diseases, but occasionally in tanks that have been established for some time they suddenly deteriorate. This can often be attributed to a chemical change in the water, and possibly exhaustion of certain trace elements that plants require in order to grow. To counteract this a partial change of the water every few months will most likely have the effect of rejuvenating the plants, and of keeping the fishes in first-class condition as well. The fact that *Cryptocoryne* plants sometimes die for no apparent reason can probably be attributed to undesirable chemical changes taking place in the water. The growth of algae can be a nuisance, but such growth is closely related to light, and

(Continued at foot of next page)

In the Water Garden in APRIL

by
ASTILBES

NOW is the time when the pondkeeper must really get busy. Few ponds which have become well established can be left without special attention during this month. Most of the water plants will be starting to make fresh growth and so now fresh specimens can be planted and the older plants divided. The necessity for dividing may not be just that some more plants are needed, either for another pond or for a friend, but if some of the larger clumps are not divided occasionally they may become too massive and outgrow some of their neighbours in the pond. Not only has one to consider this aspect but it must also be borne in mind that many plants do not flower as well once they become very dense. The old centres of such plants as water lilies can get very woody, and then the pond does not give anything like its normal crop of flowers.

It is not possible to give a hard and fast time when the plants in a pond will be due for division; so much will depend on their rate of growth. In any well-planned pond it is possible that after four years of setting up most of the plants could do with some special attention. In fact, where conditions have been very good for them and sufficient nourishment has been available the plants may need division in three years after planting. Be guided by the density of the root stock and by the fact that a particular plant did not flower as well last year as it did the year before. There is no sense in moving or replanting any water plant which does not encroach on the other plants or has not grown too large for the pond.

Need for Division

The water lilies are the favourite pond plants and no wonder, as most of them flower so beautifully that they are always likely to be the prime favourites. It is very important, however, to examine them each year to make sure that all is well. If the lilies were so strong in growth last season that the leaves could not find a place on the surface of the water, the plants need dividing. This task can be easy or difficult, according to the plan adopted when the actual planting was carried out. If the system of planting recommended in these articles was used, that is, the plants were set in individual pots instead of directly into soil at the bottom of the pond, it will be fairly easy to lower the water level and then draw on to the side the pots of lilies. These can then be removed from the pots and divided if necessary.

Great care must be taken with the lily root stocks, as already at this time of the year the flower buds will have formed and can be seen quite easily. They are very brittle and can soon be snapped off by careless handling. The stock will probably show several fresh shoots being sent out from the old centre stock, and these are the best for growing on. They can be cut with a sharp knife; a table knife will be better than a penknife, as the longer blade will enable you to get at any awkwardly placed shoot. Most of the side shoots will be well provided with roots and a sufficient length of shoot should be taken to hold a good number of roots.

The old worn-out stock can be discarded, or if several more shoots may be needed later on it can be replanted somewhere where it can grow on the necessary shoots, but the plant itself is not likely to give much in the form of bloom this season. The new shoots can be planted in good-sized pots; those with holes in the sides are the best. Ordinary garden turf is one of the best mediums in which to set the young plants. No special fertilisers are necessary as they could upset the balance of the water and harm fishes. As a rule, once the plants get established and send their roots out from the pot, there is likely to be plenty of food

for them in the shape of mulm and droppings from the fishes. When the plant has been set in the pot you must make sure that the plant cannot leave it once it grows a number of leaves. It has often happened that a plant has left its pot entirely and floated up to the surface. It is then rather difficult to get back into position. To obviate this happening it is well to run some plastic cable round the underside of the pot lip. Then run a couple of strands over the top of the plant so that it cannot float loose from the pot.

Lilies Planted in Soil

This is not a difficult operation, but if the water lilies were originally planted in soil at the bottom of the pond it will be found rather a major task to deal with the plants. Many roots will have become entangled in the base soil and it will be imperative to empty the water completely before anything can be done about division or replanting. The best plan will be to get someone to help you in this task, and gum-boots will be a necessity. When the pond was first made there may have been a quantity of nice clean soil put in the bottom, fairly easy to handle, but what will meet the eye when the water is emptied out will be nothing like this. It is more likely to be nothing but filthy black slimy substance, which bears little resemblance to the clean soil originally used! The weight of a strongly grown water lily in such a position is probably going to be more than one could manage, and the advisability of a helping hand will become apparent.

It may be necessary to divide the root stock whilst it is still at the bottom of the pond, and in such a case one should try and remove the older worn-out part and leave some of the new. Water-lily roots are very easily broken, and so great care must be taken. The method adopted for breaking up clumps of plants from the herbaceous border cannot be used here, as forks or spades could do too much damage to the flower buds, and so the stocks are better cut with a knife.

Many of the other plants in the pond may need attention, and if any such plants as *Pontederia cordata* and *Butomus umbellatus* have become well established they may have spread over a wide area and be very difficult to remove. Once the water plants have received attention the pond may be refilled. It is probable that the water will not be very clear when this is done. If the pond is fairly small it can be emptied and refilled, but if not the water will clear after a few days. The pond may look a bit bare and not very pleasing for a time, but once the water plants start to grow again the pond will soon take on a new look and the extra amount of flower will reward the diligent pondkeeper.

Plants are Worth as much Care as Fishes!

(continued from preceding page)

when plants are growing robustly algae is seldom a serious problem. Algae of the soft green types is useful in many ways, and contributes to the maintenance of healthy conditions.

For the decorative aquarium plants are essential, and a little time taken to study their requirements will result in a far more attractive tank, and give the aquarist the satisfaction of knowing that he is providing the best possible conditions for his fishes.

GENERAL FISH-KEEPING QUERIES answered by A. BOARDER

I intend to set up some more tanks and am considering glazing them with 42 oz. glass. However, when asking for this I have been met with blank looks. Is it known by any other name please?

The glass you mention is generally known to the trade as "heavy drawn" and should be available from a good supplier. When a tank has a length of 36 in. it is imperative that $\frac{1}{2}$ in. plate glass should be used. The shorter the length of glass the more support it is going to get from the frame and the thinner it can be.

I had some water plants in my pond which lost their leaves. I tried a bunch in a tub and found that the leaves also disappeared. I then saw very tiny worm-like creatures on the plants. What are they and would they eat the leaves?

The tiny worms could eat some of the leaves from the plants. They are probably the larvae of certain small flies. These midges lay their eggs on the water plants at the surface and the resultant larvae feed on the plants, etc., until they pupate and after a time change to flies. If water plants are taken from a pond and placed under a magnifying glass many hundreds of these and similar pests will be seen. There is nothing much you can do except allow the fishes to eat many of them. This they will do if they are not fed too often artificially. When you see fishes sucking at the leaves of water plants they are not always feeding on the actual leaves but the minute life which exists there.

I recently saw what appeared to be strands of fine cotton waving too and fro in the sand of a tank. When disturbed they disappeared into the sand. What are they and are they harmful to my fishes?

The waving threads are probably *Tubifex* worms. These worms live in mud or mulm and wave their ends about to get oxygen and also food from the water. They will not harm your fishes but will make a very good food for them when they are hungry enough to try to catch them.

Can you recommend the names of any dealers who could supply me with first-class shubunkins and fantails. I have only limited room and do not want to harbour any second-rate fish.

I do not like giving any breeders' names as they might not thank me if they did not happen to have any fish for sale at the time. It is far better to watch the advertisements in *The Aquarist*, or even to put a small advertisement in for yourself. Good fish are very scarce and you may have to be content with fish from a winning strain, even if they would not actually win themselves. I am sorry, but I do not send out any of my fantails. I would like to make this point quite clear to save so many writers to me being disappointed. I just have not the time to spare to send out any fish under any circumstances.

I have been supplying a friend with *Tubifex* for some time, and can get unlimited quantities. How can I market them please?

I suggest that you either get in touch with some dealers who sell them in their shops or you can advertise them yourself in *The Aquarist*.

A friend of mine has had a tank in her hairdressing salon for eight years. The water keeps clear and the few fishes look quite healthy. I tried to copy the plan but although I appear to have exactly the same set-up my water does not keep clear and everything gets clogged up with a grey matter. When I think of my friend's tank and then of mine I am inclined to give up. Where can I have gone wrong?

Your friend's tank has only a few fishes in and this may be the answer. You are probably trying to keep too many fishes in your tank and are over-feeding them. Let me put it this way. A tank is set up with growing plants and a few fishes are added. The plants are able to make use of and clear up the droppings from the few fishes and so the water keeps clear as long as too much food is not given. On the other hand, if a tank has so many fishes that the

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.

water plants cannot use up all the waste matter from them then the water must get polluted. It is as easy as that. Reduce the number of fishes in your tank and also your feeding, and all will be well in time. It takes some weeks for a tank to settle down and really get in good working order.

In a recent issue of *The Aquarist* a list of the names of fishes difficult or otherwise to breed was given. The names do not mean a thing to me. Could we not have them listed by their popular names?

A good idea if it would work. Unfortunately, very many tropical fishes have no common name. Even with some that do have one this is not always fool-proof as a different common name is sometimes given to the same fish in different areas. For instance, *Hemigrammus ocellifer* is known as the beacon fish and also the head-and-tail-light. Some time ago I wrote an article on sun fish, and found that in their native country, North America, some of them had as many as a score of common names, and what made it more confusing was that the same common name applied to different fish in varying parts of the country.

One of my fishes has lost its balance and cannot level up; it stands on its head most of the time. Can you tell me how to treat it?

The usual treatment for this trouble is to place the fish in shallow warmer water. Occasionally a little salt in the water may help but it depends on the cause of the trouble. The swim bladder can be affected by a sudden chill and also by over-feeding with the wrong kinds of foods. Also it is sometimes the result of the special shape of a fish, such as a veiltail with a very restricted body. When eggs form in such a fish the pressure can affect part of the swim bladder and so upset the balance of the fish. In such cases the fish gets better once the eggs are laid. Sometimes a fish inherits the tendency for this trouble, when it is almost impossible to effect a cure and the fish should be destroyed. This usually shows up when a fish is fairly young. Should an adult fish suddenly become affected there is much more chance of effecting a permanent cure.

A friend of mine was advised to put some potassium sulphate in his pond to kill the blanket weed. Would this harm his fishes?

I should think that some harm would most certainly come to the fishes but, of course, it depends on the amount used. If enough was used to kill the blanket weed then I suspect that it would kill the fishes. The use of this chemical would also kill any other water plants which were in the pond. It is far safer to try to rid the pond of the weed by pulling out as much as possible with a rake or by twisting a broken stick amongst it.

I have a large pond and am troubled with frogs; is there any means of keeping them away?

I know of no means of keeping frogs away from your pond. If it was a small one a lip with an outward curve could be built around the outside, but this would have to be fairly high to prevent frogs jumping over. They mostly come to the pond in the early parts of the year for spawning, and I find that they generally arrive singly, so that they could jump in, unlike many toads, which pair up before reaching the water and then cannot jump very high. You could catch the frogs and take them a long way away (I

suggest over 10 miles) and put them in another pond where there are other frogs. If no tadpoles are allowed to reach maturity in your pond it will mean that there will not be as many frogs returning to the pond in future. It seems fairly certain that most frogs return to breed in the pond where they were hatched. However, I cannot understand your reason for wanting to get rid of the frogs. I always welcome them, as their tadpoles are such excellent scavengers and make such a grand food for your fishes. I would say that the possibility of a frog harming one of your fishes would be not more than a hundred to one against.

I have a 5 years-old shubunkin which developed a white pimple on the top of the gill plate. It broke after a time but it is now forming again and the surroundings are inflamed. What can I do and is it white-spot disease?

I do not think the trouble is white-spot disease as then there would be more spots, smaller ones, and you would not be likely to see so much inflammation. I think the fish has a tumour or a cyst. You can try touching the spot with a little undiluted Dettol once a day, which should assist it to clear up. Once the pimple breaks see that it is well painted with the disinfectant and it may never occur again. You further state in your letter that you have recently put some well-washed peat under the compost for the benefit of the plants. I do not think that this has any relation to the spot on your fish but I do not think that it is of much use putting peat in for the plants. A little loam would have been much more beneficial and the peat can make the water acid. It has very little food value for plants.

I have an aquarium 24 in. by 12 in. by 12 in. for coldwater fish. I have three moors and two veiltails. My dealer told me that I would not need an aerator for this tank of fish. My trouble is that after two weeks the water has gone cloudy and I can hardly see the fish. I have also lost a moor. Where have I gone wrong?

In the first place your dealer was quite right to advise you that an aerator is not needed. You state that you have five fish in all, but as you do not give their sizes this is not of much help. Your tank will hold 12 inches of fish and so if your fish are three inches long or more, then you have too many fish for the surface area and an aerator would be necessary. However, as you have recently purchased the fish I doubt very much if you were able to buy fish as large as I have suggested. As for the cloudiness of the water, few tanks can be set up anew and have the water remain crystal clear two weeks after setting up. There is always a period of settling down, when the plants are becoming well established. They should have time to get well rooted and so be able to assist in keeping the conditions right. During this period the aquarist should be most careful in feeding the fish. Too much will soon upset the balance of the tank. Also Infusoria may have formed and these organisms can cloud the water badly. If the fish are unfed for a week the Infusoria may clear away by itself. Your sand may contain too fine particles, which can be swirled up into the water every time the fish swim over the bottom. If you could test a little of the cloudy water under a microscope you would soon see the cause of the trouble. If Infusoria were present you would see them as tiny moving objects of varying shapes. If the sand is causing the trouble you can improve matters by running in some fresh coarse well-washed sand on top of the old.

I wish to make a pool in my garden and have an alloy bath 6 ft. by 3 ft. by 2 ft. I have some shubunkins and would like to have lilies, etc. An article said that I should not have six inches of loam in the bottom but keep plants in pots so that the pond could be cleaned out. How then can I get matured clear water?

I do wish that I could get it over to pondkeepers that it is almost impossible to make and keep in good condition a garden pond made in a small bath. Such a pond might be all right in some parts of the country, and where it was shaded from excessive sun and protected from cold during the winter; but small containers are naturally very subject

to extremes of weather, soon getting too warm and soon getting cold. To try to grow water lilies and other plants in such a pool is like trying to grow shrubs in a window box. I would not go so far as to say that a small container the size of yours could not be run for some time but I can assure you that the smaller the pool the more trouble it is to keep in good order all through the year. It is also a fact that the smaller the pool the more often it is likely to need cleaning out, hence the necessity of having the lilies in pots. If great care is taken to ensure that only a small growing lily is used, and a few under-water oxygenating plants are added, all can go well. A lot depends on how severe the weather is in the winter in your district.

In an outdoor pond I have a goldfish which has developed a black mark on its back which looks like tar. Another has what appears to be a spider's web all over it, and the ends trail in the water. The fish do not appear to be ill and there are 40 others in the pond which are unaffected. The pond is in good order and the water quite clear; what is the trouble?

The black mark is nothing to worry over; it is not a disease but a pigmentation. Sometimes the black-pigment cells become predominant and so a black mark appears on the fish. These markings can become larger and more numerous, or they can fade away. Sometimes the black is encouraged when a fish has had some slight wound, either from a pest or by damage when spawning. When the new flesh or skin forms the black will appear. When goldfish change from their original bronze this bronze turns quite black and remains on the top of the back, on the head and dorsal and caudal fins. It then gradually disappears, leaving the fish all red or red and silver as the case may be. This tendency to develop black markings is well known to be a feature of the golden orfe and some fish become almost covered with black markings when they age.

The fish with the white covering appears to be suffering from an attack of fungus, but it may be only that it has suddenly changed its mucous covering, and that this is what you can see falling away from it. If the fish is caught and examined it will soon be evident what the trouble is. If fungus, this will appear as blobs of cotton wool and it will be rather difficult to wipe off with a rag. If it is only the mucus coming away this will be easily removed from the fish. In any case the fish should be removed from the pond and given a salt bath. This need not be too strong, unless fungus is actually the cause of the trouble. A teaspoonful to a gallon will do, but use a tablespoonful if fungus is suspected.

I have a thriving white-worm culture in which a number of small black flies also seem to be thriving. There are a number of tiny maggots which I presume are from the flies. What are they and how can I deal with them?

The tiny flies may be a species of many similar ones but I suspect them to be the sciara fly. These are very small and can run about very fast indeed. They lay their eggs in damp positions and the larvae which hatch out feed on any type of damp vegetation available. They are not likely to harm the white worms, and the amount of food which they eat is small. The larvae would be eaten by fry if you could manage to feed them to them by placing some of the infested material in a worm feeder in the tank. If a sheet of paper treated with treacle is placed over the cover glass of the culture and the flies are the kind I have named, they will soon get caught up, as they run about such a lot.

I have a tank in my greenhouse that is all right now, but I wonder what will happen in the summer. Will it get too hot for it and shall I have to bring it indoors?

There is no need to do this. It will be quite easy to shade the tank from the strong sunlight later on. Some sheets of paper can be wrapped round it and a dark cover placed over it during the hottest part of the day. As long as you see that there is plenty of ventilation supplied on warm days all should be well.

Fancy Goldfish Breeding—3

by A. BOARDER

BREEDING goldfish in ponds rather than in aquaria has its advantages, especially where it is intended to establish a hardy strain of fish which will live in an open pond. Considerably more care must be exercised than with tank breeding, as the pond will contain more enemies of eggs and fry, and the avoidance of losses of eggs and fry can become a major problem. Types of fancy goldfish suitable for pond breeding are: comets, shubunkins (especially London type), fantails, lionheads and bubble-eyes. The scaled fantail is the better for pond work as it may be found that the shubunkin type of fantail is not quite as hardy in certain districts.

Those fishes with large flowing finnage are not really suitable for pond breeding, and are best bred under controlled conditions. As has been previously stated, it is far more difficult to get fishes in a pond to spawn when required. It is probable that most aquarists will be at the mercy of the fish, and will just have to show plenty of patience until the fish are ready. Keep feeding the spawners on earthworms and other live food as much as possible and see that

3. Spawning the Fish in Ponds

you have a couple of bunches of water plants anchored at the side of the pond in as shallow a place as possible. Clean each bunch of plants every day by washing it up and down in the water, and spare plants can be kept quite clean in a tank by introducing a few tadpoles to the tank. These creatures will go over all the leaves with a vacuum-like action of their mouths and clean off every bit of mulm and algae.

On the "happy morn," the fish will be found splashing about among the plant bunches and spawning will have commenced. This usually takes place fairly early in the morning and it is possible that by the time you can get to the pond plenty of eggs will have been laid. The egg-covered bunches should now be removed to a hatching tank, and another bunch or two put in their place in the pond. Do not worry about disturbing the fish, as if they have made a start in earnest they will take little notice of you and it is quite probable that within five minutes of a fresh bunch having been placed in the pond it will be receiving attention and many eggs will be laid thereon.

I must give a word of warning here. Do not think that it is a good plan to get as many eggs on a bunch of plants as possible. I have found repeatedly that the bunch which appears to have the fewest eggs will generally give the most fry. There is no question but that when many eggs are on the plants a large number are going to be infertile. These eggs soon go bad and they pollute the water very quickly, so that the good eggs and even newly hatched fry can be killed by the excess of foul gases. It will be found far better to spread the plants with the eggs attached into as many hatching tanks as possible or many losses may be experienced.

When the fish are spawning in the pond it sometimes happens that a female may appear very distressed after she

has been pushed around by several males. This is little to worry over and the fish will soon recover. Spawning can last several hours and in some cases almost all day. Once the fish finish spawning the rest of the eggs should be removed from the pond or they may be eaten. It is not usual for goldfish to eat their eggs whilst in the excitement of the actual spawning, but once this is over it is quite possible that they will divert their attentions to the eggs and few may be left.

I always recommend removing the eggs from the pond for hatching as it is a very chancy business to rely on a pond hatching. For instance, in my own pond I suppose that many thousands of eggs were laid last year. I took many out on the bunches of plants but there is no doubt at all that many eggs must have dropped to the bottom of the pond or become attached to plants which were not removable. For all that, when the pond was cleaned out in the autumn not a single young fish was found. What eggs remained had been eaten, or any fry which had hatched had perished. It can be realised then that to be sure of getting a good number of fry it is imperative to remove the eggs from the pond.

Hatching Times

Once some eggs have been obtained it is necessary to see that they get some extra warmth so that the water is about 70° F. This gives a four-days hatch, and it is important to see that the fry do not have to remain too long in the eggs, as there are always plenty of pests about to prey on them.

The cultivation of some Infusoria is the next important step, as it is necessary to have plenty of the right kind of food for the fry from the very start. I am certain that once the fry start to eat, which is when they are free swimming, they should be able to obtain as much tiny living foods as possible. The rate at which their yolk sac is used up will depend on the temperature of the water; the colder it is then the longer will the yolk last the fry. The commencement of free swimming will be the earliest time for feeding the fry, as until that happens they are quite dormant and spend nearly all their time in an anchored position.

If some pond water is taken and examined to see that there are no pests or *Daphnia* in it, this makes a good medium for culturing the Infusoria. All that is necessary is to add some decaying vegetation, which can be either crushed lettuce leaves, potato peelings, banana skin or boiled hay. Many aquarists have their own particular method and it would be hard to say which is the best. One thing is certain, it is of no use attempting to breed Infusoria unless you have a microscope or fairly strong magnifying glass to make sure that there are actually some live creatures in the solution which you are feeding to the fish.

The culture should be examined each day and for feeding it to the fry there are two main methods. The first is to suspend a jar of the culture over a tank and arrange a drip feed so that a drop of the liquid is allowed to fall into the fry tank at intervals of about one every two seconds. An overflow will have to be arranged and care taken to ensure that no fry can be washed over the top. A very good plan is to have a piece of clean flannel hanging over the side of the tank. This should have one end in the water, not very low down, and the other end should hang down outside, and it will be found that the water will gradually drip from the flannel, preventing any fry from being lost. The other method is to remove some water from the tank and replace with Infusoria-charged water once or twice a day.

(Please turn to page 22)

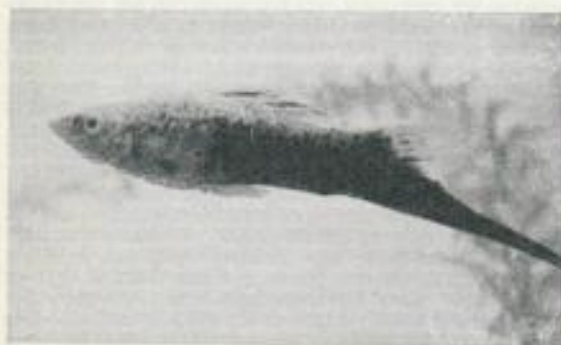
our readers

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

Sex Changes in Fishes

REFERRING again to Dr. Myron Gordon's article on sex changes in livebearers, and the correspondence which followed, I am sending a photograph of the swordtail which I mentioned in my letter earlier (*The Aquarist*, February).

If this print reproduces as well as I hope, it will show that the fish has developed a truly masculine body shape, and that the gonopodium, in so far as an amateur photograph shows, is now of quite normal appearance. The caudal extension or "sword" is also exceptionally well developed, in contradistinction to the one depicted by Dr. Gordon, which was not of true masculine form.



So much for the actual appearance of this fish. In addition to this, I now have the very interesting fact to report that it has recently become a father. This occurred accidentally as follows. A friend who was moving house asked me to lodge his fish in my community tank during the removal, and along with several egg-layers, we introduced three virgin female swordtails. I will not enter at length into the proofs, but there is no doubt whatever that they were indeed virgin. The only livebearers in my tank were four tiny immature guppies, two large female guppies, three tiny immature mollies and one female platy. Even yet, none of the immature fishes has reached puberty. In addition, of course, there was this large swordtail, and I constantly noticed him paying court to the three females, although I did not witness actual copulation. However, to cut a long story short, a week or two after my friend took his fish away, one of the female swordtails gave birth to a brood, unfortunately, in his absence, so that only six were



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

saved. These all bear the same pigmentation as my fish, and can only be his offspring.

There is one other point I would like to make, and that is in regard to the heredity of this fish. Here, I fear, I am really going to upset Dr. Gordon, in view of his published opinions on the subject. *This fish is almost certainly a generic hybrid.* I am not given to rash statements, nor to accepting strange facts without adequate proof, otherwise I should say that it is certainly a generic hybrid. I will content myself, however, by saying that it is 99.99 per cent. certain, and if this is so, it may account for several unusual things about the fish; for instance, the succession of melanomata which appear from time to time on the ventral surface of the caudal peduncle, the dead-black appearance of the pigmented parts, as contrasted with the shiny or "sparkling" black of the species, and its remarkable immunity to white-spot disease. It has been exposed to extremely heavy infection on two occasions, and has remained free from signs on each occasion. It may also, of course, account for the completion of sex-reversal processes, which often commence in the true swordtails, but never (I think) proceed to finality, as appears to have happened here.

Finally, by way of explanation, I would say that if I am right in my opinion that this is indeed a generic hybrid, then his grandfather was an all-black *Molliensia sphenops*.

L. WARBURTON,
Romiley, Stockport.

Activities of an Association

THE article "Even a Secretary must eat" by Constance Gordon in your February number provides food for thought for both lone clubs and collective organisations. However, I should like to tell your contributor that clubs in the South London area first tackled these problems several years back, and the following points may be of interest.

The Executive of the Association of South London Aquarist Societies has never been complacent nor content with the numerical strength of member societies. Most, if not all, the facilities offered to members are aimed at aiding clubs to maintain and increase their strength.

Firstly come the Speaker and Judge Panels, and none charge "a guinea or more" for their services (expenses only being the rule). Subjects on the speakers' list cover most aspects of the hobby, as is usual, and at the same time we have several items which are probably unique, such as the "Cooking for Fish" talk by Mr. Bell, a very instructive and amusing item. There is also the film-filmstrip show (probably the first offered by an area group) which is

financially aided by the Association in order that no club, however small or poor, shall be debarred from the facility.

The judges are especially trained by means of a course or courses covering every known species of fish likely to be entered in Club, Table or other competition. Members of individual clubs are encouraged to enter for these courses in order to aid their own group and the Association as a whole. Those who train the judges have very many years' experience to their credit, and the standard is acknowledged to be high. Again only expenses are charged, it often being difficult to ensure even this, for the "goodwill" available is enormous.

Other facilities include quiz-masters, complete with questions, a group Newsletter containing administrative and fish-keeping information, and 450 tanks of various sizes together with shades, drapes, etc.

The Annual Show is also a facility, allowing the clubs to see and compete with the stock held by their neighbours.

To aid struggling clubs the Association is prepared to arrange the production of circulars, give advice on exhibits, posters, club management, etc., or to arrange special lectures and otherwise co-operate fully in any task with which a club may be faced.

New ideas are continually devised and tested. One club recently devoted whole evenings to a "judges' course," both as a means of encouraging new judges and to see whether such events would be worth considering as another facility. Two neighbour clubs tried the experiment of a visiting team of aquarists as a change from the more usual one-speaker routine. The Association has also offered to "invest in the future" by providing speakers to outside bodies such as Youth Clubs. At the time of writing the A.D.C. (Cubs) for Camberwell is bringing this to the attention of his Cub-masters, while another club has for the past two or three years obtained excellent local publicity by sending speakers to church groups, etc.

But whatever facilities or ideas are provided by area or collective organisations the final work falls upon the officers of individual clubs, and no matter what efforts are made by those officers, only collaboration by the ordinary members

will breed success. Collective organisations can provide a central point for facilities; it is up to the clubs to use them and to provide more for their neighbours' benefit. There is no magic formula in this or any other hobby.

A final word: this Association has offered to exchange Newsletters, magazines, etc., with other groups (an offer made through the pages of the aquatic press). Results: nil. We would like to make another offer, to exchange views and advice, etc., with other groups, for our mutual benefit. Will any area organisation take us up on this?

H. J. VOSPER, *Publicity Officer*,
Association of South London Aquarist Societies.

Perspex Aquaria

I WOULD like to add to the useful remarks made by Mr. Raymond Yates in his "Notebook" in your February issue, describing methods of repairing leaks in our Perspex Aquarium.

The incidence of leaks occurring in these aquaria is extremely small, and since all aquaria are thoroughly tested before despatch, the occurrence of a leak is probably due to excessively rough handling during transit. Nevertheless, in conformity with our guarantee, we have no hesitation in repairing free of charge any leaks at any time.

The method with chloroform, as outlined by Mr. Yates, is the one we employ, but alternative methods were suggested as being in no way dangerous to the user. I would like to describe a further method which uses petroleum jelly; this is usually readily available and is simply smeared on to the outside of the aquarium along the leaking joint. It can be applied while the aquarium is still set up and full of water. The excess of jelly is wiped off and no visible trace of the repair remains. It is possible that this remedy may be just as successful in dealing with leaks in angle-iron aquaria. Finally, may I add that the fact that a repair has been made does in no way affect the guarantee, and the aquarium can be kept until such time as it is convenient for the owner to send it for repair.

R. BROOKE, M.A. (Oxon),
Arbe Products, Essex.



Irregular black paving set "dry" in the ground, and large pieces of natural stone, provide an informal setting for this Sussex garden pond. This water garden has been made in a low-lying part of the land and steps seen to the left lead down to it from a terrace surrounding the house

H. & V. Joel

Mature Water

I HAVE been a regular reader of *The Aquarist* for at least eight years, and agree with most of the information and experts' opinions, but this "mature water" craze is, I think, well overdone. I tried it for several years and got three awards in three years at shows. I decided to treat my fishes the same as any other pet, by feeding well and siphoning out often. I spawn all my fishes in tap water and change it regularly.

I think it lends weight to my argument to quote my show record for the last three years: 120 awards, mostly at open shows.

R. WALFORD,
Mitcham, Surrey.

Moonlight Gourami

IN "Aquarist's Notebook" in the February issue of *The Aquarist* I notice that Mr. Raymond Yates remarks on a colour change in the moonlight gourami (*Trichogaster microlepis*) at Belle Vue Aquarium. I am sufficiently fortunate to have a pair of these fish on loan from Mr. Gerald Iles, and I have succeeded in breeding them. I found that the female developed the characteristic black line which Mr. Yates describes, when she came into breeding condition, but that it became much less pronounced but still visible after spawning was over. The male never showed the slightest trace of marking except that the "feelers" became a more vivid orange. The eyes of both sexes were very red at the top.

The fish remaining at Belle Vue always seem superbly fit, and so this may be the explanation with the one Mr. Yates mentions.

MICHAEL WATSON,
Bramhope, Nr. Leeds.

Fancy Goldfish Breeding

(continued from page 19)

Whilst incubation is taking place the tank water must be examined every day, and if it smells or the water looks impure, generally milky in hue, then most of it should be changed. The use of an aerator is helpful but even this will not be of much use if the water has gone foul and is over-charged with bad gases.

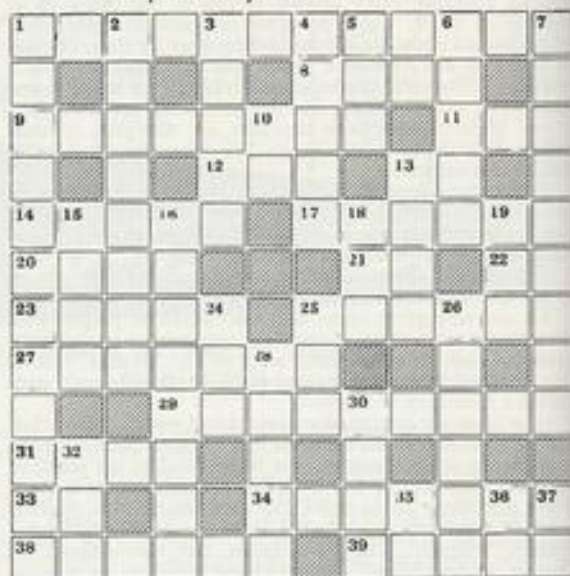
It must not be thought that I consider it to be impossible to breed fish in an open pond without removing the eggs. The point is that only in a fairly large pond, well planted with water plants, would it be possible to breed a large number of fish. It would then be very difficult and perhaps impossible to catch all the youngsters at the end of the breeding season. If fancy goldfish were the types being bred it is almost certain that there would remain in the pond many fish from which the aquarist would not want to breed. Such runts would lower the quality of the fish and in time perhaps ruin the strain.

If a pond is to be specially constructed for breeding, one or more divisions can be made, and a long, rather narrow type is the best, as the provision of grooves to take the divisions will be far easier. The part where the fish are to spawn is divided from the main pond once the fish have spawned on the plants provided. All the parent fish must have been removed from the spawning division, of course, and a perfect fit must have been made for the division. It is easy enough to keep the large fish from this division but impossible to prevent fry from getting into the main pond and being eaten unless every crack is stopped up.

Such divisions are best provided from the start, for it is not an easy task to make them later on, and in the informal pond with a varying depth it is very difficult indeed.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Order of fishes which includes lampreys (12)
- We are in no return for the Welshman (4)
- A fin, literally "breast" (8)
- Gun isn't straight for this African animal (3)
- Poetically, one time brightest jewel in British crown (3)
- Santa this is a romantic trail (2)
- Lazed (5)
- Tar (6)
- Fasten with iron pin (4)
- Is the tench or doctor fish so styled? (1,1)
- Mixed type but not cross-bred (2)
- Class or group of fishes having certain common features (5)
- An example of 23 Across as dope in a way (6)
- One of the algae (7)
- chaperi (9)
- This lovely tetra confuses none (4)
- Alias "telly" (1,1)
- Epilepsy—(See 29) (7)
- Faculties by which objects, sounds, smells, heat, etc., are observed. In fishes these may include a faculty similar to radar located in the "lateral line" (6)
- Holy book of Islam (5)

CLUES DOWN

- Family of fishes which includes guppies, swordtails and zebras (12)
- Family which includes acaras and angels (8)
- Egg-shaped (5)
- Amphibians sad to confuse (5)
- Bird in the fish bowl (3)
- Scalare (5)
- Silent service (1,1)
- Does the pet dogfish lose me if I do? (4)
- Another name for dart (4)
- The actual heating parts of your immersion heaters (8)
- And a measure of consumption by 16 Down (3)
- Open shortly (3)
- Ripple (3)
- Cleopatra's snake (3)
- He and dirt are mixed in a shake (6)
- Suckers of the *Hydra* (5)
- This may form a lake (4)
- She started man's trouble, bless her (3)
- River in China, and in Italy (2)
- and 37 Gunners enter; taken together the drips! (2,2)

PICK YOUR ANSWER

- 'Get a thorough insight into the Index, by which the whole book is governed and turned, like fishes by the tail', is a quotation from: (a) Dickens; (b) Shaw; (c) Swift; (d) Walton.
- Which of these species lacks the 'Rivulus spot'? (a) *Rivulus cylindraceus*; (b) *Rivulus irroratus*; (c) *Rivulus variegatus*; (d) *Rivulus tenuis*.
- Narrow-striped *Rasbora* is the popular name of: (a) *Rasbora argyretamaia*; (b) *Rasbora daniconius*; (c) *Rasbora leptostoma*; (d) *Rasbora taeniata*.
- Laubuca dadiburjori* was named in: (a) 1950; (b) 1952; (c) 1954; (d) 1956.
- Echinodorus martii* is indigenous to: (a) Brazil; (b) Cuba; (c) Mexico; (d) Patagonia.
- The genus *Pilea* is referred to the family: (a) Araceae; (b) Leguminosae; (c) Pontederiacae; (d) Umbelliferae.

(Solutions on page 24)

G. F. H.



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.

THE annual show of the **Midland Aquarium and Pool Society** will be held in a new and larger hall this year. The new venue is the Princes Hall, Broad Street, Birmingham and the dates are the 28th-31st August inclusive.

THE new president of the **Harrow Aquarists Club** is Mr. W. A. Bone whose long experience in the hobby has been of great value to the club. Mr. H. N. Allies, the past president, is leaving to become Curator of the Paignton Zoo Aquarium.

AT the annual dinner of the **Pontefract and District Aquarist Society**, trophies were presented by Mr. Beay (Leeds) to the following members: Morton Cup (highest number of points in table shows), Mrs. L. Rhodes; Stewart Cup (second highest points), Mr. F. Poundford; Livebearer Shield, Mrs. L. Rhodes; Fighter Shield, Mr. R. Bramby.

AT the **Bath Aquarists Society** monthly meeting, Mr. L. Challenger, vice-chairman of the recently formed Bristol and Bath Section of the F.G.B.S., gave a talk which emphasised that the guppy is not a beginners' fish. The result of the A.V. male table show was 1, veiltail, Mr. J. Wheeler, 2 and 3 doublewords, Mr. J. Dickinson.

THE monthly meetings of the **Ilford and District Aquarists' and Pondkeepers Society** are held at Newbury Hall, Perryman's Farm Road, Newbury Park, Ilford on the second Monday in the month. The secretary, Mr. V. Price, 1A, Horace Road, Barkingside, would welcome anyone interested in tropical or coldwater fishkeeping at the headquarters mentioned above.

AT the annual meeting of the **Guildford and District Aquarists' Club** it was proposed that Mr. H. J. Aylott be invited to fill the office of president for the coming year. On Wednesday the 10th April there will be a coldwater table show and a table show of tropical plants. Mr. F. S. George, who is the curator of the Chessington Zoo Aquarium, who will be judging the plants is also to give a talk (with live specimens) on Reptiles and Amphibians. The meeting will take place in the Top room of Guildford House at 7.30 p.m. The hon. secretary is Mrs. D. A. Patrick, 98, Nightingale Road, Guildford.

AT the February meeting of the **Sunderland and District Aquarists' Club** a talk and demonstration on making artificial rockwork with coloured cement was given by Mr. T. Pearson, the club secretary. The winners of the table show were 1, Mr. H. Collett, 2, Mr. J. Capson, 3, Mr. L. Kidd. All those interested in the hobby in the Sunderland area are invited to contact the secretary, Mr. T. Pearson, 31, Redham Terrace, Sunderland.

THE **Leeds and District Aquarists Society** recently saw an excellent film show given by Mr. C. Yesson, who did the photography himself. The films were of both aquatic and general interest.

A FILM is being given by the **Hornsey and District Aquatic Society** on Tuesday the 16th April at 8 p.m. at the Priory Social Centre, Priory Road, N.8. All visitors are cordially invited.

THE annual general meeting of the **Harrow Aquarists Club** was held recently. The Secretary mentioned that the club's move to its new headquarters at the Y.M.C.A. Goodson Road, Wealdstone, had proved a popular one. The club's own film had been much sought after, and had been sent as far afield as Nairobi and Mombasa. Many successes had been scored in Open Shows and there was a slight increase in membership. The hon. secretary is Mr. S. N. Spencer, 27, Woodway Crescent, Harrow. (Wordsworth 4676).

AT the monthly meeting of the **Bedford and District Aquarist Society** a talk was given by Mr. B. P. Upton, the subject being "Water." The members heard with regret that the secretary, Mr. N. Turtle, would be unable to continue as he was shortly leaving the town. The new secretary is Mr. W. Donnelly, 11, Sidney Road, Bedford.

THE **Grimsby and Cleethorpes Aquarium Society** being on the coast and having an aquarium on the promenade open to the public would like to know of any societies or members visiting Cleethorpes for holidays as they would be welcomed to the Aquarium. The secretary is Mr. A. E. Parker, 19, Lichfield Road, Grimsby, who would welcome any enquiries.

AT the monthly meeting of the **Taunton Aquarists Society** Mr. C. Scutt, the chairman, reported that the club had been allocated a space at the Spring Flower Show and that furnished tanks would be set up—one coldwater and five tropical. A suitable prize would be awarded to the winner. The meeting also heard Mr. Baldyon of Weston-super-Mare, a well-known fish breeder, give an interesting talk.

A FILM show was given by **Nunenton and District Aquarists' Society** last month. The film "Under the Red Sea" by Dr. Hans Hass was greatly appreciated.

A LECTURE on the breeding of coldwater fishes was given by Mr. J. Cultum (president) to the **Grimsby and Cleethorpes Aquarist Society**. A table show results were as follows: 1, Mrs. R. Mackley, 2, Mr. A. Kennington, 3, Mr. R. Mackley.

A WELL-attended annual general meeting which was held in March was that of the **Blackburn and District Aquarist Society**. The new secretary is Mr. J. Haworth, 38, Avondale Road, Darwen, and the meetings are held at the People's College, Whalley Range, Blackburn on the first Tuesday in each month. All visitors are welcome.

THE last meeting of **Perth Aquarist Club** took the form of a table show. The standard was high and competition was keen, the result being as follows: 1, R. MacFarlane, 2, J. Cook, 3, R. MacFarlane.

AN interesting lecture on cichlids was the leading feature at the recent meeting of the **Redhill and District Aquarists' Society**. The speaker was Mr. K. Pawcett.

A VERY pleasant evening was held at the **Kirkcaldy and District Aquarist Society** when they had as guests, the East of Fife Aquarist Society. Mr. F. Wilkinson was in the chair and extended a welcome to all present. Mr. McIntosh, president of East Fife Society, replied to the welcome and hoped this inter-club get-together would not be the last. He also hoped this would be the means of creating greater interest among fish keepers in Fife. The meeting was thrown open to all present to air their views on fishkeeping, dealing with achievements, mistakes and questions. A table show for a breeding pair of live bearers and six young was won by Mr. D. Henderson (lace guppies). Mr. Hedley was 2nd with (green sail fin mollies).

A CHANGE in secretary of the **East Midland Affiliated Aquarist Societies** was made at the recent annual meeting of the group owing to the previous holder of this office leaving the district. The new secretary is Mr. D. Atkins, 363, Willow Brook Road, Corby, Northants, and he would be pleased to hear from local societies who may be interested in joining the group. The present members in the affiliation are Bedford, Corby, Kettering, Peterborough and Northampton.

THE annual Livebearers grand challenge of the **Medway Aquarist Society** was won by Mr. B. Phipps, who gained first three places and two special awards.

RECENT activities of the **Leicester Aquarist Society** included an illustrated lecture by Mr. Mason Smith, F.Z.S., and a talk on Guppies by Mr. H. Esterbrook, the president of Bristol Guppy Breeders Society. Future events will include a talk on reptiles by Mr. A. Wilson Smith. This will be in May.

QUESTIONS ranging over a wide sphere of fishkeeping were debated at the March meeting of the **Bristol Aquarist Society**. Later several members recounted unusual experiences in fishkeeping. The annual dinner of the society will be held at the Ship Inn, Redcliffe, Bristol on the 27th April.

THE current issue of **Nottingham and District Aquarist Society Bulletin** is just to hand. Forthcoming events are the Table Show for "Labyrinth" and "Diseases of Fancy Goldfish" in the programme of the Fancy Goldfish section. The Home aquarium competition is being held on the 28th April.

THE speaker at a recent **Leicester, Morecambe and District Aquarist Society** meeting was Mr. David Jones of Morecambe. Although most of the members are tropical fish enthusiasts they are always keenly interested in what Mr. Jones has to say about natural marine life in Morecambe Bay.

This occasion was no exception, and everyone was absorbed as he spoke about the habits of the sand goby—a fish which uses the high shore between Sandylands and Heysham as a breeding ground.

RECENT events of the **Riverside Aquarium Society** have included a table show for platies and swordtails and a lecture. Future events include presentation dinner and dance, table show (carps and minnows), and a show for livebearers.

FOREST HILL **Aquaria Society** members proved too strong on two counts when they met **Brixton Aquarist Society** in a quiz. In the first part of the quiz, covering general questions on the hobby, Forest Hill won 61-59, while in the 20 Questions section their win was much easier.

THE results of the competition held between the **North West London Group of Aquarists' Societies** and the **South West Middlesex Aquarists Association** resulted in a win for the latter by 110 points to 100. Individual results are given below. It is expected that

Harrow Aquarists Society, who have applied for membership of the N.W.L.G.A.S., will be able to join in the annual points competition commencing April.

Inter-Group Table Show Competition

		Points
		S.W. N.W.
Fancy Goldfish		
1 & 2	Mr. Moore (Uxbridge)	11
3	" Stevens (Hendon)	4
4	" F. Oliver (Hendon)	3
5	" Rundle (Slough)	2
6	" March (Uxbridge)	1
Guppies		
1 & 3	Mr. Edwards (Hendon)	15
4	" March (Uxbridge)	3
5 & 6	" Atkins (Willesden)	3
A.O.V. Livebearers		
1	Mr. Flintham (Riverside)	6
2	" Morrice (Hendon)	5
3	" Atkins (Willesden)	4
4	" Meyer (Feltham)	3
5	" Rundle (Slough)	2
6	" Trant (Arnold)	1
Characins		
1	Mr. Webb (Riverside)	6
2	" Baldock (Hendon)	5
3 & 4	" Rundle (Slough)	7
5	Mrs. Skipper (Hendon)	2
6	Mr. Ainsworth (Riverside)	1
Carps and Minnows		
1 & 3	Mr. Beinley (Riverside)	10
2	" Hollings (Uxbridge)	5
4 & 6	" R. L. Oliver (Hendon)	4
5	" Povey (Slough)	2
Tropical Catfish		
1	Mr. Cozman (Hampstead)	6
2	" Huxley (Riverside)	5
3	" Fryatt (Independent)	4
4	" Wainwright (Hendon)	3
5	" Saunders (Riverside)	2
6	" Mackeonis (Independent)	1
Egg-Laying Tooth Carps		
1	Mr. Bullen (Slough)	6
2	Mrs. Robertshaw (Hendon)	5
3 & 5	Mr. Kieley (Slough)	9
6	" Filmer (Uxbridge)	1
Anabantids		
1	Mr. Tomkins (Independent)	6
2 & 3	" Rundle (Slough)	9
4	" Pye (Hampstead)	3
5	" Atkins (Willesden)	2
6	" Shears (Uxbridge)	1
Cichlids		
1	Mr. Ellis (Riverside)	6
2	" Landau (Willesden)	5
3	" Filmer (Uxbridge)	4
4	" Cozman (Hampstead)	3
5	" Dare (Independent)	2
6	" Hollings (Uxbridge)	1
A.O.V. Tropical Egg-Layers		
1	Mr. Churchman (Hendon)	6
2 & 6	" Landau (Willesden)	6
3	" Flintham (Riverside)	4
4	" Rundle (Slough)	3
5	" Morrice (Hendon)	2
Totals		110 100

FORMED in May 1956, Poole Aquarist Association has had a flying start, and some really good meetings. Table shows are held every other month, and some really fine exhibits have been shown. Aquarists, however young, would be welcomed. Meetings are held at the St. Mary's Catholic Hall, Market Street, Poole at 8 p.m. on the last Tuesday of every month, and visitors are welcome.

AT the recent annual general meeting of the Chester and District Aquarist Society the following new officers were elected: chairman, Mr. F. Oldbury; treasurer, Mr. G. White; committee, Messrs. R. Sharp, E. Stephen, P. Millington. The financial state of the society is quite healthy and the permanent headquarters



The Aquarist's Badge

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

To obtain your badge send a postal order for 2s. together with the Aquarist's Badge Token cut from page vii, to Aquarist's Badge, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

has proved a social success. A comprehensive programme has been set out for the forthcoming year including table shows, film shows and visits. The annual show will again be held in conjunction with the Chester Cacti Society on Saturday and Sunday (7th and 8th September) at St. Peter's Parish Hall, Hamilton Place, Chester. This type of show has proved a financial success and can be made just as attractive as the big open show without the heavy financial burdens of hiring staging and tanks. Another dozen tanks will be added to the show stock.

A FILM show was recently presented by the Peterborough and District Aquarists' Society. Among those present was a small party from Huntingdon and several new members. Films shown were: "Daphnia," "Strange Sea Creatures," "Creatures of the Rock Pool," "Whaling," "Freshwater Fish," "Egg to Newt."

"PHILATELY and Fish" was the title of a talk given to members of the Derwent Aquarist Club at their February meeting at the R.A.O.B. Club, Derby. The speaker, Mr. C. Hill, vice-president of Nottingham Aquarist Society, has combined the two pastimes for several years. The talk was illustrated by means of an epidiroscope, operated by Mr. Mark Welch, of Borrowash. Mr. Ken Allen, chairman of the club, presided.

ON the 2nd March, Merseyside Aquarist Society presented a furnished tropical aquarium to Huyton Old Peoples' Home. It was received by the deputy warden, Miss Brown. The chairman of the comforts committee, Mr. H. Freeman, thanked the society, and later took members on a tour of the home.

The residents took a great interest in the tank and fish, and it is hoped it will remain a source of interest and amusement. The society hopes that others will follow this example in providing aquaria for their local old folk.

AT a recent meeting of the Cambridge and District Aquarists' Society, members were given a very interesting and instructive talk by Mr. F. Lemmon, whose subject was microscopy. It was of great value to those present, in so far as the use which was already being made of the microscope which is on loan to the society, could be even further extended with the minimum of equipment and some little improvisation.

Mr. Lemmon gave practical demonstrations with the use of a sample of *Paramecium*, an organism of great value to the breeder of fishes. It was shown that for study purposes, the speed

of movement of these tiny creatures could be appreciably slowed by the admixture of a cellulose product to the water in which they were swimming.

Mr. Lemmon also gave a most interesting demonstration of improvising a magnifying glass for use with the microscope, by filling a glass flask with a solution of very weak copper sulphate.

During the short business session which preceded the talk, the chairman of the society, Mr. B. K. Elkerton, said that congratulations were due to Mr. J. Tingey and to Mr. P. Mason for the excellent work which they had carried out in the aquarium which has been maintained by the society in the Children's Ward at Addenbrooke's Hospital for several years.

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies: Southport and District Aquarium Society (Mrs. J. E. Cahill, 38, Marina Road, Little Altcar, nr. Liverpool); Gravesend and District Aquarist Society (F. G. Elford, 136, High Street, Chatham, Kent); Rotherham and District Aquarist Society (A. Ibbotson, 34, Henley Street, Masbro, Rotherham); Federation of Guppy Breeder's Societies (Liverpool and District Section), P. G. Hilliard, 68, Folly Lane, Wallasey, Cheshire; Bedford and District Aquarist Society (Mr. W. Donnelly, 11, Sidney Road, Bedford); Blackburn and District Aquarist Society (J. Haworth, 38, Avondale Road, Darwen); East Midlands Affiliated Aquarist Societies (D. Atkins, 363, Willow Brook Road, Corby, Northants).

Aquarist's Calendar

23rd-25th May: Hendon and District Aquarist Society eighth annual open show at the Brotherhood Hall, Edgware Road, West Hendon. Entry forms are available from Mr. A. Baldock, 239, Squires Lane, London, N.12.

28th-31st August: Midland Aquarium and Pool Society annual show at Princes Hall, Broad Street, Birmingham.

6th-7th September: Bethnal Green Aquatic Society annual show at the Men's Institute, 229, Bethnal Green Road, London, E.2.

7th-8th September: Chester and District Aquarist Society annual show in conjunction with the Cactus Show at St. Peter's Parish Hall, Hamilton Place, Chester.

Crossword Solution

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C Y C L O S T O M A T A
Y I V O W E N Q
P E C T O R A L G N U
R H I N D F E A
I D L E D S A I L O R
N A I L M D P I
O R D E R A P O D E S
D E S M I D S I T
O E P I P L A T Y S
N E O N S E H
T V T C H A P E R I
S E N S E S K O R A N

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PICK YOUR ANSWER (Solution)

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