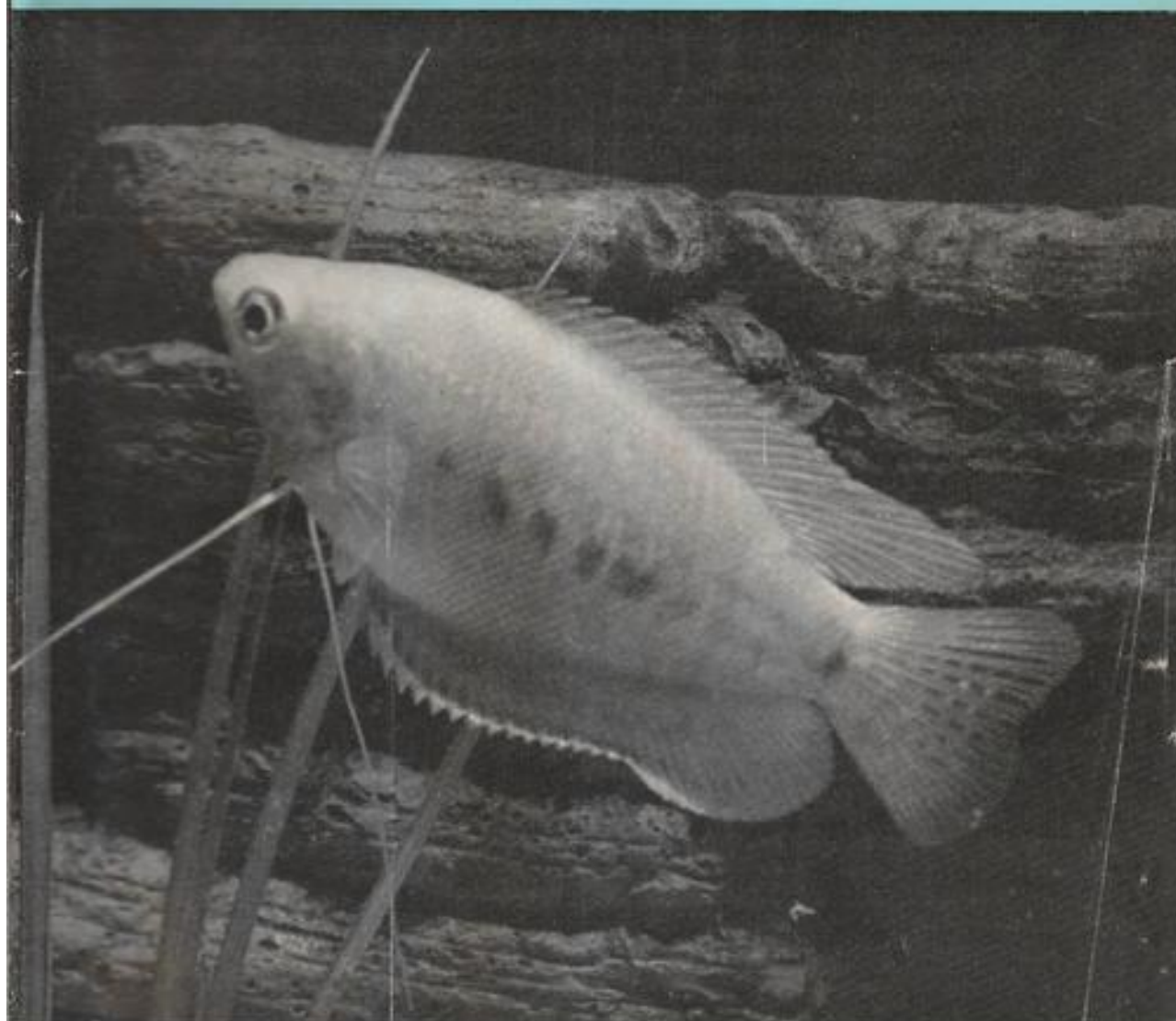


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The Editor accepts no responsibility for views expressed by
contributors.

Editor: Laurence E. Perkins

January, 1969

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Dreissensia polymorpha

by Bill Simms

THE DEATH of a mussel in an aquarium is not easily detected at once, and such a large bulk of flesh decaying there can cause plenty of trouble; so most of us avoid the use of these interesting molluscs. However, the Zebra Mussel, *Dreissensia polymorpha*, a common freshwater species, is so interesting that it is worth keeping one on its own in a small aquarium.

This freshwater mussel is the closest relative to the common mussel of our sea-shores. Unlike other freshwater mussels that retain their eggs until they hatch, the zebra mussel discharges hers freely into the water. There they hatch out into tiny larvae that are free-swimming. At once they swarm towards the water surface, feeding on microscopic plant life and staying in this state for about eight days. During this period they are often wafted with the water for considerable distances and because many are found in reservoirs, they often turn up in water supplies in various stages of growth.

After this short free-swimming period they sink to the bottom and are thereafter dependant on their foot and the byssus threads for all locomotion. In general they cluster on submerged objects in lakes, rivers, canals and, via reservoirs, in main water pipes.



Peculiarly enough, this mussel was unknown in Britain 150 years ago, though it was present in prehistoric times. Recently it has spread throughout Europe once more, and now is fairly common in Britain.

The shell is dull brown in colour, marked with lighter bars forming the zebra pattern. The interior is beautifully smooth with mother-of-pearl, forming a striking contrast to the dark-coloured flesh of the animal.

This mussel, like the common mussel of the sea-shore, spins very strong byssus thread with which it fastens itself. Once anchored in a position that yields a good supply of the micro-

scopic water life it feeds on, the zebra mussel rarely moves away. But it can do so, and for this purpose severs the threads, moves along on its foot, and then spins new byssus threads at the new anchorage.

If any aquarist does decide to keep one of these prettily shelled mussels, he must ensure that he has a plentiful supply of green water with which to feed it. This is best obtained from a row of jam-jars containing some pond water and which are stood in a very good light. But do keep an eye open for any signs of death, for these creatures do smell badly when decomposing.

WHAT IS IT ?
you will find the
answer on page 671



The international way of keeping marines successfully:

The marina method

part two

By the International Marine Study Society

Heating and Heating Control

HEATING OF THE aquarium can be successfully accomplished by one of several methods well-proven in use with freshwater tropical aquaria: either by the conventional heater and thermostat set—which requires slight modification as certain thermostats, and indeed several brands of heaters, are sealed with rubber bungs—although the life expectancy of rubber bungs in seawater is nowhere near that of the same bung in freshwater. Using a conventional heater (plastic-bunged) and an outside fitting thermostat, making sure that the metal clamp which holds over the frame of the aquarium is protected by being threaded through polythene tubing to prevent its corrosion, you can effectively succeed in heating the tank. The method we favour, however, is the use of fully-submersible combined heater-thermostats, as these have the advantage of being compact, easily controllable through their plastic cowl, and accurate. Use can also be made of the non-submersible combined models, but with these you always have the risk that seawater may one day penetrate into the working parts unnoticed, thus causing havoc with the instrument and even more with the inhabitants of your tank. There is at present on the market an adjustable, double sucker version of an all-polythene heater/thermostat clip, and these are ideal for anchoring your heating unit.

The next consideration will be the setting of your thermostat if this is of the submersible type, as most of these instruments are pre-set at about 75 deg. Fahrenheit although they are easily adjustable following the manufacturers instructions.

As opposed to the views of some authorities on this matter, we prefer to keep our tropical marine fishes at around the 72-75 deg. F. and although

they are reputed to be less active at this temperature, we have found the difference minimal. Keeping your fishes at this temperature also allows for the fact that should you wish to raise it at any time, you have the scope to do so, whereas keeping them at the higher range of 80-85 deg. you have not.

Thermometers

Whilst on the subject of heating one must remember to provide oneself with an accurate thermometer. Most spirit or mercury thermometers have a paper scale within the external glass tube, and this type is preferable to those with an external plastic scale. If, however, you wish to invest a little extra, there is available a dial type of thermometer similar to the dials on a car dashboard. This type is held to the front glass of the tank with a ring-plastic suction pad, and is much neater than the conventional models of thermometer. You may incur difficulty if using rubber suckers to stick your thermometer to the front glass as rubber perishes quite quickly in seawater and will therefore require frequent replacement. If possible it is a good idea to substitute all plastic equipment for its rubber counterpart.

Hydrometers and Density

A hydrometer is the instrument used to measure the density of seawater. The scale most widely used by aquarists for this purpose is one which assumes the density of freshwater to be 1.000. Therefore if seawater has a density of 1.025 then it will weigh 1.025 times the weight of the equivalent volume of freshwater.

We have found that the best density range for tropical marine fishes is 1.020—1.023, with an optimum density of 1.021. If, however, you wish to keep invertebrates in addition to fishes, then a slightly higher density of 1.028 would be more suitable. Native marine fishes seem to do best at a lower density

range of 1.020—1.025.

One point to note here about the density—when the water level in the tank falls through evaporation it will require to be replenished with freshwater as only the water, not the salts evaporate.

The Water Itself

Natural seawater is a substance which contains all the elements known to mankind, supporting a diverse collection of fauna ranging from plankton to whale-sharks.

As such, natural seawater contains all the necessary micro-organisms for the continuance of its food chain, and while this is satisfactory in nature we cannot yet hope to reach anywhere near this in the average marine aquarium, the nearest anyone has ever achieved so far being the 'natural' method mentioned in the preface.

A far better proposition for the average aquarist's use is synthetic seawater, as modern formulae have now been produced that can cope quite adequately with the demands of the inhabitants we are likely to keep. There are two types presently available on the market. Type one is the complete formula, in salts form, which comes sealed in a polythene bag. The two manufacturers of this type give full instructions on their products as to their preparation and these should be followed. Type two is the more economical to purchase if the salts will have to be sent to you, as it contains all of the elements and trace elements barring sodium chloride or common salt. This makes the pack considerably lighter, and the only preparation required when you receive it is to add the stated amount of cooking or block salt.

If you have the time and facilities, however, a more economical way of going about this is to use one of the existing formulae, buying the chemicals and making up your own synthetic seawater. For coldwater marines

the formula by Dr. F. W. G. Knowles is an excellent one; for tropical marines we recommend either the Segedi-Kelley modification of the Backhaus formula, or one tried and tested by the I.M.S.S. When mixing up any synthetic formula, always implicitly follow the directions given. Compounding your own synthetic seawater is more economical if large quantities are required. In addition to the above facts it has one major advantage over its natural counterpart, that of containing no harmful parasites or micro-organisms, but it must be remembered that if the fish you obtain are in natural seawater, then there is the possibility of introducing these with your fishes and for this reason it is a most desirable practice to have a small quarantine tank set aside for new arrivals.

Quarantining New Arrivals

New fishes should be quarantined for about 14 days before introduction to your main display. An ideal container for this purpose being a small plastic (or all-glass) aquaria equipped solely with an internal base corner, or sub-gravel filter. If the fish shows distress at its empty container as some species do, then you can add a small up-turned clam shell, or a hollowed out brain coral making sure these are thoroughly cleaned prior to use.

pH

pH is a term often used and little understood. To the layman it is the measure used when determining the acidity or alkalinity of the water in the aquarium; to the scientist it is defined as $1/\log$ of the hydrogen ion concentration. The pH of natural seawater varies between 7.8 and 8.9 and could probably (in exceptional circumstances) fluctuate even further. Seawater, as you can therefore see, is quite alkaline. The recommended pH for tropical marine aquaria is 8.3, although it can safely vary between 8.2 and 8.5 over a period, with no ill effects to the inhabitants. You will find that all proprietary brands of synthetic seawater will give you the correct pH, regardless of the pH of the tapwater used in preparation, unless it is extremely acidic, in which case the addition of a small amount of lime water (calcium hydroxide solution) should

rectify it. All the synthetic formulae will also give the correct pH when in solution.

One can buy several saltwater pH test kits, all of which are accurate enough for the average fishkeeper's use, or failing this you can use the following method:

Obtain a packet of pH test papers that will register over a scale of 7.2-8.6. Tear out two leaves from the book of papers and place them in a clean test tube together with 4 c.c.s. of water from your marine tank. Shake vigorously, then check the colour of the solution against the colours shown on the cover of the book. Surprisingly enough, although this method is accurate, just dipping the papers in the aquarium water is not. 100 tests have been carried out using this method and all proved accurate to ± 0.1 .

Filtration

The Marina system is based on sub-sand filters of the base plate type. Sub-sand filters *unless* adapted by our method, we have found inefficient, but the simple adaptation process required can be carried out successfully by even the most inexperienced fishkeeper. To create an area of sufficient enough bacterial activity to reduce undesirable matter to a desirably minimum level, an extremely active bacteria bed has to be created. We find that total coverage of the base area, such as one gets with base-plate filters, is far more efficient than the limited coverage obtained from tubular types of sub-sand filters.

Even with an ordinary base-plate type (a) the flow of water is not great enough and has to be supplemented and (b) the amount of material to be broken down is in excess of the maximum that can be coped with by the available bacteria.

Now, if one is able to pull water at a faster rate through the sub-sand filter the base media and bacteria bed receive a faster and more oxygenated flow of water and 'foods' and will support a far greater number of bacteria per sq. inch. This, as you can see, does away with both problems as you have at the same time increased circulation (a) and increased the adsorption rate of undesirable matter (b). To increase the flow one does not need a powered water pump, although if

these can be obtained for a smaller sum than the currently expensive ones at present on the market, then by all means use one, but *only* as a pump, leaving all filter materials out. If you have not one of these, then with the aid of a little ingenuity, a small empty plastic fishfood canister and an airstone, one can easily construct a chamber which, depending on size, will give a flow rate variable from 20 to 150 gallons per hour! However, if you do not feel all that energetic (and after inhaling the chloroform needed for welding the plastic tubing and canisters we shan't blame you!) you can purchase these units "ready made" from the International Marine Study Society for the princely sums of 5s. 6d. (for the up to 60 g.p.h. ones) and 8s. (up to 120 g.p.h.). If you wish to produce your own, however, a diagram is shown on page 651.

All joints should be caulked with a treacle solution of plastic and chloroform which dries to a solid plastic within 48 hours. It is non-toxic to even the most delicate marine life.

Once your tank has been set up containing one of these units the advantages to be gained are endless. You will be able to grow marine algae successfully, keep live coral easily and even breed marines—yes, we've even done this and have slides to prove it too. But now a few words of caution must be added as this method does not combine readily with 'standard' or so-called methods.

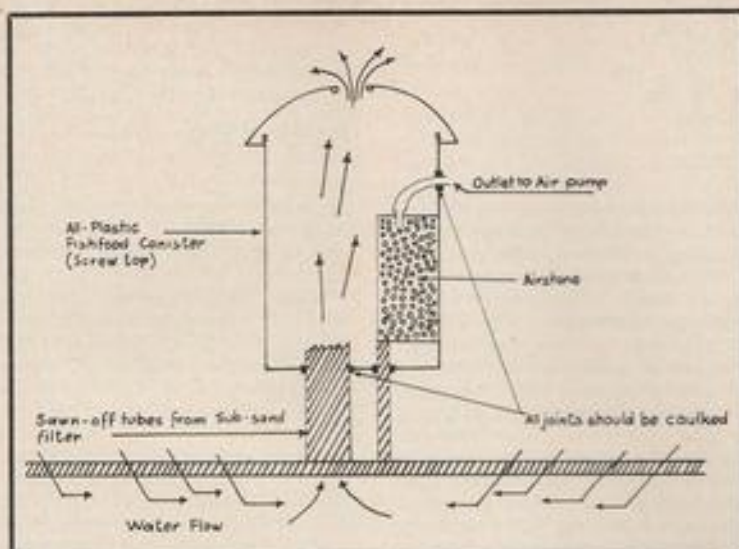
Do not use ozonisers under any circumstances with this unit. They are not necessary in any case.

Do not use copper sulphate solution to treat Oodinium (if you ever get it in one of these systems)—there are far better and safer drugs on the market now in any case.

Check nitrate levels regularly with a nitrate test kit. If your algae grow well you may have to add extra nitrates! Potassium nitrate (in measured doses) we found the most effective.

Keep a watchful eye on your illumination. Successful algal growth requires stronger lighting than is normally employed.

Do not irradiate your tank with ultra violet. If you wish to use

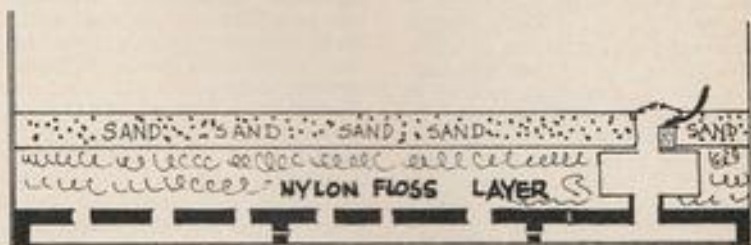


Below

Diagram showing filter chamber in position on a sub-sand filter. This also shows a secondary sub-sand chamber which can be used for ion exchange resins or carbon. As both canisters have screw tops they are easily emptied when replacement resins or a new airstone need be fitted

U.V., and there is no reason why you should not, pump your water past a U.V. unit situated outside the tank.

Well, there it is, the *Marine System*. Simple, yet we have found it 100 per cent. effective and successful. You may think our system hopelessly and theoretically improbable—but it works, and we can keep marines successfully for far less than you can.



HAIR GRASS

by B. Fry

FEW AQUARIUM PLANTS are daintier in appearance than hair grass (*Eleocharis acicularis*), which is related to the cosmopolitan sedges (*Cyperaceae*) and is widely distributed in Europe, Asia, Australia and the Americas. In the natural state it is commonly found growing along the swampy margins of lakes and in habitually wet ground. Strictly, then, it is a swamp plant rather than a submerged plant.

The filiform stems reach a height of some six to twelve or more inches. They grow in close-packed tufts, each tuft consisting of a few to several stems. The stems, each one seemingly on its own roots, arise from thread-fine runners that travel in all directions under the growing medium. The miniscule elongated-oval brown flower-spike, which is borne on a quadrangular stem, is not produced unless the plant is established on mud raised slightly above, or below, water level.

Among the essential needs of hair grass in the aquarium are sufficient light to keep it a healthy green but not so much as to promote a choking growth of algae to spread among its fragile stems, and clear, soft and neutral to slightly acid water.

The right quality and duration of light (the length of time the plant is

exposed to light of the right intensity each day) may be arrived at by experimentation; for size of tank, depth of water, and type of light used all play their part. Clear water is largely a matter of keeping bottom-grubbing fishes out of the tank and excluding any ornaments (man-made or natural) likely to break down into a fine dust. (Any rock or rock-like formation soft enough to do this would be unsuitable—nay, dangerous—to place in an aquarium, anyway.)

Because of its delicate foliage and shallow rooting-system, hair grass is best suited to a tank housing a pair or collection of smaller fishes. It has a wide temperature tolerance, but flourishes best at a range of from the upper fifties to the middle seventies (°F). Besides its popular name of hair grass, it is less commonly known as needle grass or lesser spike-rush.

EXPERIMENTS IN KEEPING DISCUS

by R. M. WINTER

Continued from part one in the December issue

Filtration

This is one of the most vital parts of keeping Discus and one that is often overlooked. Suitable filters in the main should satisfy four main conditions. They should maintain good water circulation, actually take dirt from the tank (this in the main rules out the use of internal filters), permit the maintenance and facilitate thorough cleaning, and finally, they should be as big as practically possible. They can, of course, be the air-lift type or the motor driven. I had a problem inasmuch that I couldn't use the orthodox type because the tanks were built into alcoves. I therefore made one of my own design to fit inside the hood I made previously. This was used alternately with a purification plant. (See figs. 1, 2 and 3). The filter was very efficient and helped considerably towards tank hygiene and water circulation was excellent. I cleaned it at least once weekly irrespective of whether it looked dirty or not. I also found that it acted as an algal filter which saved time on tank maintenance. Sub-gravel filters I found were first class in keeping suspension down and aiding water circulation. They should also be cleaned and should only be turned off when this is being carried out as it is considered that when they are not in operation the toxic gases etc. that they normally keep in check cause poisoning. The method I use to clean them is as follows: the air line from the pump is disconnected and used as a siphon, drawing the water from below the sub-gravel bases. This also brings up the detritus and surplus debris. I also found the carbon capsules that fit the outlet tubes useful in maintaining a high standard of tank hygiene.

Some authorities advocate the use of peat housed in nylon stockings placed on top of the bases. I found, however, that it soon became exhausted and deposited a fine layer of "dust" over the substrate; also on one occasion,

possibly due to negligence on my part, tubifex worms found their way into the stocking and caused slight pollution.

I have found peat filters to suit me better mainly because they can be cleaned and changed. The filter in this case can be internal or external; the peat is sandwiched between two layers of FIBRE wool with a few gravel chips to hold it in place or to give it weight. Glass wool should never be used as it tends to put fine splinters into the tank causing extreme irritation and could be fatal. The most important point is to clean filters regularly. At this point I would make mention of the use of an air stone. With the sub-gravel filters and the home made plant and filter I seldom found the need to use one but if one is employed, it should only disturb the water and never make it turbulent as I find Discus prefer gently moving water.

Species

Some authorities claim that there are four species of *Symphysodon*, while others declare that there is only one and the others are colour variations of it. I am not suitably qualified to argue, but from the experience I have gained in keeping them it appears that the requirements of the *axelrodi* differ quite considerably from those of the *heckel*. Recently I have obtained some specimens of *Saequifasciata aequifasciata* (Green Discus), but have not had them long enough to pass comment.

From information provided by greater authorities than I it is apparent that all the species will inter-breed and produce fertile young so lending weight to the other side.

Symphysodon aequifasciata axelrodi (Brown Discus).

I have found this species to be the easiest of the two to keep. Their water requirements do not appear to be as vital or demand such regular changing as do *heckel*. The same high standard of hygiene is necessary but their tolerance to unfavourable conditions is greater. Cures of ailments have proved easier to effect. They will also accept most foods after perseverance. The brown Discus that I have kept will all take dried food in moderation,

The Editor greatly regrets the omission of the author's name in the December issue when Part I of this article was published.

PART TWO

freeze-dried regularly, frozen food when ever offered besides tubifex, *daphnia* and finely chopped brandlings.

Water without partial changing would be tolerated without ill effects for 4 to 6 weeks though this is not recommended as a standard. Temperature preferred is 78° to 84°F., DH 4 to 8 p.h. 6.5 to neutral and a little over up to 7.6.

The fish in general seem to take to tank life more easily and are not so skittish. Tank-bred specimens seem to show all these points to a greater degree. Some authorities recommend the addition of salt but I have found this not advantageous; quite the contrary in fact.

This species quickly become finger-tame and after a short time will feed from the hand but are, however, shy of strangers.

Symphysodon Discus (Heckel)

A very demanding species, considered by some experts to be the most difficult of all Discus to keep. To keep them at their best, water conditions are of optimum importance. They will tolerate neutral water only if it is not too hard. Should the water become hard I find they go off the food and sulk in corners and do not show their wonderful colour patterns. They are extremely shy of strangers and in my opinion recognize individuals.

When I approach the tank they come to the front glass. In fact, I was able to "call" them to the front glass and have demonstrated this to many disbelieving colleagues. They are unfortunately terribly temperamental and some days they parade up and down like grenadiers showing their finest colours while on others they lurk at the back of the tank and only venture out to feed.

When in full colour they are a sight to behold and I feel put many marine fish to shame. I found they prefer the water to be 1 to 4 DH p.H. 6.4 to 6.8, temperature 82° to 86°F. when these conditions prevail I find them to be really entertaining and pass through their colour patterns in front of your

eyes. I also find they appear to do better when a weekly partial water change is executed; I change five of the thirty gallons each week. After a water change they show visible signs of improvement and swim the full range of the tank repeatedly showing their finest colours while their appetites are quite huge. Feeding, I find, is their biggest drawback. The specimens I have and had all show definite preferences and would rather starve than eat something they do not relish. *Daphnia* and *Tubifex*, in that order, I find are favourites. I have had them taking frozen brine shrimp but refuse to accept it as staple diet. All *Discus*, unfortunately, are fussy about feeding and foods they will take must be fed regularly. If *Discus* are fed exclusively on one food, even if they have taken others previously, they will, after a very short time, only accept the one that has been exclusively fed. Other foods I tried would only be accepted in minute amounts, if at all. Those included freeze-dried, white worm, grindal worm and midge larvae. I did find they would accept *gammarus* but stopped feeding this for reasons yet to be mentioned.

For a first pair I would recommend tank-bred *Axelrodi* if one can acquire them; if not a wild pair. Tank-bred specimens are not as shy, will, as stated, eat most foods with perseverance and, apparently, show more resistance to disease.

Water

Here again a very important factor in the keeping of *Discus*. In their natural habitat the water temperature is 29° to 30°C. (approximately 86°F.) pH 6 total hardness .6 DH chloride 1 mg./litre nitrate 0.15 mg./litre. μ conductance at 18°C. approximately 43 micro siemens. (Briefly that is if an electrical current is passed through the water the dissolved salts (chloride, nitrate, etc.) act as conductors and give an electrical reading thus enabling a quick assessment to be made concerning the amount of dissolved salts present.)

Natural soft acid water is considered most favourable if you can gather the required amounts; this is something even in this rain-sodden country I find difficult. It must be clean and free from harmful substances; rain that washed down roof tiles and gutterings is not suitable. It should be collected in open pans after the rain has been falling 30 minutes or more. I found

difficulty in maintaining one tank from this source and had to find alternative methods to obtain the required amounts.

Ion Exchange Resins

Water softened by this method is suitable but the amount of salts and the pH remains unaltered. The first requirements are good hardness and pH test kits. The tap water in my area is pH 8.4 and 12 English degrees of hardness. Consequently it is too hard and alkaline. I have a small Permutit plant of my own but cannot produce the quantities required so I obtain artificially softened water from a local laundry. The hardness is less than 20 ppm but the pH is 8.4 far too alkaline.

To bring this water into the required scale I employed the use of three ten gallon polythene containers. Peat moss is placed in nylon stockings, German Sphagnum is considered to be the best but extremely difficult to obtain, I therefore used Irish peat moss that can be procured quite easily; sedge peat I found to be rather harsh.

The stockings were hung in the containers; 24 hours was usually sufficient to obtain the required acidity. Unlike the use of chemical methods the water did not return to its original condition. To obtain the required hardness this water is mixed with tap water treated with the peat in the same manner. To calculate the amounts to use to give the required hardness I have set out a simple method below. The values have been chosen for convenience:

Actual hardness of the prepared tap water 100 ppm = A
Actual hardness of the artificial water 20 ppm = B
Desired hardness 60 ppm = C
Proportion required = D
To find D:

$$\frac{C - B}{A - C} = \frac{60 - 20}{100 - 60} = \frac{40}{40}$$

Therefore, equal quantities in this example will give the desired characteristics.

This was very acceptable by the *Discus* and other species of fish do well in it, both *zevans* and *nannacara* have raised several families in this prepared water.

I found that subjecting both the tap and the artificially softened water to same length of treatment in the peat gave almost identical pH values.

Another method I found acceptable is mixing the tap water with distilled water (treated) using the same formula. A pair of *Heckel* spawned twice in this particular made-up water. Some authorities state that artificial water is harmful, but I have not found this so in my experience. That is in as far as I am able to judge. I consider a fair assessment to be that both species thrive and have both spawned in one or the other.

I have also found that *Discus* appear to grow quicker and generally do better when they are allowed 12 to 15 gallons per fish.

Foods (and their preparation)

In my experience *Discus* prefer *Daphnia* and *Tubifex* in that order. Individual tastes etc., I have already mentioned.

After listening to a talk given by a chemist aquarist I became aware of the importance of vitamins, particularly as shortly afterwards I read in a German magazine an article concerning *Discus* and vitamins. Among other points *Discus* apparently have difficulty in secreting the mucus so vital in the breeding of them if certain vitamins are absent or in insufficient quantities in their diet. Shortly after I began to add vitamins to the diet, Vitamins C, B, B12 were all fed at regular intervals over periods of two months. One pair of wild *Heckel* would only accept *Daphnia* during the day but after vitamins would take both *tubifex* and chopped brandlings when offered at any time. I also find that the addition of vitamins to the diet of other species of fish will act as a trigger for spawning and I feel this is not as drastic a step as the use of hormones.

During the "summer" months, like many aquarists, I make several *Daphnia* pond trips and from a local source acquire quite huge amounts of not only *Daphnia* but *gammarus*, midge larvae etc. But even after painstaking preparation I experienced my first bout of ailments with *Discus* shortly afterwards and I therefore cannot recommend this as a suitable source.

In their natural habitat, according to Dr. Stoll, their diet consists mainly of small ostracods closely related to our *gammarus*. I have tried the *gammarus* on the *Discus* and they accept them with relish. Unfortunately *gammarus* are notorious carriers of disease, particularly the larvae of *acanthocephalus* which is a common parasite found in

the gut of free-living fish. This invader is relatively rare in aquarium fish but imported specimens are often infected. For these reasons, slight as they may be, I have stopped using *gambusia* in their diet.

Discus, unfortunately, will only accept live food in the main and no matter how it is treated while it is still alive, it remains suspect as a would-be carrier of disease.

How diseases are introduced has not been fully investigated as yet but in my humble opinion live foods must be more than a likely source. If the time ever occurs when Discus will take other foods regularly, eliminating the use of a live diet, I believe that there will be fewer and fewer mysterious deaths.

Any food should be warmed to tank temperature before feeding. The precise reason for this is not clear, but contact with other Discus-keepers and accounts that I have read have revealed that if this practice is not carried out fatalities or outbreaks of disease usually follow.

Figures

Figs. 1, 2 and 3.

Both the filter and the purification plant are dependant on an adequate supply of air.

Fig. 1. The Hood

The dimensions of the hood are the same as the inside of the top frame angle. It is higher at the back than the front to allow condensation to return to the tank. Its height is determined by personal choice but must be sufficiently high to allow the housing of the filter and plant.

A—Supporting shelf for filter and purification plant.

B—Inlets for air lines.

C—Support brackets for lid which also prevent sliding.

D—Support brackets to prevent the hood slipping into the tank.

E—Section. The edge nearest the tank was formed to provide a drip ledge.

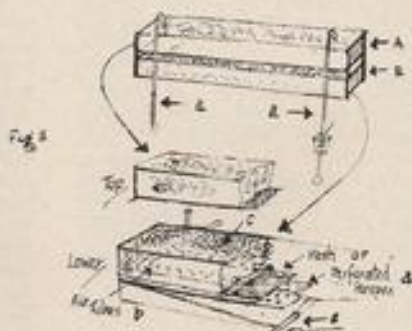
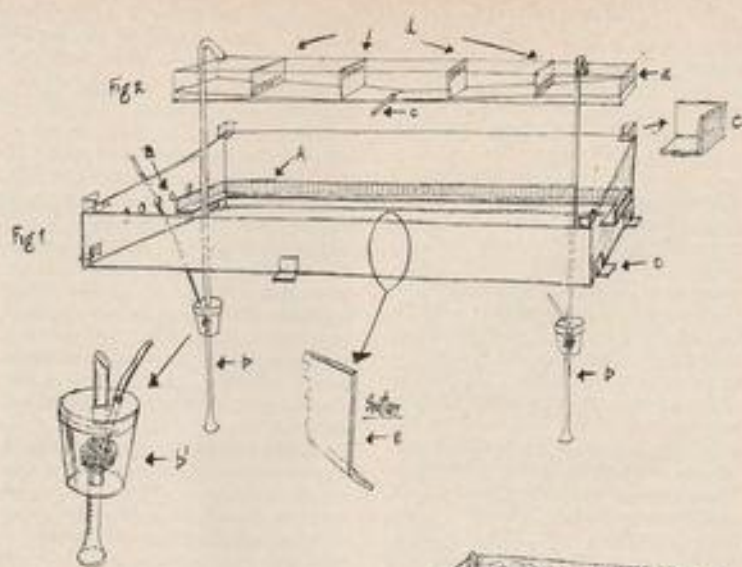
Material: $\frac{3}{8}$ in. to $\frac{1}{2}$ in. clear perspex. It could also be laminated fibre glass. All parts glued.

Fig. 2. Filter

(a)—Filter box with bottom sloping towards centre to ensure drainage.

(b)—Air lifts into filter.

(b')—Boosted air lifts. The tubes are cut and a food container screw type is glued between them to house an air stone.



(c)—Outlet into tank. If faster filtration is required more may have to be installed.

(d)—Dividers for the filter medium. Fibre wool can be used in the sections where the tank water enters the filter. The others can be filled with activated charcoal, peat or water softening resin etc. Take note of the positions of these draining holes in these dividers.

Fig. 3. Purification

Top—Plain box with a mesh bottom this mesh can be $\frac{1}{8}$ in. to $\frac{1}{4}$ in. stainless steel or nylon, it allows entering water to DRIP through into the lower box. Fibre wool may be used in this to catch the larger detritus.

a—Inlet airlifts these can also be the boosted type.

Lower—Plain box with two bottoms, the first of which (a) is either mesh or perforated perspex on this is a network of air tubes; (b) similar to a biological sub-gravel filter but there is

only one row of holes and these face upwards.

c—Coarse chips (I used granite) are placed over these tubes. The bottom proper slopes to the centre. The outlet tube (e) is fitted in the centre, as in the filter others may be necessary.

The filter and the plant have the added advantage of keeping the water surface moving therefore allowing more oxygen to be taken in this is achieved by virtue of the outlet tubes.

Preparation

The need for a high standard of hygiene cannot be stressed enough. My wife often declares that I am more particular over food for the Discus than I am about food for myself. When I was "forced" to take a holiday (she muttered something about reference to keeping Discus should have been included in the marriage vows). I almost made a colleague turn grey training him to be extra careful in their

care and he came to feed them for a full week under my beady eye before we left for our holiday.

Seriously though, hygiene is very important; the advent of the Ozonizer presented the aquarist with a means of treating live food thus rendering it fairly safe but unless one is proficient in its use, more damage than good can be done. There is not as yet sufficient experience in the uses of ozone in aquaria. Experiments that are being carried out are apparently proving favourable. With the ever increasing prices in the hobby few of us, after laying out for equipment and the actual fish, can afford one. In fact, I was only able to carry out this experiment because a very great friend owns a London Aquarium, and is genuinely interested in promoting the keeping of Discus and fish in general.

Food can be cleaned without an ozonizer quite satisfactorily and the method I suggest is as follows:

Daphnia

A small tank or large jar is filled three-quarters full with water of the same temperature as the Discus tanks. To this add a few drops of Acriflavine, enough to colour the water a definite yellow. Leave this for thirty minutes or more and check that the concentration is not killing the *Daphnia*. Live *Daphnia*, I find, usually swim to the bottom enabling corpses and undesirable bodies to be siphoned off the surface layers. They are then transferred to clean water at the same temperature. This can be achieved by straining them through a sieve. Finally, they are re-strained and fed in the normal way making a final visual check for foreign bodies. NEVER tip a bag of *Daphnia* straight into the tank. A point I feel worth mentioning is the method of culturing *Daphnia* during the milder weather. I have done this with considerable success in old battery jars and raised enough to only warrant occasional supplements from outside. The mediums used were grass cuttings and dried blood, usually that left over from beef heart that the Discus would occasionally take.

Tubifex

As this, in the main, is their staple diet, exceptional care must be taken. When purchased, Tubifex usually stinks. Yes stinks! No other word seems more apt in its description. We should all know the source,

sludge and filth. When first purchased I wash them thoroughly with a jet of water, removing all debris and noticeable dirt particularly the green slime that often accompanies them. They are then placed in an Acriflavine solution for approximately 8 hours. I then place them under a running tap as standard procedure. The worms should be washed for at least two days before they are fed. Before feeding they are re-washed, soaked in Acriflavine and finally warmed to tank temperature. I find that cleaning them is easier if they are scattered into a bowl and left to 'ball' up; this also applies to warming them in clean water. The amount of worms will vary from fish to fish but I find Discus have enormous appetites and food, if they like it, is seldom left long in the feeder.

When preparing foods the removal of finger rings is advisable as they are likely traps for soap, etc. As previously mentioned the Discus are sensitive to toxic substances in very slight amounts. Separate equipment should be kept exclusively for them and should, after use, be thoroughly washed in boiling water. If the nature of the tool or equipment renders this difficult, wash them in a solution of either permanganate of potash, Dettol or Halamid, taking care to rinse the cleansing agent away.

I suggest that Discus are fed approximately the same time each day as they appear to approve of habit forming. You may find as I have that wild specimens seldom feed during the main part of the day, but prefer to feed prior to lights-out. I usually feed them about an hour before. Any specimens I find refusing to eat (hunger strikes are quite common especially with new imports) usually break down if the temperature is increased and large amounts of *Daphnia* offered. When feeding time was near the Discus would form a line along the front of the tanks as if they were on parade. Any food given should not be too large as Discus have small gullets. Surplus fish fry would be accepted if it was very small (two or three days after the free swimming stage, depending on the species). Most of the Discus would not eat guppy fry and on a couple of occasions the guppies reached maturity in the same tank.

Heating

There are many conflicting reports concerning temperature. In their natural habitat the temperature is 29/30°C. approximately 86°F. At one time I maintained this temperature with a few degrees variation, but from scientific research and observations, a high or stable temperature even if the fish will tolerate it, favours bacterial infections but a varying or lower temperature has a protecting effect. I therefore allow the tanks to drop 4/6 degrees at night. I have been doing this for six months or more without ill effects. The temperature should be evenly distributed through the tank with no cold pockets. To aid this there is an excellent long heater available (Rena). Tank to heater rating should be as recommended by the manufacturer.

The thermostat can be internal or external. Personally I prefer an external one because they are more easily adjusted and I suggest anything that can be external should be.

Lighting

Discus do not like strong or sudden light, but a reasonably good light has to be maintained to keep the plants healthy. One authority states that Gro-Lux lighting is beneficial. I have found no definite proof of this; it is a fact that the light given off is not quite so intense and supposedly aids plant-growth and enhances the colours. This can lead to confusion when trying to determine sex. I have used warm white and daylight tubes and find little to choose between them. If anything, the warm white seems to be most suitable for the Amazon type of plants. Gro-Lux, I found, encouraged algae even in the soft acid water. I have never used carbon lighting so cannot comment on its suitability with Discus, however, Graham Cox in his article "Some Observations on Brown Discus" covered this quite admirably and very thoroughly. (*The Aquarist*, Oct.-Nov., 1967).

When using fluorescent lighting, care should be taken to ensure that in the event of a tube breaking the glass and associated debris cannot fall into the tank. Unlike carbon bulbs (other than the danger of broken glass), the materials used in the manufacture of the tubes are poisonous to all species of tropical fish. A safety 'net' can be made from glass or

clear perspex, the latter being the more suitable due to its workability. The hood previously mentioned, if provided with a glass lid, can also serve this purpose. Where light is concerned, the most important factors are: regular amounts and regular times and lights on and off should be approximately the same time each day. The Discus will become accustomed to this and 'retire' to their selected resting places when the time for lights-out draws near. Usually 10 hours a day is sufficient but I have found individual pairs preferring longer, up to 14 hrs. a day. This applied particularly to *Heckel*. I also find two tubes of a smaller wattage better than a single larger tube. Two 20-watt tubes to a thirty-gallon tank are usually sufficient.

Transportation

One problem with Discus is transporting them. If you have to travel any distance as I do to procure them it is worth making a special carrying case. It should be reasonably large so a fair quantity of water can be brought with them. A container approximately 15 ins. square \times 12 ins. to 15 ins. deep is suitable. If the bottom of the container is formed into a vee shape a greater depth can be achieved with a small amount of water. This will encourage the fish to remain upright, something that is desirable in flat fish. The carrier can be lined with polystyrene to insulate it. I find that the temperature only drops a couple of degrees over several hours. (A practice that is common is to oxygenate the bag with pure oxygen but this can be harmful in as much as the pure oxygen can bring about a drastic drop in the temperature by virtue of its natural temperature). The lid, if removable, allows the easy handling of polythene bags; it can attach to the case with snap fasteners available from any Do-it-Yourself shop.

At this point I would like to mention a problem that sometimes arises in matching the dealer's conditions of water. In all fairness to the trade, it is extremely difficult for them to maintain optimum conditions because of the constant activity and disturbance necessary in a working tank particularly as they are constantly having to top up because of the tank water being

depleted on a trading day. I therefore suggest that you select a dealer in advance and have a chat with him. I have always found dealers ready to help in any way they can. However, if you do not have an assessment of the previous conditions, damage can be caused to the Discus as they are sensitive to sudden drops or increases in pH and DH. It is up to the aquarist to take the necessary steps and may necessitate the use of an intermediate tank enabling a method of stepping the conditions to be employed before finally housing them in the selected tank.

Behaviour

I have found both species to be very gregarious and think that this could be the cause of single specimens wasting away. They appear to do better in a shoal and under these conditions become sheep-like. If one of them takes dry food all of them will; if one will feed from the hand, again all of them will. The most I have had in a tank together is the ten previously mentioned and their behaviour was totally different from that of one pair. They were not as shy and seldom took fright at anything. On one occasion the glass lid fell into the tank due to my clumsiness. Normally something of this nature would properly put the wind up Discus but on this occasion they didn't 'bat an eyelid'. In fact, when I put my hand into the tank to retrieve it, they nibbled at my fingers. When eight of them were returned to stock the behaviour of the remaining two quickly reverted to what I had become accustomed to from Discus. Some are terribly shy but all are far from docile and the authorities who tell the aquarium world how docile they are should first tell the fish. All specimens that I have had engage in bouts that would do a Dempsey proud. On one occasion a pair of *Heckel*, prior to spawning, cleared a tank of ten fully grown guppies and a couple of catfish overnight, and when I tried to remove the corpses, promptly had a go at me. The wife had to keep them off with a pet while this was done. Normally, Discus will not molest other fish but I suggest they are kept in a tank of their own. The only reason the guppies were in the tank was because originally they were live food and had grown

to maturity. The catfish were being used as scavengers after the slight pollution mentioned previously. They are very temperamental, sometimes swimming the entire range of the tank and at other times hiding at the rear of the tank. It is difficult to give a set behaviour as I find most Cichlids individuals and Discus more so inclined.

Sexing

Some authorities state that Discus cannot be sexed others say they can by colour and finnage differences. In the other words, sexing is conspicuous by its absence, although they all 'tell' you how to breed them. The only indications as to the sex that I found consistent are the colour patterns. I found that the female constantly showed the darker coloration. With the *Heckel* these patterns ranged from:

1. Light overall colour, vertical bars not visible. Iridescent blue and red showing in ventrals, dorsal (slight) anal, and mask.

2. Main body a mauve blush. Head dark blue to mauve. Iridescent blue and red predominant. Mask, forehead, anal fursal and ventrals, red edge to the dorsal very prominent. All bars visible.

3. As above, without iridescence showing on mask and forehead, centre bar clearly visible the others barely.

4. As 2 with the centre bar, the peduncle bar and the three between them only visible. This pattern appears to be a prelude to spawning.

The above colour patterns were common to both male and female. However, the female always showed slightly deeper and darker tones.

The brown Discus I found also had four main patterns. Again the female showed the darker hue. Prof. Sterba states that the blue streaks of the male carry right to the base of the anal fin and those of the female carry to the dark longitudinal band on the outer part of the anal fin. This in itself I find insufficient and have had very colourful specimens where this has been almost impossible to determine. The patterns range from:

1. Body colour brown/yellow, all bars visible. Blue iridescence showing in anal, dorsal and ventrals; slight reddish overtones with a bluish

tinge to the anal and dorsal. This I find to be the most regular pattern.

2. Body almost chocolate brown, all bars clearly visible with a greenish tinge. Iridescence as above with mask slightly visible.

3. As 1 with bars of the female only showing vaguely. The vertical bars of the female are visible throughout all the colour patterns.

4. Body golden brown to saffron yellow, the latter bars more clearly showing than the former, iridescence very prominent in anal, dorsal, forehead and mask. Head darker than rest of the body.

Again the female showed slightly darker coloration. All these patterns I found were more noticeable when the fish were kept in pairs and the only time patterns other than their normal regular colour, and when they were fed and began sparring, showed was when they went through the pairing-off sequences. This behaviour, when it can be observed, is a definite indication of sex. The male is usually the more aggressive, and will try to confine the selected female to a particular part of the tank. When pairing they constantly 'bow' to each other; colours are then most brilliant and this is the only time when the male is darker in hue than the female, but if the male is acceptable by the female, little difference can be observed. Typical cichlid tail beating is in evidence and body rubbing usually follows together with mouth to mouth sparring but I find that this is not always evident. If the two fish are compatible a sort of convulsive shake can be clearly observed. The males I find are usually more aggressive to each other and are apt to be a little 'bossy'.

Personally, I think that it takes many years experience to sex Discus accurately and only then if they can be observed over a time. There is a definite need for comparison and single Discus, I think, are virtually impossible to sex. The males tend to be the larger of the two. The colour patterns all indicate various moods of the Discus and tend to be more involved with the breeding of them which does not concern us at this time.

Hygiene

A poor standard of hygiene, in my opinion, is the biggest cause of

death and failures to breed. It is my honest opinion that if bacteria is present above a certain level, Discus will not spawn successfully; in fact if eggs are laid they will promptly eat them.

Filters must be cleaned regularly irrespective of if they look dirty or not; mulm and the like should not be allowed to accumulate and the sub-strata should be kept loose.

Air must be fresh, clean or purified if the room is subject to tobacco smoke or gas fumes, etc. In any concentrations a filter bottle should be used. A close eye should be kept on the areas below the feeders, and kept clean and free of dead matter, worms, etc.

If space allows a purification plant should be considered (See Fig. 3). I have used this type of plant very successfully. It works on the principle of bacterial breakdown by micro-organisms and is similar in some ways to the system employed to purify sewerage and industrial waste. The book "Aquarium Hygiene" by Helmuth Wachtel gives an excellent and extremely informative account of this type of plant.

Ozone

I have used ozone in the care of Discus but precautions must be taken to ensure that free ozone is not introduced into the tank. As it has hormone-damaging properties, can kill eggs and can also damage vitamins supplied in the foods. The safest method if one wishes to use ozone is to introduce the appropriate amount into the filter air lift, thus rendering the water entering the filter free of bacteria and no free ozone will reach the tank itself. It is a valuable aquatic aid when used properly and has the added advantage of leaving no injurious substances in the water.

Currently available now is an Ultra-Violet Sterilizer. As yet I have not used one as I, not unlike most of us, suffer occasionally from attacks of financial cramp. I do, however, intend to use one as reports concerning them are more than just favourable and they appear to be ideal for keeping Discus.

Disease

Without doubt this can be the biggest bug-bear. Unfortunately, few Discus die of old age. I have found

that Discus do not necessarily turn black before they die; from my experiences it depends on what they die of. Also, there are what can be only described as fallacies about them. The diseases that Discus have and are prone to are not necessarily peculiar to them alone and I have only found this to be so in one case. Unfortunately, it does appear that the fish usually contract those diseases that are difficult to treat or those that have not been fully investigated. The following concerning disease less than scratches the surface. I have tried to describe those diseases that Discus appear most prone to, and I suggest possible treatments where it is practicable. I also hope that the descriptions aid in the recognition of them, something that has always been a problem, as symptoms can appear very similar. Most, if not all, the diseases described I have experienced with Discus at one time or another. It is apparent that most diseases are introduced or contracted in the wild and only manifest themselves when the fish is restricted to tank life.

Many authorities consider that most tropical fish are infected with one or more diseases. In his book "Diseases of Aquarium Fish," Dr. Schubert gives an account of an investigation carried out on a number of fish, 80 per cent. of all the fish examined were infected with tubercle bacilli.

Ichthyosporidium (hafert)

It was first observed in marine fish and is believed to have been introduced through them. It has not been decided as yet if Ichthyosporidium can be introduced with live food from sources not containing fish. It is a parasitic fungi and infectious. Most of the losses (50 per cent. or more) can be traced to this disease. All internal organs can be infected but nearly always the liver and kidneys. Symptoms vary according to which organ is infected. Fish can die without showing any visible signs; others can become hollow-bellied. On the other hand the body may swell. A difficult disease to diagnose and frequently confused with fish tuberculosis. The first signs in Discus are usually: refusal to eat anything, hollow bellies and loss of colour. As the disease progresses the eye reflex is often lost and the forehead breaks open into lesions or 'blister' type

growths are observed. The infected fish must be removed immediately and if any cure is to be tried, the treatment must be started as soon as suspicions are aroused. I have only succeeded in curing this disease once and this was in its early stages. The disease was first noticed in another fish and only when I examined all the others in the tank did I notice this particular one. The fish in which I first noticed the disease was destroyed for further examination after attempting treatment. Both fish were placed in a bare tank with a temperature of 86 to 90°F. The water was 3DH pH6 no filter, slight aeration with an air stone. To this was added phenoxetol (Liquitox) at a strength of 1 capsule to 2 gallons. A further stock solution of double that strength was prepared and the infected fish painted with it prior to transfer. The less infected of the two showed response after ten hours and began to feed on tubifex that had been kept in a solution of the standard dose 1 capsule to 4 gallons. It was immediately transferred to another tank and kept in the standard dose for a further two weeks before starting water-changing to dispel the Phenoxetol. To the time of writing there appears to be no further outbreaks in this fish.

The other Discus began to show signs of improvement after two days and the lesions began to heal. Unfortunately, it lost equilibrium on the third day. I therefore destroyed it for further examination. The liver, kidneys and brain were heavily infected and these were the only organs examined. These organs in a squash showed cysts containing brownish black granules. Had it have been tuberculosis these granules would have been yellowish brown. They can be seen under a magnification of 50 to 120.

It is important that the infected fish are isolated. Acid water, it is considered, aids encysting and killing the fungus together with the high temperature. The endoconidia have a thick shell and this protects them from treatment thus making it necessary to repeat this treatment several times. Phenoxetol is a treatment suggested from America but to be successful it must be used in the early stages. Unfortunately there is no known chemical treatment that is particularly lethal to this disease.

No fish are immune to it. In some works it is referred to as *Ichthyophonus*.

Tuberculosis (*Mycobacterium piscium*)

This is a bacterial infection and can be highly infectious. It can be introduced, but a low standard of hygiene can be the culprit. Vigorous fish can survive an infection without showing any external visible signs. The development of this disease is favoured by high and stable temperatures. Allowing the tank temperature to drop a few degrees at night is recommended. Symptoms are similar to *Ichthyosporidium* and difficult to determine. Usually infected fish do not feed properly, become hollow bellied or knife backed; colours fade; skin show lesions and open ulcers; eyes protrude (pop-eye is one of the well-known secondary infections) and fins are frayed. All these symptoms may not occur together.

In practice there is no effective treatment but some success has been recorded with the wide spectrum antibiotics Aureomycin and Chloromycetin. The methods used are prolonged baths and injection.

Aureomycin 13 mg to the litre; approximately 50 mg to the gallon. Bare tank, varying temperature. This drug is apt to cloud the water after a period. When this happens it appears to be toxic where Discus are concerned; therefore I suggest the use of two tanks used alternately. The baths should continue until there are signs of improvement.

Chloromycetin

Injection: .1 gram per 10 grams body weight.

Baths: 50 to 80 mg to litre approximately 200 to 320 to gallon.

Baths should be of 8 hours duration. Do not use this drug in the aquarium itself. A weaker dosage for a longer period can be tried. Again all fish are prone.

Hexamita (*Octomitus truttae*)

This has also been observed in cichlids (*Angel* fish and *Severum*). Probably most fish susceptible. Difficult to treat in advanced stages; good feeding usually suffices to protect the fish. Symptoms: the infected fish become very hollow bellied and occasionally dark in colour. The parasite infects the hind gut and gall bladder.

It is not certain in every case if *Hexamita* is a primary parasite or whether a follower in the wake of some other infection.

It is found frequently with fish tuberculosis and *ichthyosporidium*. Symptoms are similar but examination under a microscope of the living fishes' faeces show cysts containing two flagellate. This flagellate is oval with a pointed end and moves in a tumbling motion using six flagella in the front and two to the rear.

Octomitus symphysodoni

I have read all the major works concerning diseases of fish and this is the only one that appears to be peculiar to Discus. Resembles *truttae* but is somewhat smaller and is considered to enter the blood and is carried to the liver and spleen and the mucous filled canals along the lateral line. This disease has not yet been fully investigated and is the possible cause of many mysterious deaths.

Treatments

In dealing with these parasites many treatments have been suggested: the adding of 0.2% calomel to the food for two days or 0.2% Carbosone for four days. Feeding with agar-agar soaked in Acriflavin (Acriflavin is the same as trypanflavin). These treatments I find all right if the fish will accept the soaked food.

In correspondence with Dr. Schubert of Stuttgart he informs me of a new treatment; unfortunately at this time it is not readily available owing to the fact that it consists of the main substance used in human vagina infections and is manufactured in Germany by Bayer. Chemically it is 1 (hydroxyethyl) -2-methyl-5-nitromidazol.

The method of treatment: 0.343 grains are used for every gallon (4 mg per litre), the fish is kept in this for 4 to 6 days without filtration. Dr. Schubert also adds that he has always been able to get rid of *Hexamita* (*Octomitus*) this way.

Poisoning

Poisoning can be caused by: aquarium mastics, unsuitable tubing, etc., insecticides, DDT, paints, tobacco smoke and nitrogenous compounds.

As mentioned before, Discus are very sensitive to almost undetectable

toxic elements, and appear to be more sensitive than any other freshwater species particularly to the effects of iron.

Many aquarium mastics give off poisonous substances. If the glasses are carefully cut to fit closely this can help in avoiding this likelihood also the sealing of the inside of the tank with the prementioned products.

Paints can give off poisonous phenols and can be tested by painting a sheet of glass and placing it in a tank containing a few cheap species or with other water life.

Only tubings sold exclusively for aquaria or the new surgical plastics should be used in any tank.

Tobacco poisoning is comparatively rare in the majority of aquarium fish as Nicotine is quickly decomposed in water; affected fish often show unusual restlessness, their pectoral fins become stiff and they begin to swim with undulating movements, finally sinking to the bottom.

Nitrogenous compounds

These are caused in the main by the remains of food, urea in urine and rotting plants, etc. Ammonia is the intermediate product and it is these substances that contribute towards the need for regular water changes (partial). They are nerve and blood poisons and convulsions and decomposition of the blood often result. Wild specimens appear more prone than tank bred ones.

Insecticides can also cause poisoning. Affected fish lay at an angle in the water and become paralysed and lay on the bottom.

In general, poisoning, whatever the cause, brings about similar symptoms. Briefly, if the fish begin to show unusual behaviour, trying to jump out of the water, extreme restlessness, swimming with undulating motions, laying aimlessly on the bottom or hanging at the surface off even keel, an investigation should be carried out without delay. If the suggestions I have made are carried out the above troubles will have been catered for. When dealing with poisoning generally, the only method of treatment in practice is to remove its source and transfer the fish to fresh water. Aeration and a slightly higher temperature and good feeding may, in some cases, aid in treatment.

Cottony Growths

It appears that cichlids are all prone to cotton-like growths on the forehead, in particular the Discus. Initially it was considered by some authorities to herald the final stages of Octomitus. This, from information gathered, does not seem to be so. In correspondence with Dr. Schubert he suggested the use of an acridine-derivative called 'Rivanol', after considerable difficulties I was able to obtain some. A solution of 100 mg to 100 ml of water (1.54 grains per 3.52 fluid ozs.) was prepared and following his instructions, the infected areas were touched with this solution soaked on a piece of cotton, wound around a wooden toothpick. Dr. Schubert also suggested that it may be necessary to repeat the procedure after three days. However, I did not find this necessary; in fact the infection cleared after 24 hrs. and to time of writing there has been no further outbreak. 'Rivanol,' for those interested chemically is: 2 ethoxy - 6.9-diamino acridine lactate. In England it is known as Ecridine Lactate. Care should be taken not to confuse this infection for symptoms of more serious complaints as treatment for it is relatively straightforward. If correct diagnosis is not made more harm than good could result. These growths are usually cream or white and appear looking like the tail end of a very small worm or there can appear to be more grouped together. What causes this has not been determined as yet.

The similar growths that appear with tuberculosis or ichthyosporidium are definite lesions or blisters and the whiteness that sometimes accompanies them is in close proximity to them. Unless they are noticed quickly they may begin to fungus and this can often lead to the wrong diagnosis. These ulcers also disperse when the fish is removed from the water.

The cottony-type growths I have also experienced with angel fish and seen them on blue acaras.

Snails in the Aquarium

Snails are considered to be the carriers of many diseases and can be the host for worm larvae. I therefore suggest they be excluded from the tank.

Eye Damage

The eyes of Discus, as with all other tropical fish, are a definite indication of their condition. They should be clear and dark red in colour. With ill-health they tend to be pink, yellow, grey or even black. If tank illumination is too strong, considerable damage could ensue, even blindness. Damage can also be done if they are subjected to a great change in DH or pH and this will bring extreme cloudiness to the eyes. Usually a few days at the correct temperature, DH and pH, will clear up and I find in the majority of cases this is the only treatment necessary with newly imported specimens. These often arrive with cloudy eyes and I consider it to be due to the shipping conditions. In some cases bathing with a silver mercury preparation is necessary and accelerates the healing. I suggest that medicants are only used if absolutely necessary. In any treatments the diagnosis must be carried out quickly and thoroughly and a decision arrived at and then acted upon promptly.

You may make mistakes as I did and do still. I recall the time I lost a magnificent pair of *Heckel* through inexperience and lack of knowledge about them. The incident came near to me finishing fish keeping altogether and I was almost brought to tears, but then ten pairs arrived from London for resting and conditioning and I was away again.

Other complaints

From time to time you may find other minor ailments pestering Discus. Along the region of the belly, if they are kept at too low a temperature, tumour-like nodules may be observed. Medicants will be of no use in these cases but an increase of temperature will dispel them.

On occasion damage may result either by fighting or by hitting against rocks, etc. Unless it is serious, I find it better to let nature take its course as it has been my experience that Discus have quite remarkable powers of healing although not quite up to the regeneration of knife-fish. If it is necessary, bathe the affected areas with acriflavine. I found mercurachrome, no matter how weak the solution, causes considerable soreness and in some cases inflammation. (Not only with Discus but I also find leeri gouramis to be

rather allergic to it). Damage can be done usually with the males in mouth-to-mouth sparring. If necessary cut away the loose skin that usually results and paint the affected area daily with acriflavine.

Conclusions

It has been a considerable mystery to me why an association has not been formed devoted to the study and

understanding of Discus, or at least Cichlids, as in America. After all we have them for killifish, guppies, etc. The Discus has been known to us for many years and as aquarists we still are not much farther advanced than we were years ago. Surely an association could only promote the furtherance of knowledge about the keeping and breeding of what I consider to be the most

beautiful of all the freshwater species. The problems that surround them must be more quickly solved when more people keep and discuss them. I would welcome contact with anyone interested in these aims. I hope this feeble attempt has aroused some interest. You may think that they are a lot of bother but they do present the aquarist with a challenge well worth accepting.

Can be obtained from:

Notes on Substances mentioned in the Text

Araldite AY 103 with hardener
Costs 15s. 2d. per lb; hardener 951,
7s. per lb.

CIBA (A.R.L.) Ltd.,
Duxford, Cambridge.

Propol 820
At the beginning of the year its cost was
17s. 3d. per lb. plus packing.

Protective Polymers Ltd.,
Rhee Valley Works,
Shepreth, Cambridge.

Water Softening Resins

Permutit Company Ltd.,
Permutit House,
Gunnersbury Avenue,
London, W.4.

It has been some time since I have
purchased this.
In 1964 Softening Material ZK225
C.20/2 was 8s. per lb.

Service Dept.:
Commerce Road,
Brentford, Middx.

The above companies were extremely helpful to me particularly CIBA and went out of their way to oblige me with my needs. My sincere thanks to them.

Suggested Reading Matter

"Some Observations on
the Brown Discus,"
Graham Cox

The Aquarist

Oct./Nov.,
1967

"Experiences in Keeping
Discus,"
Hans Mayland

The Aquarium

April, 1968

"Breeding Aquarium Fish,"
Wolfgang Wickler

Studio Vista
aquarium paperbacks

"Aquarium Hygiene,"
Helmuth Watchel

ditto.

"Diseases of Aquarium
Fish,"
Gottfried Schubert

ditto.

"Freshwater Fishes of the
World,"
Gunther Sterba

ditto.

Suggested Reading Matter

"Aquarium Care," Gunter Sterba	Studio Vista aquarium paperback	
"Aquarium Mineralogy," Crystal Gordon	T.F.H.	May, 1967
"The Red Discus," Col. Fernando Durval DeLacerda	ditto.	March, 1967
"Danger from <i>Cryptocoryne hartwegi</i> ," Frank Partington	<i>The Aquarist</i>	Dec., 1967

And for the more scientific minded among us:

"The Principal Diseases of the Lower Vertebrates," H. Reichenbach-Klinke and E. Elkan	Academic Press, London and New York
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WHAT IS YOUR OPINION?

by B. Whiteside

A COUPLE MORE LETTERS have arrived on the subjects of leaving fish for holiday periods, the popularity of tropical fish over coldwater ones, and the most popular fish.

The first letter comes from 15 year old Robert Allan, of Glasgow, who this year, as usual, did not make any special arrangements for having his fish fed whilst he was on holiday. He mentions that this excludes young fry which should never be left without regular feeding. Robert merely feeds his fish well on live food for two weeks before going on holiday but this year he was unable to get much live food and he thinks that a few fish decided to see what it was like to eat a harlequin. This was the first time that anything like this had happened. Master Allan has no favourite fish but he thinks that tropical fish keeping is more popular because tropical fish are more colourful, easier to breed, are cleaner; and tropical plants are easier to grow than coldwater plants. Robert adds

that he always cleans his tanks thoroughly before leaving.

From Hazel Grove Boys' School, Stockport, comes a letter from Mr. G. Hough, who is the master in charge of the school aquarium society. Mr Hough says that in a quick survey of his newly formed society he found the following to be the most popular fish, shown by the number of votes cast: tropical—angel fish, 5 votes; neon tetras, 2 votes; Siamese fighters, swordtails, three-spot gouramis, three-line pencil fish, red tailed black sharks, black mollies, dwarf gouramis and zebras all receiving one vote each, the last named being that of the school's headmaster. The reasons given for selecting these fish were usually appearance, liveliness, etc. None gave reasons such as ease of breeding, non-faddy feeding habits, etc., probably because it is a young society and many of its members have only just assumed responsibility for the family fish tank—the one dad set up, because it would look "nice" in the living room.

Votes for coldwater fish were: golden orfe, 4 votes; black moors, 2 votes; comet-tails, 1 vote and common goldfish, 2 votes. Many members didn't know any coldwater fish and didn't vote. As to why tropical fish are more popular, Mr. Hough sends the following suggestions: they have a greater variety, colour and liveliness and one can keep a large number of fish in a given tank. These are the reasons submitted by his society members.

Holiday arrangements for the school fish were simple; the school caretaker looked after the school's eight tanks, managing to overfeed and pollute the display tank so that only a three-spot gourami survived. With his own tanks, Mr. Hough fed his fish very heavily on brine shrimp and tubifex, three meals a day for a fortnight, before he went away and then left them without food for two weeks. A neighbour came in every day and put on the tank lights. When he returned he found that the water was crystal clear; the plants, mainly Indian fern, *ambulia*, Bacopa, and water wistaria had gone berserk and choked both tanks; the fish were in good health, and that his black mollies had given birth to young ones and that six of these had survived, something which had never happened before, even when he'd hovered over the tank with a net.

What is your opinion on the following topics? (1) Do you find that the dwarf sucker catfish, *Otocinclus arnoldi*, wastes Indian ferns by going over them with its mouth? (Sent by Master Robert Allan). (2) On what do you feed your white worms, and where do you keep them? (3) Do you have any artificial decorations in your aquaria? (4) If you had a large, healthy, handsome but rogue fish, which terrorised and often killed its tank-mates, and you could neither segregate it nor give it away, what would you do with it? (5) What method would, or do you use, to dispose of incurably sick fish?

Aphyosemion australe australe

by Karl Knack

THIS BEAUTIFUL LITTLE fish comes from the Ogow Delta near Cape Lopez and is therefore called by us "Cape Lopez"; it grows to about 5-6 cm and is a peace-loving fish which can be kept without difficulty in community tanks with other fish. As with almost all Killifish the male has much more beautiful markings than the female. The females are of one greyish yellow colour without any marking; even the fins are colourless. The male looks quite different. It is a feast for the eyes to look at this beautiful fish with the fins spread out. The background



colour is principally light brown. On the sides of the body from the head to the middle the colour is a clear gleaming blue, and in addition many red spots are scattered over the whole of the body. The back is light brown. The ivory coloured points of the anal, dorsal, and tail fins which are extended as a prolongation, wave beautifully.

The dorsal fin, with the light blue, green, ochre, and wine-red colours which are to be seen in light bands, is very beautiful! The anal fin shows the same colour tones. The tail fin ends in a fork. At the beginning of the tail fin the upper and lower edge is yellow in colour as far as the centre, and then continues as an extension as mentioned

Top: Male Killifish

Left: Male observes the female

Above: Male approaches female

Photos by the Author

above, ivory in colour. The fundamental colour of the centre part of the tail fin is light blue and is dotted with strong wine-red spots. The ventral and pectoral fins are very short and of a brownish colour. The mouth is displaced upwards. The eyes are small, and the iris is black.

The species does not make any special demands upon the water. Perhaps slightly sour and somewhat soft water contributes to its well being. p.H.6.8. is quite sufficient.

The "Lopez" is a Killiefish which is described as a close spawner. When making an advance the male spreads his fins in such a manner that his wife cannot resist him at all. He impresses with his most beautiful colours until the female follows to the spawning substratum which consists of fine feathered plants or of Perlon web. At first the male tries to swim over the female, seemingly in order to press her to the spawning substratum. If the female is then finally willing to spawn, the spawning follows automatically. The female even leads the male into the bush in order to spawn with him there closely pressed together. This is repeated until the female has ripe spawn which can be deposited. If the female has expended her supply of spawn, she tries to hide herself in the plants and have a rest before further wooing on the part of the male.

Various methods of breeding can be practised. Either continuous application, when the hard-shelled eggs must be sought out from the spawn substratum and kept in a bowl with the same water or the pair can be left together for 24 hours and then separated for 3-4 days. Then we repeat this method as often as the fish are prepared to co-operate.

Another method is that we leave the pair for 14 days in a container before transferring them to another container with the same conditions of water and spawn substratum. The young fish are then hatched in 10-14 days according to temperature and can be brought up in batches. Or the eggs are left with the parents, and the young hatched fish are caught up with a spoon from the surface of the water.

The rearing of the young fish presents no difficulties. As the first food very finely sieved cyclops or daphnia can be given. After about 10 days small Cyclops and Grindal worms can be given. After about 4 weeks almost



any living food can be eaten by the young ones.

In the adult state the Lopez accepts almost any living food. As preparation for the spawn any kind of insect larva is suitable, especially *Culex*.

The Lopez in the aquarium reaches without difficulty an age of 3 years. It is a rewarding and beautiful fish.

Top: Male glides over the female
Above: Spawning takes place

OUR READERS WRITE

25 Watt Lighting

Whenever an aquarist asks for advice on how to eradicate brown algae from his tropical aquaria, and further states that his plants are dying, low intensity lighting (e.g. 25 watt lamps being used) is always pinpointed as the direct cause. Invariably the advice given is to use higher intensity lighting for a longer duration of time.

Is the advice good? Perhaps! Let me quote my experience in using 25 watt lighting on aquaria. To illustrate my points and to show the other side of the picture, I will use the question-and-answer method.

What type of light do you use on your tanks?

A. Two 25 watt lamps per tank.

Duration of light, per tank, per day?

A. 12 to 14 hours, approximately.

How long have you used this type of lighting?

A. Over ten years.

Does brown algae exist in your tanks?

A. No.

Do your plants die off?

A. No; but some plants such as *Aponogeton* do suffer some leaf-loss at this time of year; this is normal for many, if not all, species of plants do have a recession or rest period.

Have you ever used any other form of lighting?

A. Yes, in experiment; each type of lighting tested over fairly long periods of time on an experimental tank.

Do you consider duration and quality of light used to be of more importance, than using higher intensity lighting?

A. Yes.

Do you use peat or soil-compost in any of your tanks?

A. Yes, but in one tank only; for experimental purpose of propagating certain types of rare plants.

Do you use filtration or aeration?

A. Yes, in tanks where the plants do not like "cold feet"; temperature layers below what is known as the Thermoclines is normally too cold for

many species of plants, therefore I find it advisable to disperse these cold layers of water by using filtration. What type of fish and species of plants do you keep?

A. Gourami's, Platies, Guppies. Plants: 32 species of plants belonging to 15 families.

To conclude: In my tanks many of the world's rarest tropical water-plants, acquired over many years, are living and propagating as to their nature quite happily under the conditions I provide for them; plus many of the more common plants such as water wistaria, *Cabomba*, etc. The common varieties growing in great profusion, necessitating frequent thinning out of plants to give the fish swimming room.

One experiment that I carried out was to place a 10 inch stem of water-wistaria into a 24x12x12 in. tank; the tank contained no gravel, the water was aged and conditioned, the light provided was one 25 watt lamp; lit for 14 hours per day, approximately; the pH of the water was 7.2; temperature: 73 degrees, min. (78 degrees, max.). The plant was not anchored down in any way, but allowed to grow just as it liked. A year later this plant was displayed at a society meeting to illustrate a talk on plants given by myself. When finally taken out of the tank, the plant was 36 inches in height, excluding the root system, there were 14 secondary stems; the height of these stems was: 12 in. min., (28 in. max.). Leaves covered the stems in all stages of growth, from base to apex. The plant in question completely filled the tank. No fish or any other plant was kept in this tank during this experiment; nor were artificial fertilisers used.

Now! May I ask a question? What other factors cause brown algae, and cause plants to die-off? I would be most interested to read other aquarist's opinions on the question.

STANLEY FOX.

Large Marine Aquaria

With reference to Trevor Wilda article "Marine News and Views" in the October edition.

I think his remarks on large all-glass aquaria, will discourage people from making them, using only sealant. I personally have made three large ones, measuring 48 in. long by 18 in. wide by 18 in. deep, successfully

using R.T.V. Sealant purchased in England.

My method was based on a previous article but with two full length pieces of quarter-plate glass, joining three sides each at the top, this was to give additional support at the top when filled.

I did have one failure, however, this was not due to the sealant bond breaking but my failing to give the base adequate support. I now place all these tanks, including some other 16 assorted sizes, on a firm base of chipboard 1 in. thick; as yet I have had no more failures.

I think that Mr. Wild made three mistakes, the first being bad preparation of joints; the second no support at the top, hence his statement "the side bow" and lastly, poor support to the base when filling.

I am taking it for granted that the glass he used was a minimum size of quarter-plate. I used 6 mm which is equivalent.

PETER J. YATES,
Thessaloniki, Greece.

Red Discus

In the article "Large Cichlids for the Aquarist" in the November issue, Mr. J. M. Parry writes that the Pompadour or Discus fish is found in two colour varieties, blue or brown. This statement is true, but Mr. Parry does not mention that there is also a variety of Red Discus.

The red discus is a very rare variety and has rarely been photographed, although a colour photograph can be found in W. T. Innes "Exotic Aquarium Fish."

HUW COLLINGBOURNE (age 13)
(Rhondda A.S.)

Lecturers Wanted

I should be very pleased to hear from anyone who can provide slide shows, quizzes or films or from lecturers who are prepared to travel to our club. The programme for our forthcoming year's 25 meetings is in the course of preparation and our letters in connection with the above sent to the undermentioned address will be answered promptly.

M. T. HARRINGTON,
Secretary,
Hucknall & Bulwell
Aquarist Society,
5, Greenwood Vale,
Hucknall, Notts.

GOURAMIES

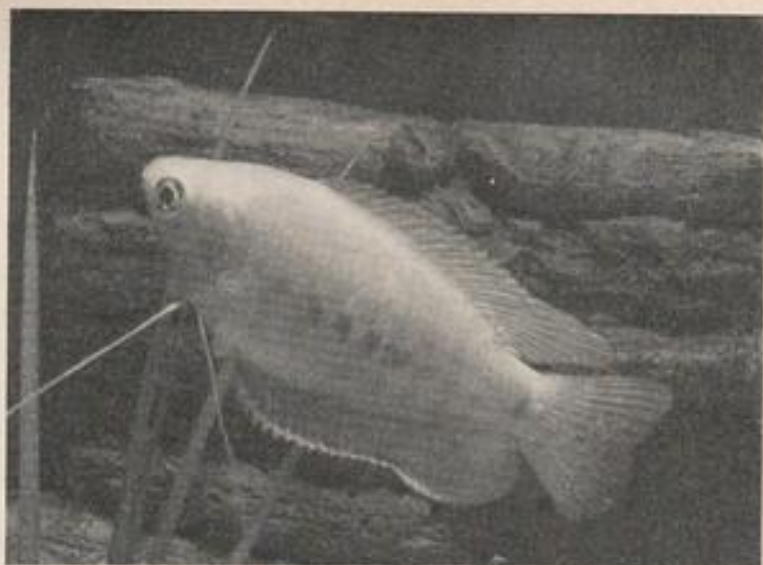
Through thick and thin

by R. C. Mills

MOST AQUARISTS in their community tanks have at least one labyrinth fish, usually the showy fighter—an isolated specimen of course, and possibly one or two gouramies.

My experiences with these fish has been very varied. I first tried keeping the Blue and Three-spot varieties but after a very short acquaintance these were replaced by (in quick succession!) kissing, dwarfs and finally Leeris. The gouramies I have kept, or shared their last moments with, as I used to think of it, were divided into two distinct groups. There were the "bloaters"; I had hoped that these were well rounded ladies, but eventually had to admit that there were also some portly gentlemen. This was, of course the disease dropsy making its presence known, and soon all the affected fish had turned into "floaters". The other group of short-lived gouramies were the "was-ters". These unfortunates just got thinner and thinner until there was only a head, two enormous eyes and a tail joined by a backbone swimming around. The other sad aspect was that these fish ate quite well and seemed to cling to life very tenaciously, and yet never got any fatter.

This, then, was the state of affairs my gourami-keeping was at, and I despaired of ever being able to keep these fish let alone of propagating the species. At this time, of course, I vowed that another labyrinth would never cross my angle iron frames again. A year or so passed and then I forgot my solemn oath and bought some leeri or lace gouramies, four to be precise. To my surprise they settled in nicely, ate and grew well and everything seemed fine for a few months. I had thoughts of trying to breed them, and was looking forward to them reaching maturity when it would be easy to sex them. However, I had just decided that the splendid fish I had grown on were four ladies (oaths again, and this time none too solemn!) when fate took a hand. My



Thicklipped Gourami *Colisa Labiosa*

solitary fighter contracted some disease of the eyes, pop eye or Exophthalmus, or fungus of some kind, and this spread to the four gouramies. Soon then, I was again bemoaning that gouramies were not for me. The four I had lost were really fine fish and had that virtue that is dear to all fishkeepers—they would eat anything and everything. This had encouraged me in that I could at least keep them alive for some time, and these hadn't bloated or floated like the others; so I was determined to try again but my fancy had been taken by another species at this point, and it was after a few months interval that I crossed paths with gouramies again.

My eye was attracted to a male dwarf gourami in my local shop; he was full of the joys of living, chasing everyone around, all his colours intensified, beautiful turquoise throat and chest, yellow and purple anal fin, so I thought "better one volunteer than ten pressed men." and promptly bought him together with a female. I put them into my community tank and let them settle down which they seemed to do quite quickly. There were plenty of plants for them to hide in if they felt nervous, but they soon felt at home and indeed were usually well placed in the rush for food each day. Too good to last, I thought and waited expectantly for them to succumb. After a month or

so, I was watching the tank one evening and to my surprise saw a leaf go from one end to the other. When the penny dropped I noticed that the male gourami had built a bubble nest in the back corner of the tank and was hard at work developing the site. As I had another tank set up with plants handy and the temperature similar (approx. 78-80°F), I transferred the nest with a saucer and the adults soon followed. After inspecting their new home, the male continued to build his nest and repair any damage I had done in transit, whilst the female, perhaps a seasoned campaigner, sat patiently in a bottom corner until the male tipped her the wink. Then up she swam and after the embrace, which climaxed with the male tipping her on to her back, the expelled eggs were collected and placed in the nest by the male and she returned to her corner to await the next summons. The spawning activity lasted a couple of hours, and then the male went quite mad! He swam up and down under the nest as though on rails, obviously in a high state of nervousness and the female was removed for recuperation and her own safety to another tank. Even though there was no other fish in the spawning tank the male still continued his sentry duty, until the fry hatched when he had an added duty in trying to replace the fry in the nest. When they became free-

swimming, he hadn't enough pairs of eyes to cope so he was removed before he became a nervous wreck. On returning to another tank he promptly thought that someone had stolen his nest, for he immediately started to blow a replacement!

At this stage the fry were quite tiny, or what was more important their mouths were, and I had been told that even liquid food was too large for them at such an early age. So to be on the safe side I put in everything I could think of to produce a brew. A tablet to produce infusoria (tested in a jar and there was live infusoria in the time stated), liquid food, plankton culture, a couple of jars of bright green water from a fellow aquarist's pond, and a little something I had discovered earlier. This secret was a piece of wood I had used to decorate a tank with, and I had noticed that the sap had oozed out of the end grain even though the branch had been soaked for weeks beforehand and had been detached from the tree for some time previously. The tank it had been in had contained some platy fry and they fed on this stuff and their growth rate was increased no end. This wood was already in the tank

with the gourami fry and had a decomposed look about it. Anyway, fry seemed to survive on this cocktail, and after a week or two brine shrimp were offered and snapped up, the liquid food was discontinued and dried flake food substituted and eventually screened daphnia and chopped tubifex were added.

The fry grew quite quickly for a month then there was a definite pause and then the growth rate accelerated again; there seems to be one or two different sizes in the fry, and this may be due to the size of the initial food. Some of the fry may have been able to take larger particles and hence shot ahead at the expense of the others, and now some are three times the size of their brothers and sisters. Careful precautions were taken not to let cold draughts enter the hood of the tank, especially in the first 3-4 weeks when the labyrinth organ was forming, but now the fry are two months old the dangers are passed and I suppose there are about two dozen youngsters growing on. As I didn't know the number of hatched eggs I cannot estimate a mortality rate, on the other hand it may have been a small spawning.

The male continues the good work; everything seems to suit him and whenever I have moved him to new quarters he has blown another nest, and a week ago I had another spawning. However, life is never a bed of roses, for I noticed a colony of Hydra had sprung up in the spawning tank. These must have been introduced with some daphnia that I had caught to feed the adults on. Luckily, I saw a hydra catch a "flea" and digest it and a pretty fast evacuation took place. I removed about 60-80 fry safely to another home whilst I dealt with the hydra. These were eliminated by raising the temperature of the infested tank to about 110°F for an hour, allowing the tank to cool and siphoning off the bodies! So now I have a definite number of fry to keep check on and can calculate a mortality rate, although attributing a cause of any death is more difficult.

It must be a good year for dwarfs, because a friend of mine has spawned some, to keep up with the Joneses no doubt, and his male is so obliging that as soon as he had finished with his partner he went and spawned with a lady thick-lip gourami! So anyone for dwarfs with thick lips or thick lips with dwarf's colouring?

Fish Food Review

continued page 671

'Miracle Freeze-Dried Foods,' produced by Miracle Plastics Corp., Jersey City, U.S.A., distributed in Britain by T. F. H. Publications (London) Ltd.

A couple of years ago, the editor of *The Aquarist* sent me a clear plastic drum of a new type of fish food and asked me to test it and to write a review of it. Whilst writing that review, I did not realise that it was about a food which would revolutionise the feeding of our fishes and other aquatic pets. The food in question was 'Miracle Freeze-Dried Tubifex.' Since then, the firm has marketed a much wider range of freeze-dried foods and this has recently been extended.

The full range at present comprises the following: 'Miracle Freeze-Dried Tubifex,' price 3s. 3d. per 5 gram pack and 55s. 0d. per 110 gram pack; 'Miracle Brine Shrimp,' 5s. 0d. per

5 gram pack; 'Liver Treet,' 6s. 6d. per 10 gram pack; 'Fish Nip,' 3s. 6d. per 5 gram pack; 'Goldfish Treet,' 3s. 6d. per 5 gram pack; 'Daphnia,' 4s. 0d. per 3 gram pack; 'Tubifex with Daphnia,' 4s. 0d. per 4 gram pack; 'Tubifex with Chlorella,' 4s. 0d. per 4 gram pack; 'Gordon's Formula,' 4s. 6d. per 10 gram pack; 'Turtle Treet,' 4s. 6d. per 5 gram pack; 'Mosquito Larvae,' 5s. 6d. per 15 gram pack; 'Red Worms,' 5s. 6d. per 12 gram pack and 'Fry Treet,' 5s. 0d. per puffer pack of 25 grams.

Now for a few words about those foods which I have tested. Many people will know the original tubifex worms which are sold in small cubes. Pieces may be stuck to the aquarium glass or left to float. The tubifex worms, with the algae *Chlorella*, are also sold in cubes, and the inclusion of the algae is to benefit those fish such as guppies, mollies, swordtails,

platies, etc., which require a vegetable content in their food. (One wonders if the freeze-drying process would kill all spores and filaments of algae, thus preventing the chance of introducing unwanted algae growths into the aquarium?). Both of these foods were quite popular with my fish.

I found that the cubes of food in 'Liver Treet' were of more use to my fish if they were crushed with the fingers into a powdery form. This food was more quickly eaten then. The brine shrimp I found to be very popular with all of my fish, even fairly small ones. It comes in lumps of varying size, and being very soft compared with the 'Liver Treet,' it can be easily torn into suitably small fragments which quickly absorb water and disintegrate. 'Fry Treet' contains brine shrimp, tubifex, whole egg solids and fish meal, all ground down into a powder. This food is puffed

JUNIOR AQUARIST

Reptile Communities in the Outdoor Vivarium

by Andrew Allen

AFTER MAINTAINING SEVERAL indoor and tropical vivaria the aspiring herpetologist will naturally progress to some sort of large outdoor vivarium. All the available alternatives allow much satisfaction in the layout of the interior, it being possible to set up an accurate reproduction of practically any European habitat. Having decided to build some sort of outdoor vivarium it will be necessary to decide which; although in all the inmates will live happily for many years and benefit from the almost innumerable advantages in scope, layout, breeding and feeding over the inhabitant of the indoor vivarium.

There are three major alternatives—a greenhouse, a reptiliary, or a cold-frame. Each has advantages in respect of particular communities of reptiles.

For those living in the far North the applications of the reptiliary are limited, and only a few species can be kept that will survive the hazards of snow-drifts and freezing rain. In these regions the extra warmth of the greenhouse may be critical. In the Midlands there is a wider range of inhabitants, though still limited. In the South the reptiliary has the weighty advantage that it is the cheapest of the three, and can be built from waste materials, though the overhang, the vital part, must be well constructed. But in every region the reptiliary is limited to the hardier species, prohibiting green toads, spadefoot toads, eyed lizards and others that will thrive in the greenhouse. Furthermore, tree frogs cannot be kept in the reptiliary for obvious reasons, and it



Slow worms

has to be a very well-designed reptiliary that will baulk the escapist urge of green and wall lizards. Several of the more active frogs such as the agile and edible frog would treat a three foot wall with disdain. But the latter will settle down readily in an unwall garden pond, thus making it equally eligible for the reptiliary. It is worth considering that food will always enter the reptiliary from outside, though a cat may also do the same. There is also the feeling when one leaves home that some prize specimen may have absconded by your return. A hibernating chamber situated in a dry position is an advantage in the reptiliary, but is not essential in the other two.

The adapted cold-frame is primarily suited to amphibians, and also to slow-worms. Using one's own materials one could also build an outdoor vivarium with individual advantages. Both must be situated in a fairly shady position. The humidity can be maintained at the right level for amphibia, but is hard to regulate in the case of reptiles, which also resent the lack of

vertical space, even when the vivarium stands on several courses of brick.

The greenhouse is the most expensive of the three, but in many ways the most satisfactory. A wide range of less hardy reptiles and amphibians is possible and every refinement of design can be included. It is safe from the ravages of the weather, and is entirely escape proof if the base is sturdily built. All conditions can be minutely controlled.

This, then, should give some guide to the best alternative for your purse, for your garden, and for the type of community you wish to establish. If you have a small garden it is best not to keep male marsh frogs which may croak you out of your own home!

When arranging a community it is wisest not to include the hunter with the hunted. No one would mix grass snakes and smooth newts if the latter were intended to thrive and breed. This is a very obvious example, but there are many reptiles which would gladly eat their nearest cousin on the evolutionary tree, let alone their own offspring, though this last oversight is

JUNIOR AQUARIST

continued from previous page

Lacerta viridis

by H. G. B. Gilpin B.Sc.

COMMONLY CALLED THE Green or Jersey Lizard, this handsome saurian ranges from S. Europe to the Channel Islands. It is neither native nor, in spite of a number of specimens being released on occasions, feral in Britain as far as I know at present. I have seen them basking in the heat on sunny stone walls in Portugal where they look magnificent. They are naturally alert and are not easy to approach closely in their own native environment.

Viridis is a singularly beautiful lizard which reaches some fifteen inches to sixteen inches in length. The tail is graceful and slender and accounts for two thirds of the total length. The upper body colour varies from yellowish green to vivid grass green and the underside from yellowish white to deep, clear yellow. It is related to the much larger Ocellated Lizard.

Provided it is given a reasonable amount of room, *viridis* is an excellent vivarium animal, not the least of its virtues being the ease with which it can be sexed. Adult males in breeding condition have rich, cobalt blue throats but this alone is not an entirely decisive characteristic as young males are sometimes entirely innocent of any blue coloration and on occasion one encounters females in which it is quite pronounced. A more reliable differentiating factor is the colour of the upper parts of the body. In males the basic green is profusely speckled with tiny black spots, whilst in females the black is confined to large black patches. Sometimes the female is plain self green, completely free from markings and sometimes she carries from two to four whitish stripes. The males also have stronger, coarser heads than the females and have a

thicker root to the tail. Completely dark, practically black specimens, are not unknown. The young are brownish and sometimes, but not always, spotted with white.

Green Lizards are extremely active and capable of moving with considerable rapidity but are not unduly nervous or highly strung in captivity. In fact, they are particularly easy to tame and under confined conditions soon become familiar with their owners. A pair I have at present, imported through the trade from Italy, fed freely on inch long locust-hoppers within half an hour of their coming into my possession and in less than twenty-four hours the male accepted mealworms from my fingers. Inside a week both of them could be picked up and handled without difficulty.

A not inconsiderable recommendation for these lizards as vivarium inmates is their habit of remaining almost constantly on view. The floor of the converted aquarium in which I keep mine is covered with a couple of inches of fairly coarse gravel and one corner is occupied by a bark covered log. Very rarely one or other of them will retire for a short spell behind the log and even more rarely do they bury themselves in the gravel. The majority of the time however they

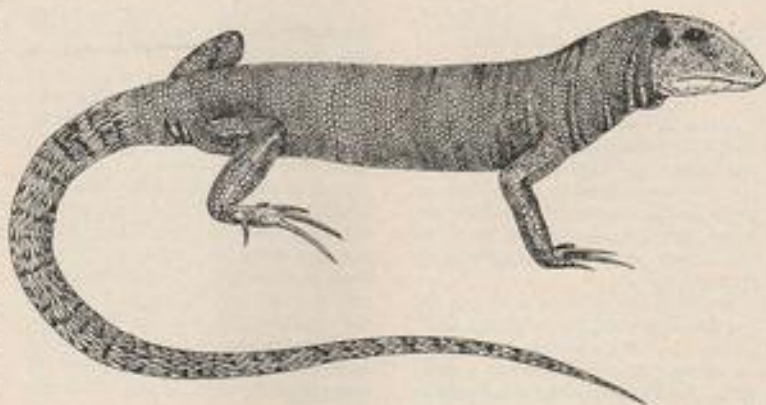
spend revelling in the heat beneath the electric light bulb or stalking through their domain hunting for food.

Green Lizards are oviparous, the clutch consisting of some five to twenty eggs. Under natural conditions the female buries her eggs in damp sand. According to different authorities the incubation period varies between one and three months and the parents are reported to remain in the vicinity until they hatch.

I am hoping my current pair will help to establish the facts more accurately. They were seen to mate on May 16th. The behaviour of the male was somewhat violent but no damage to either participant resulted. He clamped his jaws on the back of the female's neck, coiled himself along her length and for a brief moment their vents came into contact.

I have seen it stated that six to eight weeks elapse between copulation and egg production. In view of the fact that she started to deposit her eggs the following day there is no doubt that this female had been previously mated before she came into my possession.

Depositing her eggs satisfactorily involved the female in a protracted outburst of energy, lasting throughout the day. She scraped out a large hole



THE AQUARIST

under the log by vigorously hurling the gravel in all directions, violently scratching it out with both fore and hind feet. She was still working away when I left her for the night but by the next morning calm had returned to the vivarium. The female appeared to be considerably thinner than she had been and not only was the hole filled in but the gravel had been scraped up from all directions until it sloped gently, almost to the top of the log. Both lizards were sprawled peacefully across the summit of the pile but the sight of food galvanised them into immediate action and between them they consumed four fully adult locusts and a dozen mealworms in a matter of minutes. Evidently their attempts at propagation had involved a considerable expenditure of energy.

Green Lizards are said to eat earthworms and sometimes soft fruits.

Personally I have not succeeded in persuading them to take fruit but, when short of more acceptable fare, they have eaten earthworms of up to four inches in length. Given the choice they much prefer locusts, particularly half grown hoppers, blow flies, spiders, maggots and mealworms. They need water, drinking it fairly freely, and will take it from a pot.

In the wild these lizards hibernate in winter but under vivarium conditions I like to keep them active throughout the year by the use of a thermostatically controlled heater maintaining a fairly constant temperature of 80°F. I know of one reptile enthusiast who keeps Green Lizards in an unheated greenhouse. They appear to do well and spend the winter hibernating in artificially constructed underground burrows.

Although male Green Lizards tend to fight among themselves when in

breeding condition they will live amicably with other species of comparable size. I kept one pair for some time together with a pair of Skinks of approximately equal length but rather greater bulk, and both species seemed perfectly content and indifferent to the presence of the others. I should not, however, be inclined to trust them with lizards much smaller than themselves.

Green Lizards are not difficult to obtain and are frequently offered for sale in pet shops. They are inexpensive to buy and their beauty of shape and colour together with their active habits, tameness and adaptability make them well worth a place in the vivarium. Personally I would recommend them highly as the first choice of a beginner in reptile keeping wishing to gain experience of lizard culture before venturing upon more exotic and more difficult species.

Fish Food Review

continued from page 667

on to the surface of the water and is greedily eaten by young fry.

'Gordon's Formula' is a fish food which was devised by Dr. Gordon a number of years ago. The recipe is given in some of the smaller books for guppies. The food was rather difficult to prepare from fresh liver, etc., and required heating. The resulting paste-like gel was not too easy to keep fresh for long periods but the food was thought very highly of by American guppy breeders. The freeze-dried version has removed all the bother of preparation and the food comes in about $\frac{1}{2}$ in. square cubes. I have found this food most useful if small pieces are crushed between finger and thumb and scattered on the tank water. Fish of varying sizes and ages can then feed on appropriately sized pieces. All of my fish seem to be very fond of this food as they do of the mosquito larvae. These are in the form of small, almost black granules and powder, and they have a fairly strong smell which apparently attracts the fish quickly. The final freeze-dried food which I have had the chance to

test so far is the red worms. These are ordinary freeze-dried tubifex worms which have not been compressed into blocks and which have retained a more natural colour than those in cube form. My fish seemed to prefer these loose worms to those in cubes as they were more easily taken and eaten.

The analysis of each food is given on the side of the pack, and most of them are high in protein content, this being the constituent which builds strong, large and healthy fish. One can see that the prices vary considerably, and by careful selection one can obtain best value for money; e.g. cubes of tubifex are 3s. 3d. for 5 grams and 'free' red worm tubifex costs 5s. 6d. for 12 grams.

Although these freeze-dried foods, as with other brands, are quite expensive, the trouble that they save one in not introducing diseases or pests, nor having to buy, rear or catch live foods, is worth the cost. One can, of course, include both live foods and freeze-dried foods in the fishes' diet, as well as the normal stable diet of various ordinary dried foods and fresh foods from the kitchen or garden at home. The other foods, especially the daphnia, interest me and I hope to review these in the future. B. W.

Goldfish Fanciers Criticised

Fishing and goldfish breeding have come under attack in the Shanghai newspaper, "Liberation Daily," which describes the hobby as "an evil wind" spread by chairman Mao Tse-Tung's opponents.

Quite a number of young people had become influenced by this "evil wind" and were spending most of their time "frantically fighting" to buy materials to make fish tanks, according to an article in the newspaper.

The newspaper said some people used state materials and utilised their working hours to manufacture their goldfish bowls in the factory workshops and thus help spread anarchism.

What is it?

From page 648

ANSWER
Swim Bladder of
Veiltail Goldfish

OUR EXPERTS' ANSWERS TO YOUR QUERIES

COLDWATER QUERIES

by A. Boarder

Each year I breed many goldfish in my pond but most of them remain bronze. These thrive but any coloured ones soon die out. Why is this?

The reason is that you have left fish in the pond to breed which have not changed colour soon enough. The young ones take after these and so do not change. You should never allow any goldfish which has not changed colour by at the most two years, to remain in the pond to breed. If this is done in a few years time it is probable that very few of the youngsters will ever turn to gold. These fish appear to have more stamina than many coloured fish and so the weaker ones go to the wall.

Is it possible to keep Faintail goldfish in an outdoor pond throughout the winter?

This is quite possible as I have been doing the very same for the past 31 years. I do occasionally lose a fish in a very bad winter, such as 1963-4, but then it was only an old one which was getting to the end of its life. However one must be careful with which faintails are used. If they had been bred in very warm conditions and had not been gradually acclimatised to a lower temperature of water they could be in trouble. Any fish which had been in the pond since spring could easily go through a winter safely, as the water would have become colder gradually.

I have two small goldfish which I have bought recently. They have some scales missing from their sides and occasionally skid across the bottom of the tank. Do you think they have flukes?

Because the fish perform as stated it does not necessarily mean that they

are attacked by flukes. It may be that they have received some damage and the fresh scales are forming. This might cause some irritation. If the fish show no other bad signs such as blood streaks on the body and go off their food, I do not think there is anything to worry about. Sometimes a bath in a mild solution of Dettol or T.C.P. will clear the fish if there are any parasites on it. A solution not stronger than one recommended for a gudgeon will do.

All the articles on breeding goldfish appear to assume that the breeder has already sexed his pairs. I find this very off-putting, for try as I may I am not just able to find any information on the sexing of fish?

I am sorry that you have found no information on sexing goldfish in this journal or anywhere else. I have myself during the past 22 years repeated this information so often in this journal that I am afraid that readers will have become tired of the repetition of the subject. However, once again I will take a chance. Male goldfish are usually slimmer in the body than a female of the same variety. Also when in breeding condition they show small white raised tubercles on their gill plates and sometimes also on the front rays of the pectoral fins (the front pair). You have apparently missed the information I have given in my book "Coldwater Fishkeeping," so often advertised in *The Aquarist and Pondkeeper*.

If you have any influence over the Editor can you please get him to publish more about cold-water fish in the journal?

I will do my best but you must realise that requests also come in for more on tropicals, more on reptiles and plants. There would appear to be more tropicals kept than coldwater fish and if you doubt this statement perhaps you will visit your nearest aquarist dealer. I did this recently and called on one of the largest in

London. On the ground floor were many well set-up tanks of tropical fish. Every tank a joy to inspect and no doubt a real encouragement to anyone to buy tropicals. After having enjoyed seeing all these tanks I asked if there were any coldwater fishes for sale. I was told there were plenty upstairs. On going up I found two tanks with goldfish in. The water was very cloudy and dirty, there were no plants, gravel or rocks in the tank and what goldfish there were, did not look attractive enough for anyone to buy. I do not see how people are to be attracted to start keeping coldwater fishes under such presentation. Why tanks could not have been made as attractive for coldwater fish as for tropicals I fail to see.

I wish to gather wild plants from ponds and streams to grow on in a tank. Shall I be in order to put some peat under the compost gravel?

You can do this; use ordinary horticultural peat or else a little potting compost. Do not use much as once you have fish in the tank they will supply much of the necessary food for the plants by way of their droppings. Be careful to examine the plants carefully and give them a good soaking in a solution of permanganate of potash the colour of beetroot. Otherwise you might introduce unwanted pests and diseases into your tank.

I have followed your articles on breeding goldfish with heat and now have hundreds of fry in a six-foot tank. How often should they be fed?

Small fry are almost continuously eating but they can only take very small particles and so require frequent feeds with food of a suitable size. As long as they can be seen eating you can add a little food but never a lot at a time. As they grow you may give larger particles and try to vary the types of food you give, including some live foods mashed up.

TROPICAL QUERIES

Recently I bought an eel-like fish called *Mastacembelus loenbergi*. I should be grateful for what information you can give me regarding the requirements of this species in the way of temperature and food. I should also like to know the length it may attain in a 4 ft. tank, and its country of origin.

M.loenbergi is retiring by nature and needs hiding places such as thickets of plants or mounds of non-calcareous stones. It is harmless to all other fishes, excepting swallowable fry. Food for *M.loenbergi* should consist of white worms, tiny or chopped earthworms, live daphnia, few days' old guppies, pieces of red meat, and the like. It is essential to see that food is taken; for other fishes may snatch it up before the spiny eel (fishes of the genus *Mastacembelus* are popularly known as spiny eels) even gets around to knowing it has been introduced. At dusk and after dark, though, the spiny eel goes hunting, and food dropped in at this time, when the other fishes are resting, will be seized without delay. A temperature in the middle seventies (°F) suits the fish best. *M.loenbergi* is native to West Africa and will attain a length of about 8 in.

Please tell me how to sex and breed the scissortail rasbora.

The sexes of *Rasbora trilineata* are not easy to tell apart until they have reached about half size, when the female is the heavier bodied of the two. At breeding time, however, the male assumes brighter colours and the female shows a more protuberant abdomen and swollen sides. A tank measuring about 24 in. by 12 in. by 12 in. is about right for spawning. It should be filled with water on the soft side and giving a neutral to slightly acid reaction. A tangle of some aquatic moss or weedy plant

should be weighted to the bottom. After the fish have been introduced into the tank raise the temperature gradually, that is a few degrees (°F) above what the fish are used to. If spawning takes place, eggs will be scattered over or in the plants. As the eggs are not strongly adhesive, quite a number come to rest on the floor of the aquarium. Of these, some will produce fry and some will go cloudy-grey and develop a fuzz of fungus. These should be removed as soon as noticed with the aid of a narrow bore dip-tube. The parent fish should be removed after spawning. Incubation of the eggs takes about three days. Thereafter the free-swimming fry need Infusoria or a proprietary fry food until they are large enough to take sifted Daphnia, crushed flake food, and the like.

I have just taken possession of a 4 ft. tank and would like to know whether it would be better to have it covered over with a single sheet of glass or with three or four smaller pieces of glass, placed end-to-end.

A single sheet of glass is tidier looking, but it has its drawbacks. For one thing, it is awkward and heavy to move about. For another thing, if you crack it a replacement is far from inexpensive. So, all in all, we recommend a cover made up of more than one piece of glass. It makes for a happier household if the aquarium can be attended to without difficulty.

Is the glass tetra (*Moenbhaunia oligolepis*) a ready spawner, and are the fry easy to raise in a 2 ft. tank?

M.oligolepis is neither a free-spawner nor are the fry rapid growers or, for that matter, easy to grow on in the average aquarium. The chief difficulty in raising the fry lies in the fact that they need a plentiful supply of the smallest live food, and very clean and well-aerated water. Given these things, and after the first few weeks have been got over satis-

factorily, there is every chance of success.

Please tell me when mops made of nylon thread were first used as a spawning medium and who thought up the idea of using them?

It is believed that the first aquarist to think up the idea of bunching nylon threads together to form a spawning medium for certain oviparous tropicals was one Jacob Scheidnass, of Philadelphia, U.S.A. He put his idea into practice towards the end of the 1940s.

I should be grateful for some information about the care, disposition and breeding habits of the red-lined rasbora.

The red-lined rasbora (*R.pauciperforata*) is easily cared for if it is given plenty of swimming space (bear in mind the fish reaches a length of about 3 in.) in clear water maintained at a temperature in the middle seventies (°F). It looks most brilliant against a background of plants. It is a peaceful species, that does well in a community tank, but seems most contented when it can move about in the company of its own kind. It eats any food. Its breeding habits are simple. The male drives the female into plant life. Eggs are scattered. The parent fish will eat them unless the aquarist takes rapid action to separate the eggs from the parents. The fry hatch out in about three days and become free-swimming a few days later.

Is it true that there is an albino x-ray fish?

If you mean an albino *Pristella riddlei*, then the answer is yes. We do not know whether this quite attractive-looking fish was developed from a sport taken from the wild—albino fishes are not unknown in nature—or from a mutation in a brood of tank-bred fry. It has the typical red-currant eyes of the albino and is less hardy than the type. We have not seen it around for quite a time.

BREEDING GLASS CATFISH

by G. C. Powell

ALTHOUGH FOR MANY years I have wanted to keep tropical fish, it was not until October 4th last that I actually got round to buying my first fish. And within six weeks I had managed to breed Glass Catfish—something, it would appear, that has never been done before.

Having bought an adult pair of Glass Catfish (*Kryptopterus bicirrhus*) during October, I set up a second tank on November 1 and put the adults in on November 6. The tank was a 15×8×8 in., with approximately an inch of gravel, an aerator, no filter and only two plants—Giant Sagittaria and Water Wistaria. A small amount of salt was added to the water.

On November 10th I noticed that the male adult was dead; the following day I spotted the two babies—about one-eighth of an inch long. I assume the babies were live-born, and if this is so it would appear to disprove the general theory that this species belong to the catfish family. Catfish normally lay eggs.

The babies have been kept in the tank at a constant temperature of 78°F, and are now about half an inch long—and apparently enjoying a healthy life! Liquid food has been added to the water, but I believe the babies could be living on infusoria in the tank. Daphnia has lived for up to four days in the tank before being eaten, and it can be seen that the tank is 'alive' with Cyclops.

Whether or not I could breed these fish again, I do not know. I only tried in the first place because all the reference books said they had never been bred in captivity before. It was my wife who pressed for me to buy Glass Catfish in the first place—I prefer the highly coloured fish myself—I am now very pleased to have bought and bred them.

BOOK REVIEW

Wonders of the Oceans. Published by Thomas Nelson & Sons, Ltd. at 30s.

Lavishly illustrated entirely in colour, this is a very pleasant book to possess. Based on the original Dutch text by Frank de Graaf, Curator of the Aquarium and Reptile House, Amsterdam Zoo, it is easy to read while completely holding the interest. Specific names have been avoided as the book is not designed for specialists but is intended to satisfy the growing appetite for more information and pictures relating to the colourful life within the world's oceans.

Of the high standard of production we have come to expect from this publishing house, "Wonders of the Oceans" is a *must* for all lovers of natural beauty.

Glass catfish





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.

RECENTLY the **Horsforth A.S.** entertained **Keighley A.S.** to an inter-club match and also some colourful films were shown. These included a tropical sequence, one on the scorpion and a film on a public aquarium in the U.S.A. There was also an interesting range on salmon, crocodiles, snakes and parrots. There were ten classes in the table show the winners being: 1, C. Corn (H.); 2, Mr. Bickle (K.); 3, Mr. Audsley (H.). Anabantids: 1, B. Lancaster (H.); 2, H. M. Smith (K.); 3, P. Duanley (K.). A.V. Breeders: 1, Mr. Burnap (K.); 2, Master J. Duggdale (H.); 3, Mr. Bickle (K.). Cichlids: 1, Mr. White (K.); 2, Mr. Bickle (K.); 3, B. Lancaster (H.); J. A.O.V.: 1, Master White (K.); 2 and 3, Master D. Shaw (H.). Barbs: 1 and 2, Mr. Girdham (H.); 3, Mr. Burnap (H.). Pairs: 1, Mr. White (K.); 2, P. Dearbly (K.); 3, M. Pollard (H.). Characins: 1, Mrs. P. Hall (H.); 2, Mr. White (K.); 3, B. Lancaster (H.). A.O.V.: 1, H. M. Smith (K.); 2, Mrs. J. Dickinson (H.); 3, Mr. White (K.). Best in Show: Mr. White (K.). Points: Keighley 32; Horsforth 27.

AT the annual general meeting of the **Hasting-stoke and District A.S.** it was mentioned that the highlight of the year was undoubtedly the Annual Show held during July. The Show Secretary reported that a record number of entries had come from over a large area of the south of England and that subsequently many appreciative letters had been received. Members had had successes in showing throughout the South, although the performance in the Three Counties League table was disappointing. Following a vote of thanks to the retiring Committee and especially to Mr. D. H. Walls, the Secretary, who announced that owing to other commitments he would be unable to stand for re-election, voting took place to elect the committee for 1968-69. Those elected being: Chairman: R. Radley; Vice-Chairman: F. Lange; Secretary: H. F. Gough; Treasurer: Mrs. J. Lovegrove; Show Secretary: A. Blake; Show Manager: D. H. Walls; Members: Mrs. P. M. Gough, I. Lamb, A. Marshall. In view of the large and ever increasing number of junior members, it was agreed that one would be elected to serve on the Committee; the elected junior member being Mr. R. Blight. Meetings will be held in future at two weekly intervals commencing Friday, 10 January.

THE Manchester Section of the **Fancy Guppy Association** held its monthly meeting on the first Sunday in November when a lecture was given by Mr. K. Rigby who is chairman of the Judge and Standards Committee, on recent Guppy standards. The meeting was well attended and as usual a fish show took place

and a Gold Medal was awarded for best fish in show. Those interested in keeping and breeding Guppies will be most welcome at the monthly meetings which are usually the first Sunday in the month and are held in the Social Room at the Drill Hall, 3, Stretford Road, Manchester, 15. The entrance is in Upper Cambridge Street where there are excellent car parking facilities. Anyone interested will be always welcome at the meetings.

THE Eastern Region of **A.S.A.S.** held an inter-club table show at the Portsmouth Community Centre in Twyford Avenue. The show was divided into twelve classes and the results were as follows: Singletailed Goldfish: 1, 2 and 4, C. Beets (Portsmouth); 3, J. Stillwell (Portsmouth). Twintailed Goldfish: 1 and 2, W. Stokes (Portsmouth); 3, V. Hunt (Portsmouth). A.O.S. Coldwater Fish: 1, J. Stillwell (Portsmouth); 2, V. Hunt (Portsmouth); 3, E. Binstead (Portsmouth); 4, C. Smith (Portsmouth). Guppies: 1, 2, 3 and 4, C. Beets (Portsmouth). A.O.V. Livebearers: 1 and 2, C. Beets (Portsmouth); 3, D. V. Jones (Southampton). Cichlids: 1, J. Stillwell (Portsmouth); 2, M. Mansbridge (Southampton); 3, M. Miller (Walsley); 4, I. Russell (Southampton). Barbs: 1, D. V. Jones (Southampton); 2, I. Russell (Southampton). Danios, Rasboras and Minnows: 1, S. Crabtree (Portsmouth); 2, Mrs. Wright (Gosport); 3, D. V. Jones (Southampton); 4, Mrs. J. Vincent (Southampton). Characins: 1, 2 and 4, C. Beets (Portsmouth); 3, H. Armitage (Portsmouth). Catfish: 1, C. Smith (Portsmouth); 2, J. Bedford (Portsmouth); 3, S. Crabtree (Portsmouth); 4, K. Clough (Gosport). Labyrinth: 1, P. Bennett (Wichester); 2, M. Mansbridge (Southampton); 3, Mrs. Wright (Gosport). A.O.S. Tropical Fish: 1, Mrs. Wright (Gosport); 2 and 3, Mrs. J. Vincent (Southampton); 4, H. Armitage (Portsmouth).

AT the November meeting of the **Bournemouth Aquarists Club** over forty members and guests enjoyed a pleasant evening. The Club's Chairman, Mr. Coombes, welcomed Mr. Gerald Jennings, Director of the Marine Study Society, who assisted during the evening by answering some questions relating to marine fishes. The main item of the evening was "Question Time," when members questions were answered by various people. The table show of the month was judged by Mr. Ron Matley and Mr. Jack Jeffery, with the following results: A.O.V. Tropical: 1, Mr. Macfarlane; 2, Mr. Lawrence; 3, Mr. Waddilove. Breeders (Egglayers): 1, Mr. Greenhalgh; 2, Mr. Watkins; 3, Mr. Merrifield.

THERE was a record entry at the **Mixedden T.F.S.** annual show and the results were as follows: Guppies: 1, D. W. Smith (Tadcaster); 2, J. Greenwood (Halifax); 3, M. Ward (Mixedden). Swordtails: 1, Mrs. R. Robinson (Aireborough); 2 and 3, Mr. and Mrs. Bone (Huddersfield). Platies: 1, R. Wilkinson (Halifax); 2, A. G. Esteves (Top Ten); 3, Mr. and Mrs. Webb (Salford). Mollies: 1, Mr. Bickle (Keighley); 2, M. Ward (Mixedden); 3, J. H. Brown (Mixedden). Small Barbs: 1 and 2, F. Gregory (Osram); 3, A. Beasley (Osram). Large Barbs: 1, Mr. Wilkinson (Halifax); 2, Mr. Burnap (Aireborough); 3, S. Poole

(Mixedden). Small Characins: 1, D. Kennedy (Bradford); 2, M. Jones (Valley); 3, D. Shields (Halifax). Medium Characins: 1, N. Turner (Mixedden); 2, Mrs. Robinson (Aireborough); 3, J. Waine (Huddersfield). Large Characins: 1, J. Whately (Aireborough); 2, J. Howard (Barnsley); 3, D. Jackson (Rotherham). Dwarf Cichlids: 1, P. Barrett (Aireborough); 2, G. Poole (Mixedden); 3, Mr. Bickle (Keighley). Angels: 1, Mrs. Robinson (Aireborough); 2, L. Thompson (Mixedden); 3, M. Jones (Valley). A.O.V. Cichlids: 1, P. Barrett (Aireborough); 2, L. Thompson (Mixedden); 3, D. Kennedy (Bradford). Fighters: 1, M. Jones (Valley); 2, A. Beasley (Osram); 3, D. W. Smith (Tadcaster). A.O.V. Anabantids: 1, J. Howard (Barnsley); 2, P. and H. Gorton and Openshaw; 3, D. Dixon (Swillington). Tooth-cirrus: 1, D. Jackson (Rotherham); 2, L. Greenall (Tadcaster); 3, J. Roberts (Nelson). Sharks and Flying Foxes: 1, N. R. Gibson (Huddersfield); 2, A. B. White (Keighley); 3, D. Kennedy (Bradford). Danios, Minnows and Rasboras: 1, F. Gregory (Osram); 2, A. B. White (Keighley); 3, P. and H. Gorton and Openshaw. Corydoras Catfish: 1, R. Robinson (Aireborough); 2, A. G. Esteves (Top Ten); 3, P. Reynolds (Swillington). A.O.V. Catfish: 1 and 3, A. G. Esteves (Top Ten); 2, Mr. Bickle (Keighley). Loaches (inc. botias): 1, B. Parkin (Huddersfield); 2, Mr. and Mrs. Webb (Salford); 3, T. and W. (Belie Voe). Breeders (Egglayers): 1, Mrs. Robinson (Aireborough); 2, A. Beasley (Osram); 3, F. Gregory (Osram). Breeders (Livebearers): 1, P. Barrett (Aireborough); 2, M. Jones (Valley); 3, Mrs. Robinson (Aireborough). Pairs (Egglayers): 1, B. Parkin (Huddersfield); 2, S. P. Helm (Horsforth); 3, F. Gregory (Osram). Pairs (Livebearers): 1, Mr. Burnap (Aireborough); 2, D. Shields (Halifax); 3, D. B. Wilkinson (Halifax). A.O.V. Tropical: 1, H. Naylor (Halifax); 2, S. P. Helm (Horsforth); 3, A. G. Esteves (Top Ten). Children (Tropical or Gold): 1, L. Davies (Heywood); 2, P. Hodgkinson (Gorton and Openshaw); 3, C. Longbottom (Mixedden). Fancy Goldfish: 1 and 3, P. Moorhouse (Bradford); 2, Mr. Eadon (Sheffield). Common Goldfish: 1, C. Ellis (Valley); 2 and 3, Mr. Eadon (Sheffield). A.O.V. Coldwater: 1 and 2, D. Shields (Halifax); 3, H. Naylor (Halifax). Best Fish in Show: Cichlid; Owner, P. Barrett (Aireborough).

THE **Salford A.S.** were very pleased to be able to welcome **Bury A.S.** to an inter-club show at Salford A.S. headquarters. There were over sixty entries and many good fish on show. The winners were: Single (egglayers): 1, G. Edmunds; 2, Mr. and Mrs. Cooper; 3, Mr. and Mrs. T. Webb. Single (livebearers): 1, S. A. Foley; 2, Mr. and Mrs. T. Webb; 3, W. Orton. Pairs: 1, J. Shepherd; 2, J. Murray; 3, S. A. Foley. Breeders team: 1 and 2, J. Shepherd; 3, W. Orton.

The overall show winner on Salford A.S.'s own points system was J. Shepherd, who was presented with an attractive inscribed trophy. Entertainment comprised a colour film with sound. Films shown were: World without Sun, Dance of the Fishes, Garden under the Sea, Submarine Scooter—Fashiona Deep, Catching Fish, Wonderful Africa, and a Chilly Willy Cartoon. Several fish were auctioned, refreshments were provided and a raffle was organised, all of which went towards making the evening a complete success. Anyone interested in joining a lively, progressive society, should contact Mr. Stephen A. Foley, 18 Alder Drive, Wardley, Swinton, Lancs.

THE programmes for the next two meetings of the **Scottish A.S.** are as follows (28th January): Dealers Night, Table Show (Breeders Egglayers) Visitors (Paisley A.S.). 25th February: Speaker D. Naismith. Subject: "Catfish". Table Show (Corydoras, Common Goldfish, A.O.S. Tropical Catfish). Visitors (Whirburn and Clydebank A.S.).

halamid A FRACTION A DAY, KEEPS ALGAE AWAY
Hillside Aquatics London N12

THE Bristol Tropical Fish Club marked the end of a highly successful season at the recent annual meeting during which the following officers were elected: Chairman: L. Littleton; Vice-Chairman: A. Kimber; Hon. Secretary: W. Holland; Asst. Hon. Sec.: C. McGrath; Hon. Treasurer: R. Toome; Reporting Sec.: R. Chapman; Programme Officer: K. Gale; Librarian: Mrs. P. Chapman; Auditors: Messrs. G. Furber and B. Clarke. Award winners for the 1968 Table Shows were: Open Section: F. Brown (Runner-up A. Hinks); Novice Section: M. Heard (Runner-up Mr. A. Hinks).

This year's Open Show proved once again to be very popular and a committee has been formed to plan and arrange details for next year. The Show Secretary is Mr. E. Newman, 71 Somerdale Avenue, Knowle, Bristol 4 and further details will be announced as soon as possible.

The members enjoyed success in various Open Shows during the year and the Club was pleased to be able to supply judges to several shows including Cheltenham and Barry. A very high standard of speakers was heard at the monthly meetings and plans are currently being made for a comprehensive programme of Talks, Slide Shows and Table Shows for 1969. Coach outings were made to various Aquatic establishments and recently to the Furnished Aquaria Show at the Royal Horticultural Hall and it is hoped that similar visits will take place this year. An invitation is extended to visitors or new members who are assured of a warm welcome at the monthly meetings held on the third Tuesday of each month at the Black Horse Hotel, West Street, Bristol 1, commencing at 7.30 p.m.

MEMBERS of the **Brighton and Southern A.S.** heard an excellent lecture on the breeding of *Kribia* by Mr. M. Mason of Portsmouth A.S., showing the various stages in preparing a tank for breeding this species, the hatching of eggs and raising of fry. Mr. Mason showed what can only be described as top quality colour slides of the parents in their spawning colours followed by the eggs and hatched fry. Competition was keen in the table show for Breeders. A new trophy presented to the Club by member Mr. V. Aldis was obviously appreciated. Results were as follows: Livebearers: 1, J. Kail; 2, D. Soper; 3, T. J. Croucher. Egglayers: 1, 2 and 3, D. Soper. The V. Aldis Trophy was won by Mr. Soper with his entry of Cherry Barbs. Another table show staged during this month was for Barbs. Results: 1, J. Pelham; 2 and 3, C. West; 4, J. Pelham. Any person interested in joining the Society will be assured of a warm welcome at its fortnightly meetings.

RECENTLY members of the **Merseyside A.S.** gathered to hear a lecture from the Society's President Mr. R. E. Legge. Mr. Legge explained that since he is unable, at present, to spend as much time as he would wish in the Aquarium at Belle Vue Zoological Gardens, he is perhaps not as up to date with his knowledge of recent imports of tropical fish as some of the members might be. He proposed, therefore, to spend only part of the evening discussing fish and the remainder of the time discussing natural history, particularly those aspects which might interest the aquarist—the collecting of coastal marine life, rockwork and driftwood. This he proceeded to do in a most fascinating and entertaining manner, stressing his points with amusing stories of the adventures of himself and his family in collecting, over the years, a truly amazing amount of rockwork and natural wood which were shown in the colour slides with which Mr. Legge followed his talk. Throughout his talk, slides illustrated some of the wonderful places where rockwork and wood can be found and also some of the beautiful effects which might be achieved by its use as ornament in the home or as an aquarium background. A most interesting series of slides also showed the construction of the alligator pool at Belle Vue.

In November the last Society Table Show for the year was held. There were ninety-three

entries and at the close of the meeting, the judge, Mr. Pillinger, commented on the very high standard of the exhibits. The Best Fish in Show award went to the Chairman Mr. F. Mulla for his Giant Gourami which was awarded 85 points. Four entries were awarded 84 points.

THE Wellingborough and District A.S. is now one year old and the lively monthly newsletter which they publish is an indication of the good progress made by this young society. For further information please contact Mr. D. R. Lawrence, 85 Albert Road, Wellingborough.

FORTHCOMING table shows of the **Nottingham and District A.S.** are January for Barbs



The Aquarists' 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 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 3s. 6d. to *The Aquarist*, The Buxis, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

and Loaches and for February, Egg-laying Toothcarps and Catfish. The November Bulletin contains some interesting features especially the article by Sandra Barber on the "Evolution of Fishes".

THE Bradford and District A.S. were entertained recently by Mr. Lea Taylor who gave a talk on "Fish House Construction". He proceeded to go through the materials and methods employed in the construction of fish houses of all types and then the attention of the meeting was turned to specific problems. One of these was insulation and heat build-up from fish house lights. The very interesting question of "Can one over-insulate a fish house" was posed, to which no satisfactory answer was given by anybody.

The November issue of "Lateral Lines" the monthly magazine of the **York and District A.S.** contains a number of interesting features. These include articles on Extra Tanks (a "Do it Yourself" feature), Fish House Insulation and an illustrated story on "Sea Shore Life".

At a recent meeting of the **Midlands Aquarists League** the rules were revised and Nuneaton is now a member of M.A.L., the Societies number seven. The season will run this year from March to October and the rota is as follows: March, Livebearers (Breeders), Cichlids and Anabantids, Atherinids, April, Egg-layers (Breeders), Barbs and Characins,

Northampton, May, Livebearers (Breeders), A.V. Guppies and A.V. Coldwater, Coventry, September, Egg-layers (Breeders), A.O.V. Livebearers and A.O.V. Tropical, Bedworth, October, Livebearers (Breeders), Catfish and Loaches and Rasboras, Danios, Killies, W.C.M.M., Rugby.

THE Haling and District A.S. were hosts recently to Runnymede and Riverside Aquarist Societies. For half-an-hour members put questions to a panel of three made up from one member from each Society, and this was followed by a film show and commentary on "Building a Fish House" which was of great interest to all present.

Mr. Harry Towell judged thirty-six fish (twelve from each Society) and the results were as follows: Characins: 1, Mr. Harman (Riverside); 2, Mr. Shanks (Runnymede); 3, R. Biggs (Runnymede); 4, Mr. Violet (Runnymede). Cichlids: 1, Mr. Grosvener (Runnymede); 2, Mr. Goss (Runnymede); 3, Mr. Simonds (Riverside); 4, Mr. Harman (Riverside). Barbs: 1, R. Savage (Haling); 2, J. Healey (Haling); 3, Mr. Grosvener (Runnymede); 4, Mr. Huckland (Riverside). Corydoras: 1, 2, 3 and 4, R. Biggs. Card for best fish in the show went to Roy Biggs for his *Corydoras Schwartzi*.

In November, Mr. R. O. B. List visited the above Society's monthly meeting to give a talk on the care and cultivation of aquatic plants. As many enthusiasts throughout the hobby will know, Mr. List is an eminent authority on water life and his experience both in this country and abroad provided very helpful information concerning tropical aquatic plants, and members enjoyed his first-class lecture on the subject. Following questions and discussions with Mr. List, the results of the Society's Annual Home Aquaria Competition were announced and comments on the entries were made by the Vice-Chairman, Mr. J. Sanders. The first three places were awarded to: 1, K. Seaman; 2, D. Woodley; 3, G. Irish.

An interesting programme has been arranged for the winter months. The meeting to be held on Monday, 13th January, will be for the annual prizegiving; a film show will also be included in the programme. Anyone who would like to come along to these or any of the Society's meetings (held on the second Monday evening of each month) will be most welcome. Further information is available from the Hon. Secretary, Mr. Ron Ruth, 103, Heath Road, Chadwell Heath, Romford, Essex.

The first meeting of the newly-formed **B.A.C. Aquarist Society** was held recently when a Jar Show was included consisting of Guppies. There was also a talk from Mr. N. Court who judged the show with the following results. Open Class (Male): 1 and 3, F. Brown; 2, P. Gadd. (Female): 1, F. Brown; 2, W. G. Gadd; 3, P. Jones. Novice: 1 and 2, J. Sheppard; 3, D. Gould. The committee members elected were: chairman, P. Gadd; secretary, J. Webb; treasurer, A. Derrett; committee, K. Watkins, T. Church, P. Jones, K. Wood; programme officer, A. Mountford. The meetings are held at Bristol Dock Labour Club, Welsh Back, Bristol, Monday at 7.30 p.m.

The winners at the **Halifax A.S. Show** were as follows: Guppies: 1, J. Greenwood (Halifax); 2, M. Ward (Moxenden); 3, D. W. Smith (Tadcaster). Swordtails: 1, C. J. Burnap (Aireborough); 2, Mr. & Mrs. Bone (Huddersfield); 3, D. R. Starden (Loyne). Mollies: 1, J. Green (Sunnybrow); 2, T. Bickle (Keighley); 3, D. R. Starden (Loyne). Platys: 1, Mr. & Mrs. T. Webb

**IN AQUARIUM OR POND
BE SAFE
WITH**  **Hillside Aquatics London N12**

(Salford); 2, R. Wilkinson (Halifax); 3, J. Greay (Sunnybrow). Characins (small): 1, R. Wilkinson (Halifax); 2, D. Shields (Halifax); 3, Master Lacey (Aireborough). Characins (medium): 1, N. Turner (Moxenden); 2, A. G. Whyte (Halifax); 3, D. Kennedy (Bradford). Characins (large): 1, J. Murphy (Salford); 2, Mr. & Mrs. J. Howard (Barnsley); 3, A. G. Whyte (Halifax). Barbs (up to Nigger): 1, J. & H. Derris (Workop); 2, D. W. Smith (Tadcaster); 3, J. Greay (Sunnybrow). Barbs (over Nigger): 1, R. Taylor (Aireborough); 2, I. Watson (Sunnybrow); 3, A. G. Whyte (Halifax). Rasboras, Danios and Minnows: 1, A. B. White (Keighley); 2, S. Leedham (Moxenden); 3, D. Fryer (Halifax). Sharks and Flying Foxes: 1, A. G. Whyte (Halifax); 2, A. B. White (Keighley); 3, D. Kennedy (Bradford). Anabantids: 1, R. Taylor (Aireborough); 2, Mr. & Mrs. Bone (Huddersfield); 3, Mr. & Mrs. J. Howard (Barnsley). Corydoras: 1, D. Kennedy (Bradford); 2, A. G. Esteves, S. A. Heap (Top Ten); 3, D. W. Smith (Tadcaster). Catfish A.O.V.: 1, Mr. Helm (Horsforth); 2, D. Fryer (Halifax); 3, T. Bickle (Keighley). Loaches: 1, W. Parkin (Huddersfield); 2, Mr. & Mrs. T. Webb (Salford); 3, L. Thompson (Moxenden). Toothcarps: 1, J. & H. Derris (Workop); 2, Mr. Greenall (Tadcaster); 3, D. Jackson (Rotherham). A.O.V. Tropicals: 1, H. G. Naylor (Halifax); 2, D. R. Starden (Loyne); 3, S. F. Helm (Horsforth). Breeders (Egglayers): 1, J. & H. Derris (Workop); 2, D. W. Smith (Tadcaster); 3, Master A. Kaye (Huddersfield). Breeders (Livebearers): 1, H. Gardner (Aireborough); 2, C. J. Burnap; 3, R. Wilkinson (Halifax). Pairs (Egglayers) True: 1, W. Parkin (Huddersfield); 2, H. G. Naylor (Halifax); 3, J. & H. Derris (Workop). Pairs (Livebearers) True: 1, M. Jones (Valley); 2, R. Wilkinson (Halifax); 3, J. & H. Derris (Workop). Fancy Goldfish: 1, E. W. Hudson (Sheffield); A.O.V. Coldwater: 1, E. W. Hudson (Sheffield). Furnished Jars (without fish): 1 and 2, D. Shields (Halifax); 3, H. G. Naylor (Halifax).

AT the first meeting of the **Hinckley and District A.S.**, the officials elected were as follows: chairman, C. Watkins; secretary, R. Worth; treasurer, N. Fywell. Meetings will take place monthly and new members will be welcome. For further information please contact Mr. R. Worth, 14, Netherley Road, Hinckley, Leicestershire.

DURING the last few months **Chester and District A.S.** have enjoyed a full and varied programme. In August an inter-club quiz and table-show was held with Northwich Aquarist Society which was attended by many enthusiastic members from both Societies; there was a large entry of fish and they were judged by two members of the Merseyside A.S. Society members visited Chester Zoo and, under the excellent guidance of Mr. Fred Williams, were taken on a tour backstage and afterwards given a talk on the general upkeep of the Aquarium.

During October and November the Society enjoyed a talk on pencil fish by Mr. Peter Tomlinson, a club member, and on the following meeting a lively discussion on plants ensued whereby members expounded their views on the merits of trying to simulate the natural habitats of various plants. Mr. Roger Dutton, also a member, provided an informative talk on taking photographs of aquatic subjects and this was elaborated by a large selection of his slides including microphotography, individual fishes and complete furnished aquaria.

December included an excellent plant leaf quiz organised by Mr. E. V. Stokes, chairman (even puzzling a few experienced members) and the year ended with an assortment of unusual fish being displayed and these included *Botia Macracantha* and *Pseudotropheus Auratus* (adult specimens). A num-



1969

BRITISH AQUARISTS' FESTIVAL

18th and 19th October
at Belle Vue, Manchester

ber of experienced lecturers in the North West have been invited to attend the club meetings during 1969. New members are welcome. Apply: Mrs. A. Dutton, hon. secretary, The Limes Farm, Tarvin, Chester.

THE officers elected at the **Southend, Leigh and District A.S.** annual general meeting were as follows: President, D. Edwards; Vice-President, R. Passmore; Secretary, R. Wallings; Treasurer, D. Chewright; Table Show Secretary, R. Passmore; Librarian, A. Hunter; Refreshment Secretary, E. Bligham; P.R.O., D. Finch; Journal Editor, P. F. Capon; Assistant Editor, R. D. Orford; Committee member, L. Mitchell.

The following evening a number of members went to Malden to visit the **Blackwater A.S.** and take part in an Inter-Club table show and quiz. The participating clubs were Blackwater, Witham, Billericay and Southend. An interesting point that arose during the quiz was that a member of Blackwater had had the unique experience of getting *Hygrophila polysperma* to flower; he stated that this plant, hitherto not known to flower, had small blue flowers.

THE new headquarters of the **Widnesbury A.S.** is the King's Hill Tavern, Mill Street, Widnesbury. The club night remains the first Monday in the month.

AT the November meeting of the **Pontefract and District A.S.** members took part in a Quiz on Tropical fish. The winners of this competition were: 1, T. Tranter; 2, A. Town; 3, R. J. Hunt. The visiting lecturer was R. E. Hampson who entertained members with an unusual Slide show about the inmates of an American Prison who have aquariums in their cells. Results of the monthly table show were: A.O.V. 1, D. & B. Cohen; 2 and 3, F. Gates, Norwich; 1 and 2, J. Horsley; 3, C. Asquith. Novelty Class: D. & B. Cohen; 2, J. Goodall; 3, J. Thompson. The annual show winners of 1968 were: 1, D. & B. Cohen 95 pts.; 2, F. Gates 58 pts.; 3, J. Goodall 56 pts.; 4, T. & T. 55 pts.; 5, J. Thompson 25 pts.; 6, G. Thickbroom 18 pts.

TWENTY-FIVE members of **Tunbridge & District A.S.** attended the November meeting and enjoyed a series of films on marine life shown by Mr. P. Burgess, a professional aquarist from Tunbridge Wells. He ended his show with a recent film of Cdr. Cousteau's experiment of living on the sea bed. Table show winners this month were as follows. Danios, Rasboras and W.C.M.M.'s: Joint 1, J. Bellingham and D. Allen; 2 and 3, R. Baker. Killifish: 1, R. Taylor; 2, J. Bellingham; 3, J. Mathieson.

THE results of the Championship table show of the **Hastingstoke Aquarist Club** were as follows: 1, F. Lange; 2 and 3, A. Blake. Yearly

Points Cup: 1, A. Blake 37 points; 2, F. Lange 29 pts.; 3, A. Marshall 27 pts. Breeders' Final: 1 and 3, R. Ridley; 2, A. Marshall. Yearly Breeders' Cup: 1, A. Marshall; 2, R. Ridley; 3, T. Errey.

THE first inter-club show held by the **Blackwater A.S.** was a huge success. A quiz was compiled by a well-known wholesaler Mr. Skilton of Galleywood in which four teams took part, Southend A.S., Billericay A.S., Witham A.S. and Blackwater. Throughout the quiz the result was in the balance but finally Blackwater won with 45 pts., Southend 39, Billericay 30 and Witham 15. The results of the four table show classes were as follows: Barbs: 1, Mr. Murphy (Billericay); 2, Mr. Willett (Witham); 3, Mr. Orford (Southend). Tetras: 1, Mr. Edwards (Southend); 2, Mr. Hind (Blackwater); 3, Mr. Cornwall (Witham). Labyrinths: 1, Mr. Edwards (Southend); 2, Master Devali (Blackwater); 3, Master Kempen (Blackwater). Livebearers: 1, Mr. & Mrs. E. Gee (Blackwater Chairman); 2, Mr. Norris (Southend); 3, Mr. Norris (Southend). The Blackwater A.S. wish to thank all visitors and wives for making the evening a success and look forward to the return matches for the annual trophy.

THE **Independent A.S.** kept up their recent good form in their Six Club competition by winning the final leg at home to keep the trophy for the second year running. The final placings were: Independent 134, Hendon 118, Riverside 70, Willesden 55, Hampstead 34. The club has also had a friendly match with Tottenham and although gaining first cards in three of the four classes plus other places were beaten by 21 to 19. The Society has recently enrolled about a dozen new members and many more are welcome at Montem School, Hornsey Road, N.19, Monday nights at 7.50.

THE main item at the monthly meeting of the **New Forest A.S.** was a slide show by B. Poole, of the Poole Aquarist Society, entitled "Popular Tropical Fishes." These were slides taken by the lecturer himself, and some of them were very good considering the difficulties of the subject. The table shows were well supported again and the results were as follows: Barbs: 1, C. Knapp; 2, A. Williamson; 3, C. Knapp; 4, R. Memmott. A.O.V. cold-water: 1, R. Travers; 2, 3 and 4, D. Harding; Specials: 1, Memmott.

THE **Doncaster and District A.S.** recently held its annual general meeting when the following officials were elected: Chairman, R. Stokes; Vice-Chairman, L. Marden; Secretary, W. Taylor (28, Newell Lane, Athorpe, Nr. Doncaster); Show Secretary, B. Middleton; Treasurer, W. Beasley; Committee, Messrs. Wells, Ford, Moore and Gill. Meetings are held at the Lord Nelson Hotel, Cleveland Street, Doncaster, on the

first and third Thursday of each month, at 8 p.m. A junior section is being incorporated into the Society. New members are most welcome.

THE Open Show of the Reigate and Redhill A.S. proved to be just as successful as last year. Entries came in from twenty clubs and totalled 519 in twenty-five classes. The results were as follows: Club Furnished Aquarium (Tropical): 1, Harlow A.S., 76 pts.; 2, Portsmouth A.S., 74 pts. Club Furnished Aquarium (Goldwater): 1, Reigate & Redhill A.S., 78 pts.; 2, Portsmouth A.S., 63 pts. Individual Miniature Furnished: 1, K. Appleby (Thurrock), 80 pts.; 2, T. Walker (Guildford), 76 pts.; 3, Mrs. J. Salisbury (Harlow), 74 pts.; 4, C. F. Smith (Portsmouth), 70 pts. A.A. Plant: 1, C. Chisholm (Croydon); 2, K. Appleby (Thurrock); 3 and 4, P. B. Young, (R. & R. A.S.). A.V. Swordtail: 1, A. J. McCarthy (Gatford); 2, R. Smith (Tottingham); 3, W. Evans (Uxbridge); 4, Mrs. M. Nicoll (R. & R. A.S.). A.V. Molly: 1, J. S. Wilson (Gatford); 2, Mrs. M. Nicoll (R. & R. A.S.); 3, P. Tee (Brighton); 4, J. Wright (R. & R. A.S.). A.V. Guppy: 1, C. T. Mannerley (Kingston); 2, T. Walker (Guildford). A.O.V. Livebearer: 1, R. Cooper (Kingston); 2, B. Pearson (Freelance); 3 and 4, T. J. Summers (Uxbridge). A.V. Barbs: 1, R. McMillan (R. & R. A.S.); 2, T. Walker (Guildford); 3, C. West (Mid-Sussex); 4, J. Howick (R. & R. A.S.). Characins (Nannostomus and Anostomus): 1, P. A. Grosvenor (Runnymede); 2 and 4, Mrs. M. Nicoll (R. & R. A.S.); 3, P. T. Mathison (Tonbridge). A.O.V. Characina: 1, B. Macconnisnaigh (Tottingham); 2, K. Jackson (Harlow); 3, E. Cox (Worthing); 4, T. Walker (Guildford). Danios Rasboras W.C.M.M.: 1, R. J. Baker (Tonbridge); 2, A. J. McCarthy (Gatford); 3, M. A. Carter (Bracknell); 4, D. J. Soper (Mid-Sussex). Angels: 1, P. A. Grosvenor (Runnymede); 2, W. Brookfield (R. & R. A.S.); 3, N. & S. Packman (R. & R. A.S.); 4, K. J. Wheatley (R. & R. A.S.). Dwarf Cichlids: 1, C. Chisholm (Croydon); 2, J. Marshall (Croydon); 3, B. Pearson (Freelance); 4, J. Pollard (Kingston). A.O.V. Cichlids: 1, Mrs. Pawley (Kingston); 2, J. Cox (R. & R. A.S.); 3, Mr. & Mrs. Stillwell (Portsmouth); 4, K. T. Clough (Gosport). Juggling Toothcarps: 1, T. Walker (Guildford); 2, B. J. Pawley (Kingston); 3 and 4, B. Macconnisnaigh (Tottingham). A.V. Catfish: 1, C. Chisholm (Croydon); 2, N. L. Gregory (Bath); 3, J. Wright (R. & R. A.S.); 4, P. Tee (Brighton). Siamese Fighters: 1, D. C. M. Durrant (Thurrock); 2, J. Wright (Bath); 3, S. Mooney (Tottingham); 4, H. S. Wood (Croydon). A.O.V. Anabantid: 1, Mrs. M. Nicoll (R. & R. A.S.); 2, S. Mooney (Tottingham); 3, Mrs. G. Carter (Bracknell); 4, P. B. Young (R. & R. A.S.). A.O.V. Tropical Egg-layer: 1, S. Mooney (Tottingham); 2 and 3, P. Tee (Brighton); 4, G. Greenhall (Kingston). Breeders (Livebearers): 1, G. Greenhall (Kingston); 2, C. Beets (Portsmouth); 3, J. D. Wilson (Gatford); 4, K. Bryden (Croydon). Breeders (Egglayers): 1, H. S. Wood (Croydon); 2 and 4, T. Walker (Guildford); 3, J. D. Wilson (Gatford). Goldwater: Singletails and Comets: 1, Miss D. Morris (R. & R. A.S.); 2 and 4, R. M. Whittington (R. & R. A.S.); 3, W. Leach (R. & R. A.S.). Twintails: 1, 2 and 4, Miss D. Morris (R. & R. A.S.); 3, J. Linale (Romford). Common Goldfish & London Shubunkin: 1 and 3, Mrs. P. Whittington (R. & R. A.S.); 2, T. W. Leach (R. & R. A.S.); 4, W. Leach (R. & R. A.S.). A.O.V. Fancy Goldfish: 1 and 2, Miss D. Morris (R. & R. A.S.). Native and Foreign: 1, Mr. & Mrs. Stillwell (Portsmouth); 2, B. Macconnisnaigh (Tottingham); 3, V. B. Hunt (Portsmouth); 4, R. E. Dudley (S.P.A.S.S.). Coldwater Breeders: 1, 2 and 4, J. Linale (Romford); 3, R. M. Whittington (R. & R. A.S.). Best Fish in Show: Mr. & Mrs. Stillwell (Portsmouth). F.B.A.S. Award for Best A.O.V. (Tropical Egg-layer): S. Mooney (Tottingham & D.A.S.). Kandle Hill Trophy for Best Club Furnished Aquarium (Tropical): Harlow A.S.; T. F. H. Shield for Best Livebearer: J. D. Wilson (Gatford A.S.). The Carrington Cup for the Best Tropical Fish:

J. D. Wilson (Gatford A.S.). The Gaydogs Cup for the Best Characin: B. Macconnisnaigh (Tottingham). The Daphne Morris Cup for the Best Twintail: Miss D. Morris (R. & R. A.S.). The G.R. Bass Cup for the Best Fancy Guppy: C. Beets (Portsmouth). The 1968 Committee Cup for a Nominated Class (Anabantid): Mrs. M. Nicoll (R. & R. A.S.). The Club's meeting place is Semers Hall, Slipshoe Street, Reigate, where meetings are held every other Monday. All are welcome.

New members are still joining the **Aireborough and District A.S.**, and along with other members in October enjoyed a first-class lecture, with the aid of slides, by Mr. R. B. Legge, zoo superintendent at Belle Vue, Manchester. More recently at the November meeting two of the members, Ken Emms and Ken Bateman, entertained the members with slides that they had taken themselves.

Results of the monthly table shows: October, Anabantid: Advanced: 1 and 3, R. Taylor; 2, J. Whinsley; Novice: 1, 2 and 3, J. Robinson; Junior: 1, Miss S. Robinson; 2 and 3, Master A. Fleisher. November, Cichlids: Advance: 1, P. Barritt; 2, J. Whinsley; 3, R. Robinson; Novice: 1 and 2, J. Robinson; 3, C. Thompson; Junior: 1, Master A. Fleisher; 2, Miss S. Robinson. A.V. Breeders: Advance: 1, Mrs. R. Robinson; 2, P. Barritt; 3, J. Whinsley. Novice: 1, J. Robinson; 2, C. Thompson. Fish of the month: Thick-lipped Gourami, owned by R. Taylor. Any other variety: Advance: 1, Mrs. R. Robinson; Novice: 2, B. Tate; Junior: 3, A. Strutton. Fish of the month: Apistogramma Ramirezii, owned by P. Barritt.

Results of inter-society table show: Guppies: 1, Mr. Dickson (Swillington); 2, Mr. Thickboom (Pontefract); 3, Mrs. Whitfield (Keighley). A.O.V. Livebearer: 1, Mrs. Robinson (A.D.A.S.); 2, R. Lister (A.D.A.S.); 3, Mr. Brown (Miseden). Barbs: 1, Mr. & Mrs. Strimmer (Swillington); 2, B. Stokes (Doncaster); 3, Mr. Allopp (Halifax). Catfish and Loach: 1, P. Reynolds (Swillington); 2 and 3, R. Lister (A.D.A.S.). Any variety pairs: 1, Mrs. Whitfield (Keighley); 2, R. Lister (A.D.A.S.); 3, P. Reynolds (Swillington). Characins: 1, Mr. Brown (Miseden); 2, Mr. Allopp (Halifax); 3, J. Kay (A.D.A.S.). Anabantid: 1, R. Taylor (A.D.A.S.); 2, Mr. Brown (Miseden); 3, Mr. Dickson (Swillington). Cichlids: 1, L. Thompson (Miseden); 2, P. Barritt (A.D.A.S.); 3, R. Taylor (A.D.A.S.). Carps and Minnows: 1, J. Kay (A.D.A.S.); 2, P. Barritt (A.D.A.S.); 3, W. Naylor (A.D.A.S.). A.O.V.: 1, Mr. Carey (York); 2, Mr. Naylor (Halifax); 3, Mr. Smith (Keighley). Any variety breeders: 1 and 2, Mrs. R. Robinson (A.D.A.S.); 3, Mr. Bampton (A.D.A.S.). Furnished Miniatures: 1, Mr. Naylor (Halifax); 2 and 3, Mr. Shields (Halifax).

Best exhibit of the show: 'Severum Cichlid' owned by Mr. L. Thompson of the Miseden Society. Points table: Aireborough 29, Swillington and Halifax 11, Miseden 5, Keighley 5, York 3, Pontefract and Doncaster 2 points.

NEW SOCIETIES

THE first meeting of the **Castleford and District A.S.** will be held on Wednesday, 15 January at 7.30 p.m. at the Castleford Boys' Modern School, Pontefract Road, Castleford. Top line lecturers and judges have already been booked and anyone seeking further details should contact Mr. Alan Towns, 34 Camden Road, Airdale, Castleford.

THE **Daventry A.S.** has been established eight weeks and has a membership of twenty-eight. The headquarters are at the Daventry School, North Street and the Secretary is P. G. Buxton, 4 Ashdown Road, Daventry.

A NEW section of the **Fancy Guppy Association** is being formed in the Poole-Bournemouth area. Anyone interested should write to G. R. Davis, 25 Scarf Road, Canford Heath, Poole, Dorset. Telephone: Poole 5050.

THE **Littlehampton and Bognor A.S.** was formed last spring and meet at the Crown, High Street, Littlehampton, on the first Thursday of each month at 8 p.m. Persons interested in joining the society please contact Mrs. B. Gullip, 1 Beulah Cottages, Yapton Road, Barmham. Tel.: Eastergate 3511.

SECRETARY CHANGES

Macclesfield A.S. S. B. Cass, 17 Beeston Terrace, Weston Estate, Macclesfield, Cheshire. **Sunnybrow A.S.** Mrs. C. Grimshaw, 6 St. Philips Road, Gorton, Manchester 18.

CHANGE OF ADDRESS

Salisbury and District A.S. The new address of the Secretary, Mr. J. Goddard is 106 Carmarthen Way, Salisbury, Wilts.

AQUARIST CALENDAR

26th January: Weirs Aquarist Club first Open Show, to be held in Weirs of Catboats. Details from Mr. A. London, 36 Allison Street, Glasgow, S.2.

9th March: Huddersfield Tropical Fish Society. Open Show at the Drill Hall, St. Paul's Street, Huddersfield.

12th April: East Dulwich A.S. First Open Show, at St. Barnabas Parish Hall, Dulwich Village, London, S.E.21. Further details will be announced later.

26th April: Thurrock Open Show at Gypsy Lane, Grays, Essex. Full details at a later date.

11th May: Workshop A. and Z.S. Open Show at North Notts College of Further Education, Blyth Road, Worksop.

18th May: Coventry Pool and Aquarium Society, Midland Aquarist League, Table Show, Foleshill Community Centre, Foleshill Road, Coventry.

18th May: Mireyside A.S. Open Table Show at the Montrose Social Club.

18th May: Rainworth and District A.S. Open Show at the Showrooms of E. Taylor and Sons, West End Garage, West Gate, Southwell, Notts.

15th June: Brighton and Southern A.S. Open Show (provisional date).

21st June: Bracknell A.S. Annual Open Show, at the Priestwood Community Centre, Priestwood Court Road, Bracknell. Show Secretary, Mr. Len Little, 126 Shepherds Lane, Bracknell.

22nd June: Alfreton and District A.S. Annual Open Show, at the new Adult Education Centre, Alfreton Hall. Details from Show Secretary, Mr. S. Hill, 35 South Street, Riddings, Derbyshire.

22nd June: Open Show Coventry Pool and Aquarium Society, at Foleshill Community Centre, Foleshill Road, Coventry. Schedules from C. J. Grant, 26 Cecily Road, Coventry.

29th June: Medway A.S. Further details to follow.

6th July: High Wycombe A.S. Open Show at Bovingdon Green Hall, Nr. Marlow, Bucks. (Further information later).

6th July: Lytham A.S. Annual Open Show, Lowther Pavilion, Lowther Gardens, Lytham, Lancs.

20th July: Gosport and District A.S. Third Annual Open Show.

18th, 19th October: British Aquarists' Festival, Belle Vue, Manchester.

