

The AQUARIST AND PONDKEEPER

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Editorial

IF evidence of the growth of world interest in tropical fishes were needed it could be provided by the report of a Trinidad Fisheries Department meeting at which a decision to control exports of native fishes was announced. Where once upon a time the demand for specimens such as the tropical catfishes could be met by casual collectors and private buyers, an industry of such proportions has developed in recent years that the danger of overfishing has arisen. Now licences for export are required by traders, who form the Caribbean Aquarium Fish (Importers and Exporters) Association, to whom these are issued only on the recommendation of the Fishery Officer.

Named catfishes for which export is to be restricted are *Ancistrus triradiatus* and *Hypostomus plecostomus* ("148,500 fish or 1,485 cans"), and *Corydoras aeneus* ("145,500 fish or 970 cans"). These numbers apply to the period of the first six months of this year. It was stated that applications for licences from the exporters are to be treated on a "first-come-first-served basis," and each exporter will be allowed a maximum of 12 per cent. of the total numbers fixed for the fishes. Some indication of the proportions of the trade is given by the fact that last year's exports of the three species mentioned above represented a total value of 150,000 dollars.

In such a way can the enthusiasm of an aquarist in Walsall or in Washington affect the finances and internal commerce of a distant country, an aspect of our hobby that is not often considered. Another example was given a few years ago when we reported how the work of tin-smiths in British Guiana had boomed with the demand for fish cans to carry exported fishes.

Another kind of development of the hobby is indicated by the letter from the Federation of British Aquatic Societies on page 277 of this issue. Not very long ago "traffic" in eggs of fishes was practically unheard of, but now, apparently, it occurs commonly enough for the Federation to consider this practice in relation to its rules for showing.

Nannostomus anomalous

ORDER:—Ostariophysi, from Greek *ostarion*—a little bone, and Greek *physis*—a bladder.

FAMILY:—Characidae, from Greek *charax*—a sea fish.

SPECIES:—*Nannostomus*, from Greek *nannos*—small, Greek *stomatos*—mouth, and Greek *an*—without, plus Greek *homalos*—even, or *homolotes*—evenness.

NANNOSTOMUS ANOMALUS is a real dwarf or toy tropical fish. Its overall length seldom, if ever, exceeds an inch and a half, and most aquarium specimens fail to reach this maximum. It is native to the Amazon, and is extremely beautiful. An unusual feature for a characin is the absence of the adipose fin (the tiny fin above the caudal peduncle).

Its back and sides are basically olive-hued. A black line extends longitudinally from the tip of snout to the beginning of the rays of the caudal fin. Immediately above the black line is a companion line of vivid gold. The abdomen is white, the eye golden, and in the fins are red markings. The anal fin and the ventrals are tipped with bluish-white. Its body is long compared with its depth, a streamlined ideal, built for speed, and anyone who has startled these fish know how they can streak away. Yet in calm mood they frequently remain motionless for appreciable periods, which gives an opportunity for close and leisurely examination.

For general maintenance the fish appreciate slightly acid and comparatively soft water, with a temperature of 75° F., rising rather than getting cooler.

Small-mouthed Fish

Feeding needs thinking about, for the mouths of *N. anomalous* are very tiny (sufficiently small to be described as such in the specific name). *Daphnia magna* and full-grown *D. pulex* cannot be eaten. *Cyclops* nauplii, brine shrimps, or the tiny crustaceans such as *Chydorus* are suitable live foods. Powdered dried food, moistened into a paste with blood from earthworms, can also be used, but is a little messy to prepare, and uneaten portions might well pollute the water.

Owing to their small size, the parents can be kept in quite small tanks, and will spawn (if in condition) in an 18 in. by 10 in. by 10 in. aquarium furnished with fine-leaved plants. Colours of the male intensify when he is ready to drive the female.

Egg laying may be prolonged for hours, as eggs are laid singly and not in batches. The eggs are small and extremely transparent, adhering lightly to the plants. Hatching occurs in from one to two days at a temperature of 79° F.

The tiny alevins, although hatching so quickly, take unusually long to absorb their yolk sacs and develop the swim bladder. It can safely be reckoned that five days will elapse before the first foods need be given. These should consist of water green with free-floating algae and tiny infusorians. A young culture from lettuce leaves or crushed blanket weed is more likely to contain the size required than is an old culture, where the larger infusorians have ousted the smaller.

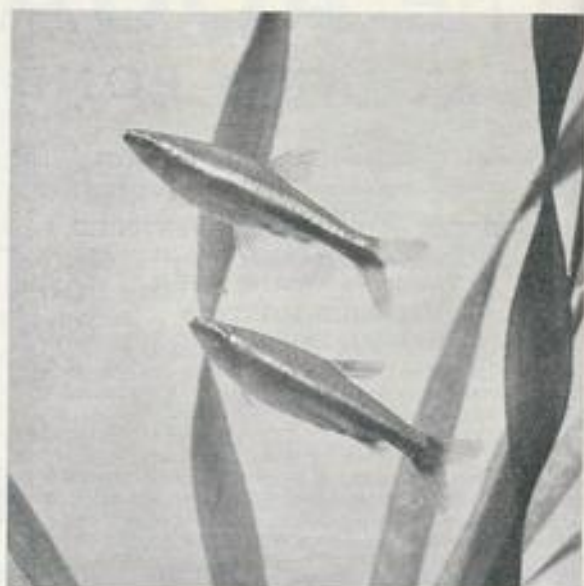


Photo:

Laurence E. Perkins

Sometimes known as the golden pencil fish, *Nannostomus anomalous* is a small and active species that can be kept successfully in small aquaria

Prolong this diet until the fry are obviously growing well, and then introduce *Cyclops* nauplii, following up with micro worms.

Growth will depend not only upon the type and amount of food given (and eaten) but upon the number of fry in the raising tank. Spread these out into other spare aquaria, or if you have insufficient space, dispose of them to fellow aquarists. Destroy any obviously mis-shapen runts.

Nannostomus anomalous are not seen in great quantity at fish exhibitions. Should you intend to show, be sure to give them slightly acid water. The maintenance of colour is greatly helped by it.

School Competition

A FURNISHED tropical aquarium competition, open to schools in mid-Scotland, is taking place at the Schoolboys' and Girls' Exhibition, to be held in the Kelvin Hall, Glasgow, from 12th to 23rd March, 1957.

A shield, also first, second and third diplomas, and tanks, heaters and canopies, all wired up ready for the competitors, are being provided by The Aquarists' Rendezvous, Glasgow.

The *Express Weekly* is organising a Treasure Hunt, and have invited questions from stallholders relating to their stands. One question will be "How many fishes are in this tank?" with a prize of a furnished tropical aquarium for the correct answer.

This is the second Schoolboys' and Girls' Exhibition to be held in Glasgow; the first (last year) proved so popular that it was decided to hold another one in 1957. This one is expected to be much bigger and with many more attractions than last year's.

Fancy Goldfish Breeding—2

THERE are two main methods of breeding fancy goldfish. They are: breeding in an open pond, and controlled breeding in tanks, usually in a fish house. The two methods vary a great deal and will be dealt with separately. Most controlled breeding is done either in a fish house or with a number of tanks which are kept under strict control. Where a fish house is available the breeding can be commenced much earlier than if an outdoor pond only is available. In the first instance a start can be made as early as March, but in the pond little will be possible for perhaps two months later.

The types of tanks and containers were dealt with in the previous article of this series and now the actual methods adopted will be described. The ideal set-up is where the male breeders have been separated from the females for most of the winter. If this has not been done it should be attended to now. The fish should have plenty of room in their tanks and the water must always be in good condition. During February extra care should have been taken with the feeding. The water temperatures can be brought up to from 55° to 60° F. and this will ensure that the fish can eat well and so come into condition. The fish should have been kept fairly cold all the winter before this to ensure that they had a good rest. Where fishes have been kept too warm during the winter months it is sometimes harder to get them to breed well when required. See that garden worms are given every day as long as the fish will take them. Do not overdo it, but two or three small worms per fish each day will be all right. Make sure that no uneaten food remains in the tank, as pollution of water is a danger at this time of the year.

2. Conditioning the Parents, Spawning and Goldfish Eggs

It is not a good plan to try to rush the fish into a very early spawning, as although artificial warmth can be provided there is always the necessity for plenty of daylight, which will be lacking if too early a start is made. Where some form of artificial lighting is possible then a start with breeding can be made fairly early in March, but if no such lighting is available then it is better to wait until the beginning of April before pairing the fish.

When this controlled method of breeding is carried out it is possible to pick out certain pairs of fish and so to breed for certain features which would be almost impossible to do when breeding in a pond. When all is ready for breeding, the male fish should be placed in the spawning tanks. These are best if about 24 in. by 12 in. in surface area, but they need not be more than 9 in. deep. The standard tank (24 in. by 12 in. by 12 in.) can be used and the water lowered to the required depth.

Two methods can be adopted once eggs are obtained. Either the eggs can be left in the spawning tank and the parent fish removed, or the eggs can be removed with the plants to a hatching tank. If the former method is used then plenty of growing water plants should be in the tank. If the latter method then only floating bunches of water plants are necessary. It is even possible to get the fish to spawn on artificial substances such as hemp, bast or shavings.

The male fish can be placed in the spawning tank a few days before spawning is required, and then the when

by A. BOARDER

female fish is added all should go well provided both fish are in good condition. Spawning usually takes place in the early morning and may be all over by 8 a.m. Occasionally it may go on to mid-day and, rarely, for most of the day. A female goldfish of any variety can lay a few thousand eggs, according to the age and size of the fish. One male can expel sufficient milt to fertilise the eggs of hundreds of female fish, and so there is no need to use more than one male to each female. This can be changed when breeding is done in a pond, but in the small confines of the hatching tank it is probable that most of the eggs will be fertilised.

Spawning Habits

The methods of spawning are the same with all varieties of fancy goldfish. The male fish chases the female fish and nudges her and pushes her body about for some time, always trying to get her into the thickest part of the water plants. When the female has been sufficiently encouraged by the male she will splash through the plants, often almost out of the water, and lay a number of eggs. The male, in close attendance, releases his milt (the soft roe), close to the female. In the milt are many thousands of minute spermatozoa, each of which resembles a tiny tadpole. The long flexible tail propels the sperm through the water and it finds an egg, which it enters. Once a few eggs have been laid, provided the male was close by, it is possible that hundreds of sperms will mill around each egg, so that few eggs will escape being fertilised.

The actions of the fish will be repeated many times during the morning until the female has laid most of her eggs. When the spawning is over the fish will probably lie about in an exhausted condition, but watch must be given to make sure that the parent fish do not start to eat the eggs. Some fish are bad ones for eating their eggs, whereas others will not touch them even if left for some time with them. However, where good fancy goldfish are concerned it is silly to take any chances, and even if no eggs are eaten it is almost certain that many of the fry would be if the parent fish were left with them. If the plants with eggs are removed to another tank it will be found that the parent fish may spawn again the following day if fresh plants are provided. It is also possible to remove bunches of plants which appear to be well covered with eggs, and then when a fresh bunch is introduced another bout of spawning will take place.

If it is intended to leave the eggs in the spawning tank the parents must be caught and replaced in their tanks. This method has one disadvantage. When spawning is over there will be many male sperms left in the water. If they do not find an entry into an egg they soon die. Probably within half an hour all will perish. If too many are in a confined space they can turn the water foul. Therefore, the removal of the eggs to a fresh tank can avoid the danger of polluted water. Many forms of mildew or fungus can develop from the dead sperms, and the necessity of ensuring that fresh water only surrounds the eggs is apparent. Some of the water can be siphoned off and fresh added to help keep things sweet.

Some aquarists may not know what an egg looks like and



Photo :

Laurence E. Perkins

The white dots or tubercles on the dark-coloured gill cover of this male shubunkin clearly indicate its sex

so a description now may assist many beginners. The eggs are laid separately, not in a bunch or string. They resemble tiny lumps of transparent jelly, each about as large as a pin's head. When first laid they are smaller, but swell up soon after being laid, no doubt at the same time receiving the male germ. The eggs are adhesive when laid and stick to anything with which they come in contact. They are not very easy to see when in the water but if some plants are lifted out, the eggs show up very distinctly as amber-coloured shining beads of jelly. They are not, as some might imagine, just skins filled with fluid, but are quite firm and fairly solid so that a short time out of the water will not do them any harm. As a matter of fact, provided that they were kept wet all the time they could be transported quite safely.

The parent fish can be given plenty of garden worms after spawning, and they will soon recover and, no doubt, be ready to spawn again in about a month's time. The treatment for the eggs will be dealt with in the next article. The pond-breeding methods will also be discussed later on, but it will be helpful if a few points are now considered as to what will hasten the spawning act and what can go wrong.

Hastening Spawning

In the first place it is most important that the water in the spawning tank should be in perfect condition. It must be clear and sparkling, containing the maximum amount of oxygen. It will be found that few fish can be encouraged to spawn unless the water is well charged with oxygen. Another point is that many fish prefer to have the sun shining on the tank before they will spawn, although this is not always necessary. Most spawning fish like to be able to splash through rather dense plants on or very near the surface of the water. It is natural for them to spawn in shallow water as they know that the eggs are likely to be safer there from large fish, and that the water is more likely to be warmer there.

The temperature of the water is not the most important point to watch, as it is possible to get spawnings in water from 50° to 75° F. However, over very many experiments it has been found that in the lower sixties the fish spawn best. The fact that fewer spawnings are made in the seventies agrees with the statement regarding the amount of oxygen in the water. As is well known, the warmer the water the less

oxygen will it hold. Should the pair of fish show no inclination to spawn, some of the water may be changed. Run in some fresh, colder water very early in the morning, and the fish may commence to spawn. Do not feed the fish whilst they are in the spawning tank as great care must be taken to see that nothing remains in the water which might start any form of pollution. Of course, care must have been taken to see that a true pair of fish have been placed in the tank; the female should show a plump and rounded body, if ready to spawn, and if viewed from above she often will show an increased swelling to one side. The male will be much slimmer than the female and may show the white dots or raised pimples on the gill plates and front fins. If no signs of spawning are apparent it is often a good plan to change the male fish; some pairs seem to agree better than others, although if both fish are in breeding condition there is usually no trouble in getting them to spawn provided the water is in good condition.

Meanwhile, for those who wish to breed their fish in a pond it is essential that the preparing of the breeders should now receive attention. As soon as all wintry conditions appear to have ended, the fish should be brought up into breeding conditions by feeding with garden worms and any other live foods available. Whilst any frosts are about there is little chance of the fish spawning, but it is a good plan to see that all is in readiness for that event. The main provision must be to see that there will be plenty of suitable water plants for the fishes to spawn on. Hornwort is ideal for this purpose, but unfortunately it seems to be a late grower and little is available in the early spring unless it has been possible to grow some under cover. A very good plant for the reception of the eggs is *Elodea canadensis*; this is a fairly rampant grower and has very many small leaves on which the eggs can stick quite well. Watch the weather and as soon as it turns mild make sure that the water is quite pure. If it looks milky or has any odour it will be a good plan to change it so that all is fresh and sweet by the time spawnings can be expected.

The Red-nosed Tetra

HEMIGRAMMUS RHODOSTOMUS is a very attractive little tetra that does not enjoy quite the popularity it deserves, partly because it is scarce and more expensive than other tetras and partly because its major coloration is not constant. Coming from Brazil, it is quite happy at any temperature between 72° and 85° F. It prefers acid (pH 6.8), clear, soft water and a well-planted tank with a good top light. Adult specimens reach two inches but breeding occurs at a size smaller than this. Both sexes are identical externally, although the female will be fuller in breeding condition and sometimes rather larger. They are very active fish indeed and are never scary or behindhand. When food is about they are well to the fore and will eat just about anything. They make good community tank fish but are best kept by themselves, in the same way that platys prefer their own company and conditions. Eggs are laid on fine-leaved plants and are yellowish. However, the fry are not easy to raise so these fish are never cheap. Many aquarists find the eggs tend to fungus so the addition of methylene blue is advisable. *Daphnia* (sifted) are a must if the young are to be brought on. At its best this fish has a blood-red head (like some barbs), an olive-silver side with a yellowish cast (after the style of the lemon tetra) and a yellow-and-black striped tail. Coloured illustrations of this fish overdo its colour effect; it seldom looks quite so showy.

Rodney Yorke

THE AQUARIST

Community Aquaria

by JACK HEMS

THE beginner or newcomer to the tropical fish-keeping hobby is almost always fascinated by a community tank housing a collection of brightly coloured fishes—and this fascination is made even more certain if the tank is artistically rather than naturally furnished with a variety of aquatic plants which please the eye and offer an excellent setting for the darting, dazzling denizens of this small underwater world.

But the proper setting up of a community tank is not so easy as may appear at first glance to the uninitiated fish-keeper. For so many things have to be taken into account during its planning, such as the temperaments of the fishes to be kept in it, and the best plants to use to create the most charming and lasting effects.

Some plants grow much too quickly and too rampantly for their inclusion in the decorative aquarium, whereas others will not grow at all unless the aquarist is prepared to flood the aquarium with bright artificial lighting throughout the whole of the winter months.

Even the sort of rockwork and compost used has to be

Peat is of inestimable value in the setting up of an aquarium. For water strained through a thick layer of peat will be made less alkaline; a thin layer of peat on the floor of the aquarium (before the two or three inches' thick carpet of sand is added) will do a lot towards promoting a healthy growth of plants and a happy-looking family of fishes.

To reiterate what has been said above on the subject of choosing plant life, the plants for a decorative aquarium should be slow-growing rather than fast-growing, and adaptable enough in the aquarium to flourish throughout the winter months (that is, in the naturally lit aquarium given two or three hours of overhead electric light every night) without going into a sudden decline about the middle of December.

The dozen or so different species of *Cryptocoryne* are well worth thinking about for filling every planting position in the tropical aquarium. For we have in the *Cryptocoryne* almost every shade of green, and through green to olive and olivaceous-red. And the *Cryptocoryne* vary as much in appearance and size as they vary in colour. Some of them,

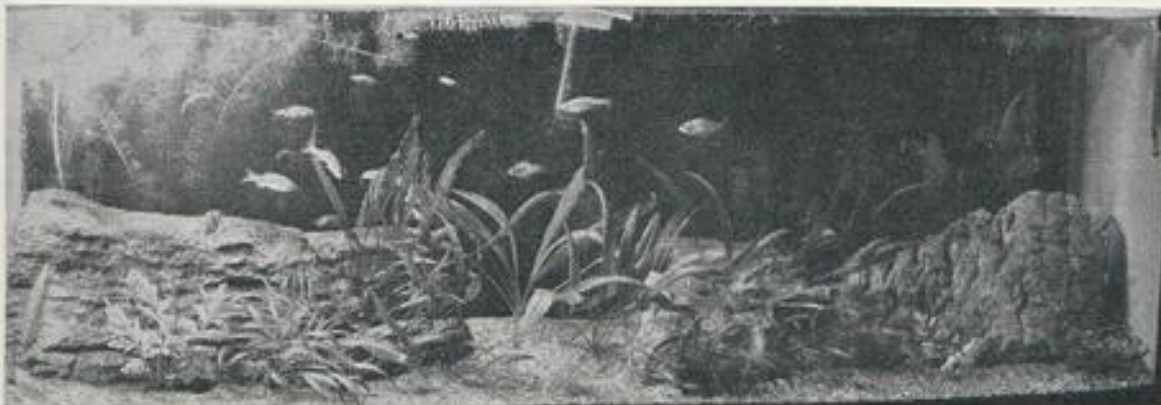


Photo:

A. C. Tom

given careful thought and attention, for while bird sand, pigeon grit, silver sand and so forth may appeal to the beginner as a most attractive floor covering for the decorative community aquarium, these grits or sands usually contain a fair sprinkling of crushed oyster shell, limestone chippings or similar calcareous fragments which soon produce a highly alkaline reaction in the water; and very few fishes or plants will flourish in such an environment for long. And while touching on the question of sand, the beginner is warned right away against using bright-yellow builder's sand to layer the bottom of his aquarium. This sand usually contains a lot of clay and other undesirable material, and cannot be washed really clean however much it is stirred up under running water; so always buy the bagged aquarium compost as sold by all reputable dealers.

But to return to rockwork. This must not be of a sort that will crumble away in the water, or, like a calcareous compost, give rise to excessive alkalinity as will lumps of marble, broken slabs of concrete paving, old bricks and the like. If, in the considered opinion of the aquarium owner, a rocky background is necessary to improve the appearance of the layout, then please use well-washed coal, granite in all its infinite variety, large smooth-edged flints, slabs of slate, tufa or Westmoreland stone rather than anything else which may come to hand in the garden or during a country walk.

such as *C. beckettii*, never grow much more than three inches tall, and so are admirably suited to growing round the base of rockwork or the crowns of taller-growing plants, whereas others, such as *C. griffithii*, will produce broad leaves on substantial stems which measured together may equal 10 to 15 inches in length.

The *Cryptocoryne* are slow growers and, generally speaking, do not need bright artificial light to make up for the lack of tropical sunshine. In fact, all the *Cryptocoryne* flourish best in partial shade.

But as the planting of a tank with species of *Cryptocoryne* alone might prove too costly for the average aquarium enthusiast, then the spaces along the back and two ends are best filled by planting staggered rows of *Sagittaria natans* or *S. lorata*.

If the aquarium is brightly lit all the year round, *Vallisneria* or *Linnophila* (*Ambulia*) may be used with every confidence of their prospering in their surroundings. As the aquarist gets to know his aquarium, and the requirements of the plants, then other gems of underwater plant life may be introduced to provide greater variety and interest.

Although a lot of plants in the aquarium helps to keep the water clear, and the fishes in fine fettle, the beginner must guard against overplanting a tank. Always leave plenty of space along the front of the aquarium so that the fishes can

obtain proper exercise without obstruction, for tangle of plant life is ideal for breeding the species, it is far from ideal if the object of aquarium is to add distinction to a room after a relaxation after a day's work (or a surfeit of television).

And now for the fishes. It is very easy to keep a number of brightly coloured fishes in a dealer's shop and think what a thrilling sight they will make when you have them swimming to and fro in your own aquarium to pick out a fish is not the wisest way to achieve the best results. Buy your fishes for their behaviour rather than the way they look. For there is no sense in buying a fish that is cowed by fin-nipping propensities or adults. Choose fish that are hardy and disfigurement of other fish. Another thing, the ideal community tank is one in which every layer of water: that is to say, movement is insatiable bottom as well as close to the surface; and fishes other species, away most of the day are not among the choicest movement community specimens.

Although a few fishes seen swimming in a 18 inch which hide by 12 in. aquarium will make a good show, the best of course is in larger tanks, say, in tanks holding upward of 218 in. by 12 in. water.

Among the fishes guaranteed not to make life miserable

Three Reasons for Sudden Mortalities in Marine Tanks

TO keep most marine animals healthy and fit is very difficult, and to keep some is impossible with our present knowledge. It is true that if you say 48 in. by 18 in., by 18 in., is set up with rocks and few small dabs, an anemone or two and a couple of whiting, and if brisk aeration is supplied, then the animals will survive for some time. Depending on the conditions and sand, animals present and their species, sooner or later a disaster will occur. If a piece of ragworm is left uneaten; animals may then within 48 hours the whole tank smells and a number of gasp and die. A striking thing is the speed with which conditions deteriorate and become lethal. Also it is noticeable that small wounds and abrasions that in themselves are trifling, quickly kill the fishes in a tank. Any sudden change in the amount of food eaten at a meal may also cause disaster.

From the foregoing considerations it seems reasonable to suppose that while the animals in the marine tank are alive they are living under very adverse conditions, since such small changes can affect them so deeply and so quickly. Further, even if things have been going well for a month or six weeks a sudden mass mortality will often occur, which at first sight is unaccountable. Let us consider in what way the marine aquarium differs from a fish's normal habitat, say the seashore.

Effects of Increased Surface

First, in the tank a far greater surface area is presented to the sea water than in the sea, where the only surfaces are the sea bed and the surface proper. In the aquarium we have the sand corresponding to the sea bed, and the surface, but also the four containing walls of the aquarium. This is a clue to the sudden mortalities and difficulties encountered. It is an important fact to bear in mind that nearly all marine bacteria are epiphytic in habit. Hence in presenting them in the aquarium with five surfaces on which to settle, we provide ample living space. However, this is not all, since the glass walls act chemically with the sea water and large organic molecules are absorbed on to their surfaces.

These two factors combined provide ideal conditions for bacterial growth and the whole of the exposed surfaces are

for their companions are the following: the neon tetra, the pristella, the harlequin fish, the platy, the zebra fish, the glowlight tetra, the giant danio, the half-striped barbel and its golden variation (*B. schuberti*), and the *Gorydoras* catfish.

All the above are active species and every part of the aquarium will be filled with movement. As a rule, the giant danios, zebra fish and platys haunt the upper layers of water, while the neon tetras, harlequin fish, glowlight tetras, half-striped barbel and pristella keep to the middle and bottom layers of water. The *Gorydoras* catfish shuffle over the floor in an almost constant search for food. Young angel fish make a valuable addition to the community tank, but as they grow to a large size if given plenty of food and plenty of swimming space they often develop into bullies and become a menace to smaller fishes in the tank. So the aquarist who includes them in his collection must keep an eye on their behaviour.

When it comes to deciding how many of each kind of fish to buy, always go in for several pairs of zebra fish, neon tetras and glowlight tetras, for these fishes always swim with their own kind in a school or small shoal, and no words can describe their decorative charms when they are seen flashing over the top of rockwork or through a lovely green thicket of water plants.

by P. SCHOLDS, B.A.

quickly covered deep with bacteria. The metabolism of these settled millions is considerable, and the amount of oxygen used and carbon dioxide given off is appreciable. The other metabolites released, and their amounts, are not well known, but it is probably these compounds which so condition the water that various planktonic types such as medusae or arrow worms are immediately killed or linger but a short while.

From this first difference in tank water comes a train of ills. Any left-over piece of food gives a quick boost to the already high bacterial population, and the sudden depletion of oxygen and increase in carbon dioxide can become acute. Locally, hydrogen sulphide may be formed, and this is lethal in very small amounts. The initial high population is responsible for the suddenness with which things go wrong. When fishes are added to the tank their excreta provides a rich source of food for the continued development of large bacterial growths settled on the sand and on the glass. Let us consider secondly the direct effect of the animals present on the tank water.

Fishes and other animals respire, and produce carbon dioxide and absorb oxygen from the surrounding medium. If the amount of carbon dioxide present in the water is high, then the absorption of oxygen is inhibited and the amount absorbed is lessened. To meet its oxygen (O_2) requirements in conditions such as this the fish must breathe faster and re-oxygenate its blood passing through the gills at a quicker rate. This adaptation to environment is limited, and if the carbon dioxide (CO_2) content continues to rise then, at some stage dependent on species, the gaseous

exchange can no longer take place at the gill filaments. No O_2 can be absorbed and no CO_2 released, and the fish is asphyxiated. Before this happens, however, the fish shows obvious signs of distress. Animals' toleration of CO_2 is varied. In freshwater fishes, such as the carp, the CO_2 content of the water can be very high, but O_2 can still be absorbed and more CO_2 given off into the water. Most marine fishes cannot tolerate high levels of CO_2 in the water.

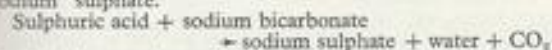
Dissolved CO_2 is negligible in the sea, since although it is all the time produced by animals present, it is continually dispersed into vast amounts of more or less virgin water. Its concentration never builds up. Even locally on the sea bed, for instance, where bacteria may be very active, or in a patch of zooplankton, the CO_2 content never amounts to more than a fraction above that normally present in the sea. In the marine aquarium the water is soon polluted with CO_2 from fishes, other animals and bacteria.

Carbon Dioxide Accumulation

In itself this would not matter if the CO_2 could be eliminated quickly to the atmosphere. However, CO_2 is very soluble and diffuses out into the atmosphere very slowly. The greater the difference in concentration between the CO_2 in the water and the CO_2 of the air, then the quicker can diffusion take place from one to the other. In the aquarium a system is quickly set up whereby the production of CO_2 by the animals present equals the rate at which it diffuses out into the atmosphere. In the tank the concentration of CO_2 has to build up to a high level before its rate of diffusion into the atmosphere is fast enough to balance the rate of production in the tank. This high solubility of CO_2 and slow loss to the air results in the build-up of CO_2 to as much as 10 times the level found in the sea, even with brisk aeration. Again merely this high concentration of CO_2 makes the marine tank lethal to some species.

These two hazards which the animals have to overcome are short-term, immediate things, but also there is a long-term change which can be just as disastrous.

When very few animals are present and the tank is briskly aerated the amount of dissolved CO_2 is lower and the animals seem to settle down, and all goes well for a time. Suddenly again we are faced with a mass mortality. This may be due to the following reasons, and brings us to our third point in which the sea water in the tank differs from that in the sea. The waste products of animals voided into the tank are often acid in nature. These various acids react with the alkalis present in sea water, thereby themselves becoming neutralised. Sea water is naturally alkaline, with a pH value of 8.0-8.3, and such alkalinity is due mainly to bicarbonates, carbonates and borates present in small amounts. When the alkalis and acids react they form salts and water. As an example consider sulphuric acid, which may be produced by animals in small amounts as the result of the breakdown of sulphur-containing proteins taken in as food. It reacts with sodium bicarbonate to give sodium sulphate.



Such acids are only produced in minute amounts, but acting over a long time they gradually deplete the excess of alkali content of the water.

Increased Acidity

The CO_2 content, excess of alkali and pH are interrelated. Increase in CO_2 content decreases the pH value (i.e., increases acidity) but this effect is damped by the action of the excess of alkali. It acts as a "buffer." If no excess of alkali is present then a slight increase in CO_2 results in a marked decrease in pH value. Where all the alkali in the sea water has been turned into various salts any slight increase in CO_2 affects the pH value. The sea water is no longer buffered. All marine animals are adapted to live at

a pH value of from 8.0 to 8.3. Depending on species, many sea-shore creatures can tolerate slow changes from 8.0 to 7.3. Many die at 7.8 but some can survive as low as 7.2-7.3. However, when conditions become acid (below pH 7.0), then all of them die. With the high content of CO_2 already present in the tank and the sea water now no longer buffered the pH value can easily fall to below 7 and the typical sudden mortality occur.

What can be done to improve the living conditions in a marine tank? The presence of a high bacterial population is inherent in the tanks set up and is unavoidable. However, if animals are fed sparingly and all obvious excreta taken out of the tank their numbers may be kept constant. The high CO_2 content of the water can be eliminated by a circulatory system incorporating a "scrubbing tower" with baffle plates and thus ensuring the most efficient aeration. As water slowly trickles over the baffle plates air is passed over them in a stream and the large surface area presented facilitates the diffusion of CO_2 from the water. If seaweeds such as *Enteromorpha intestinalis* and *Ulva lactuca*, the sea lettuce, can be induced to grow, they may act beneficially not only in removing CO_2 but also by absorbing many nitrates and phosphates which accumulate in the tank water. The bicarbonate depletion can be made good by daily additions once the rate of depletion is known. To find this rate one needs to carry out a series of chemical estimations (titrations) over a period of time. The amount of sodium bicarbonate to be added can then be calculated.

Limitations in Marine Aquarium-keeping

All in all such precautions are elaborate and are not for the average enthusiast. Usually marine aquarists live by the sea and are content to change the water in their tanks frequently. They are not ambitious about the number of animals they keep, knowing that one anemone kept as happy in a tank as it is on the piles of the pier is worth a tankful of fishes dying by degrees.

With brisk aeration and frequent water changes many shore animals can be kept happily and well, but despite the writings of certain eminent Victorian gentlemen the aquarist living inland who decides to try his hand at a marine tank is almost certainly doomed to disappointment. In this article I have tried to point out three of the commonest reasons for failure. There are, believe me, many more.

Cacti in the Fish House

IT is possible to raise many flowering types of cacti from seed, and some plants can be brought into flower the year after sowing. Such kinds are *Mammillaria wildii*, *M. bocasana*, *M. tricacantha*, *M. picta*, *M. scheideana* and *M. longiflora*. Many kinds can be flowered in two years and include *Rebutia minuscula*, *R. senilis* and *R. villiciflora*. Seed can be sown on John Innes seed compost in pans. The small seeds can be left uncovered but larger ones can be covered by their own thickness of soil only. The pan should be well damped, shaded and placed in a warm position. The top of a tropical tank is quite a good site. Strong sunshine must be kept from the seedlings once they appear, but some light is essential. Seedlings can be pricked out to an inch apart when the cotyledon has disappeared or if they appear overcrowded. The soil into which they are pricked out can be John Innes seed compost to which has been added (to each bushel), three-quarters of an ounce of sulphate of potash and an ounce and a half of hoof and horn grit.

Microscopy for the Aquarist—28 by C. E. C. COLE

THIS month we go a step further in our endeavours to secure as near-perfect illumination as possible with the apparatus at our disposal. Once more you are asked to set up your microscope and follow this article paragraph by paragraph, to see for yourselves exactly what occurs when the directions are followed—or ignored.

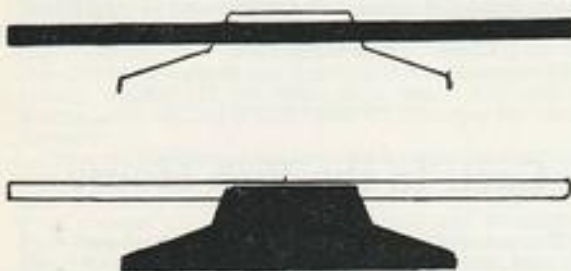
We shall need a prepared slide of an object for this session as these are easier to use than living objects. Select one which shows marked contrast between one small area and another. Many preparations of small aquatic creatures or chitinous parts of larger aquatic animals are eminently suitable for our present purposes. Do not place it upon the stage immediately, but have the slide ready to hand.

Tilt the microscope body forward to your most comfortable viewing angle. It pays to be comfortable, for experimental sessions are likely to be prolonged, and nothing weakens interest sooner than a crick in the neck or a slipping disc in the spine.

Condenser Position

As described last month, place the lamp about eight or nine inches from the stage of the microscope, switch on the light, and carry out the operation of getting its image in the centre of the field of view. Should the objective be the same as that used during the last period, little or no difficulty will be experienced. If it has been changed, however, some adjustment of condenser will almost certainly be necessary, for it is rare indeed to find two objectives on a revolving nosepiece which are equally centred when in the working position.

The condenser, you remember, was left racked up, so that its upper surface is still on a level with the upper surface of the microscope stage. Check that this is so, and that it has not in fact been racked up too far, by placing the eye at right angles to, and level with, the stage. Any projection of the condenser above the stage level will immediately be apparent (see diagram).



In the top sectional view the condenser is too high and projects above the stage (horizontal line). Below it is shown the best position for the condenser for preliminary work.

Rack the body tube well up above the stage, dust off the condenser upper lens, and rack down so that it is the merest fraction of an inch below the upper surface of the stage.

Now pick up the slide, dust its upper and lower surfaces, and place it carefully in position on the stage. The condenser is so near the lower surface of the slide that any gritty dust left upon it might well damage the lens surface. It pays to be careful, as carelessness will soon demonstrate.

With the eyes once more level with the stage, lower the body tube until the objective, in the ready position, is just clear of the slide we intend to examine. A piece of white paper held on the further side of the stage will show as a

thin white line between objective and stage. Slowly, with the coarse-adjustment wheels, rack up from the stage, with eye carefully watching through the eyepiece.

What appeared as a vague-coloured patch now begins to resolve itself into a portion of the slide. It becomes plainer and plainer, moving to neither left nor right, neither up nor down, just becoming clearer and clearer. Suddenly it is startlingly clear and then begins to deteriorate. We have passed through the focusing plane. A slight downward movement of the objective will bring it once more into sharp focus. Close the iris diaphragm of the lamp housing. The outline of the lamp opening will appear just inside the field of view.

Is it a sharp or vague outline? It should be sharp! In the absence of a specific mark on an opal lamp this is the nearest focusable point to the source of light. If this outline is the same diameter as the field of view it restricts the size of the cone of light entering the objective to that of the field of view, and almost entirely eliminates the possibility of reflections from objects or dust outside the field of view, which, as we have seen, can seriously impair the clarity of the image of the section of the object which is being examined.

Obtaining a Sharp Image

If it is a sharp outline, all is well and good. If not, we have to make it sharp. This is done by manipulating the condenser. So we have two things to do: after centring the sub-stage condenser we focus the object with the objective and then the light source upon the object by moving the condenser slowly up or down. It may happen that, with some slides, the top of the condenser touches their undersides while the iris outline is still vague. This is an indication that the particular slides are too thick: the objects are more than the proper distance above the upper lens of the condenser. There is no alternative in such cases but to attempt to lengthen the focus of the condenser by bringing the lamp nearer. Lengthening the focus lessens the numerical aperture of the condenser, and reduces its effectiveness.

Such slides were probably never intended by their makers to be subjected to high-power objective examination, and if we use our highest powers on them it will be generally found that the objects are of considerable thickness and we need all our skill in translating what we see into mental pictures of the whole objects.

While we have our apparatus set up, let us see what difference it makes if we do not do as we are supposed to. Use a 1 in. objective and a contrasty slide: for example, one of the spiracles of a water beetle, such as *Dytiscus marginalis*.

The light source, if it is one of the recommended microscope lamps, will be completely inadequate to fill the whole of the field of view brilliantly when we use a condenser. Don't worry about this; the opening of the lamp housing will appear as a circle of light and should be brought into the centre of the field of view by using the centring technique already described.

Focus the spiracle, taking no notice of the condenser setting. Can you make out the details to your satisfaction? Or is there something wrong—a dirty objective, perhaps, or dusty slide? Haven't you seen it clearer than it appears at present? Vaguely there's something wrong—perhaps your eyes are not good to-day!

Now ignore the object and concentrate upon the image of the light source. Slowly rack up the condenser, watching the image the whole time. It becomes sharper and sharper

(Please turn to page 270)

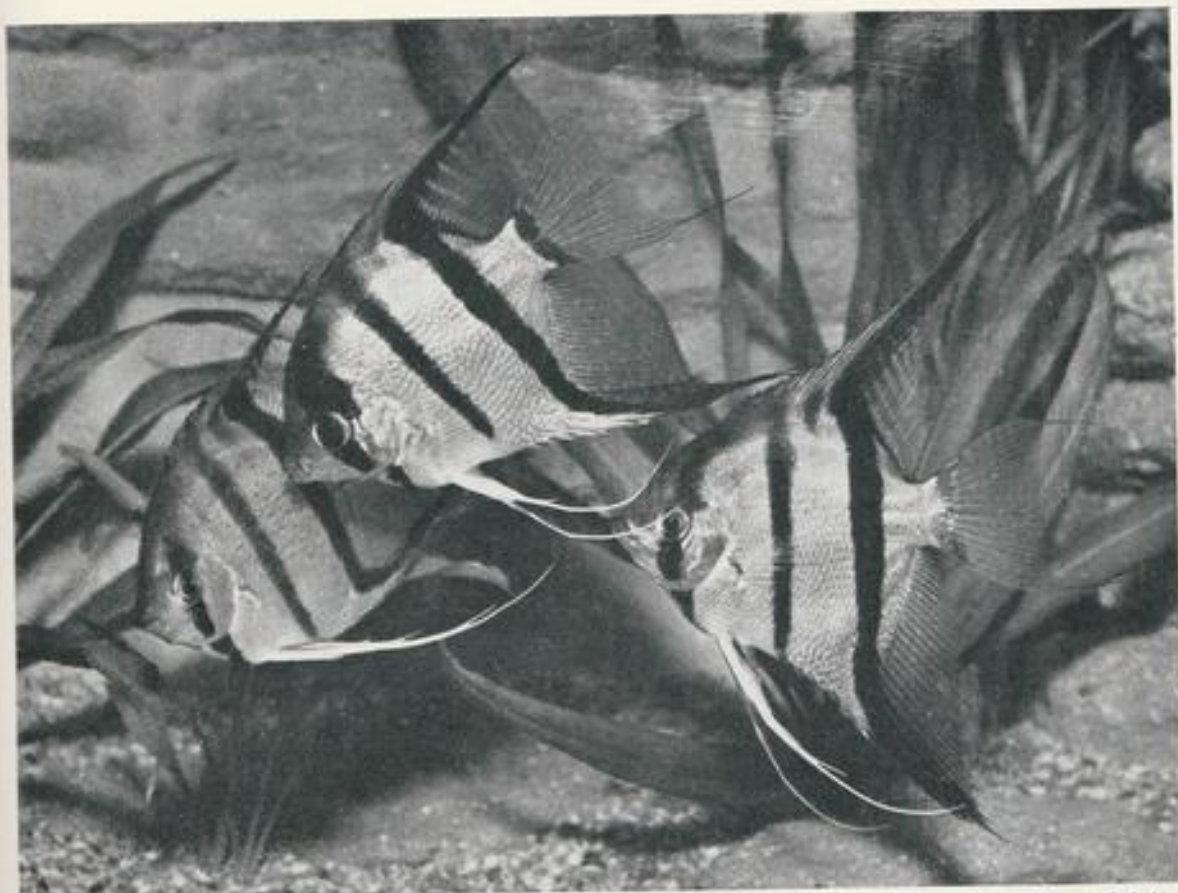


Photo:

Laurence E. Perkins

Breeding the Angel Fish

by IVOR W. BRASSINGTON

EACH breeder appears to develop his own technique for breeding any particular variety of fish, and often will attribute his success to all sorts of minor points in his method, which may or may not make an appreciable difference. Nevertheless, there are a few basic rules which should lead to eventual success.

In the first place the potential parents must be fed regularly with a variety of live food for a week or two, to build them up and bring them into spawning condition. With a great many species it is essential to have several of both sexes together during this period in order to watch for "pairing off," and so to make sure that you have a pair which will mate when the time comes.

While this is going on a spare tank should be prepared, first making sure that it is scrupulously clean, for angel fish (*Pterophyllum eimekei*) are most particular in this respect.

A depth of 7 or 8 in. of water is sufficient. Put into it a heater, thermostat and thermometer. The heater should be placed well away from the thermostat and the latter set at a minimum of 78° and a maximum of about 82° F. If the thermostat is an outside-fitting type, make sure that it is fitted below water level. The thermometer, too, should be placed well away from the heater.

Something must be provided upon which the fish can lay their eggs. I use a large-leaved plant such as an Amazon sword, which may be planted in the base of a broken plant pot, in sifted peat, with a layer of aquarium sand or gravel on top, to prevent the peat from escaping into the water. For the same reason, the hole in the base of the pot should be covered with one or two pieces of broken crock before the peat is put in. The eggs are slightly adhesive and will stick to the leaves of the plant.

It is possible that, after spawning, the parents may eat some of the young and for this reason we may consider it wise to net and remove the parents, but this also presents a difficulty because the water around the eggs must be kept constantly in motion or they may develop a fungus and fail to hatch. Normally the parents provide this circulation of the water, by fanning the eggs with their large fins. The

best way is to watch them closely and, if they show any signs of cannibalism, to remove them to another tank and use an aerator in the breeding tank, which will keep the water moving sufficiently to prevent the spread of fungus.

When all is ready, put the male and female together in the breeding tank. Here I would stress the importance of dealing very gently with angels, when netting. They are extremely nervous fish, and clumsy, darting movements with the net, during the transfer, may upset them for a considerable time.

If they are in good breeding condition, there should not be long to wait. They will first of all decide where the eggs are to be laid, and the chosen spot will be carefully cleaned over, perhaps, a period of two days. The female will then lay her eggs in batches, perhaps 10 or more at a time, and the male will be close by to fertilise them immediately.

The parents will begin fanning the eggs, which should take about five or six days to hatch. During this time the parents must be fed very discreetly, making sure that no uneaten particles are allowed to remain on the bottom.

Feeding the Fry

Another possible cause of the development of fungus on the eggs is an excess of light, so use (about) a 25 w bulb on this tank. After about seven or eight days the fry will be free-swimming and feeding will begin. First of all they will need very small food such as Infusoria, which should be used on the principle of little and often, so that the water does not become foul.

Infusorians are microscopic animals which may be obtained by filling a jar with aquarium water and adding a few crushed lettuce leaves. Keep the jar in a warm, dark place for about four or five days, when the presence of these minute creatures may be detected as a milky cloud in the water and may be fed to the fry at about half a teaspoonful every few hours—depending on the number of fry present.

By this time the parents will be tired and probably losing interest in the fry, so they should be removed. After about the tenth day the fry will be large enough to eat small *Daphnia* (water fleas), which should be screened specially for them, and from then on they will progress rapidly, soon taking micro worms and ordinary-sized *Daphnia*.

Microscopy for the Aquarist—28

(continued from page 268)

until it is in focus. Now look again at the spiracle. It is as though a veil obscuring a lot of detail has been torn away. It wasn't dirt, bad eyes or anything else, it was an incorrect setting of the condenser which obscured and clouded the image.

To satisfy yourself finally that this was so, slowly rack down the condenser again without touching anything else and note the instantaneous deterioration in the amount revealed.

We will continue from here, in my next article.

Springtails in the Aquarium

For about three months we have observed in our tropical fish tank, which has had a fair amount of floating fern and duckweed on the surface, a number of very small creatures which live on the surface. When the cover is removed they jump about to a height of 5-6 in. They do not appear to be on the increase but there are always quite a number of them, nor do they seem to grow any bigger. We can find no account of any creature like them in any of our reference books. They are about the size of the point of a blunt pin. We cannot be sure that they are eaten by the fish but think we have seen this on several occasions. We should like very much to know what they are.

There is no doubt at all from your description and drawing that the little creature that has appeared upon the surface of your tropical fish tank is a species of *Collembola*, a springtail. These are equipped with a unique apparatus which is usually held folded closely to the underside of the abdomen by a fleshy projection. When desirous of moving in a hurry—as when the cover glass of the aquarium is lifted or a fish comes too close—the tail-like process smacks down on to the surface of the water or plant upon which the creature is walking or resting and hurls it into the air. There seems to be some control over the direction in which the spring is made and the method of landing in a fresh spot. Little is known of the feeding habits of *Collembola*; it is thought to be a plant parasite. My personal belief is that it moves far too quickly to be eaten by fishes. Possibly dead ones floating on the water are eaten, but I have no evidence to support or refute this suggestion.

FRIENDS & FOES No. 54

COLEOPTERA

FAMILY Dytiscidae

THE aquarist, particularly if he has an outdoor pool or indulges in pond-hunting for live food, will not go many days before he encounters one or more species of this very large family, comprising, as it does, over one hundred members. All members are carnivorous both as larvae and adults, both of which stages are lived under water.

The name *Dytiscus* or *Dytiscus* means, roughly, able to dive, and anyone who has seen these creatures leave the surface of a pond to reach the bottom will not doubt its aptness.

Not all members of the family are as large as *Dytiscus marginalis*, which is almost an inch and a quarter in length, and is the most easily found.

In this species the male is easily distinguished from the female by the presence on his first pair of legs of circular suckers which are normally used to clasp the female during copulation. In a jar, however, he frequently presses them against the glass sides to keep himself from slipping. They make interesting subjects for study under the microscope. The second and third pairs of legs are furnished with swimming hairs.

Water Beetles (continued)



View of upper surface of the water beetle *Dytiscus*. Head and body only are shown, about natural size

Like all members of the family it cannot remain indefinitely much below the surface of the water. It is forced to return periodically to replenish its store of atmospheric air. This it does by extruding the end of its abdomen through the meniscus and drawing air under the elytra. A bubble of air remains at its abdominal extremity. The air is absorbed through a number of spiracles on the sides of the abdominal segments.

The female *Dytiscus* places single eggs in plant tissues under water in spring, and from these hatch most ferocious larvae, about which we will talk next month.

C. E. C. Cole

In the Water Garden in MARCH by ASTILBES

THE month of March may still bring wintry conditions, and few will forget the March of 1955, when it snowed almost every day. Severe frosts may occur at any time during this month and so the garden pond is not likely to be in any condition for any attempts at re-planting or dividing. April is the best month for this procedure, so this job can be delayed for a few weeks. There is plenty that can be done though to improve the surrounds of the pond. Many fine plants can be raised from seed with little trouble and far less expense than if plants are purchased.

All the plants which could be raised from one packet of seed would be far too many for the average pond gardener, but there is no need to sow the whole packet. If only a few seeds are sown they have a better chance, and it is possible to get stronger plants by sowing thinly. The remaining seeds can be saved for another year. Most seeds will keep for at least a year or two as long as they are not exposed to strong sunlight, damp and air-tight conditions. March is too early to sow the seeds out of doors, but if one can make a small frame it is possible to raise many seed pans of plantlets with little expense. Even a leaky, discarded fish tank can be utilised, and tropical tank heaters can be used to warm the frame. It is surprising how little extra warmth is needed to keep a propagating frame at a temperature of about 70° F., if it is well made and fairly draught free.

A Simple Frame

A wooden box with a small-wattage electric lamp can also be adapted for this purpose. If a tank heater is used it should be housed in wet sand at the base with peat above it. The seed pans can then be partially embedded in the peat. Seeds will soon germinate in such a frame. An aquarist with tropical tanks will find that most seeds will germinate well if the container stands on the cover glass of the tank.

It is advisable to use John Innes Seed Compost which has been obtained from a reliable seedsman. It can be made up at home but for a small quantity it hardly pays for the trouble, and it is only when at least half a bushel is required that it is worth while making the compost up oneself. The compost should be placed in a well-drained pan and the seed sown on top fairly thinly. Only the slightest covering must be given, for if the seeds are buried too deeply they may not germinate. Press the top level and then damp well. It is a good plan to place the seed pan in a container of very warm water, enough being placed in the container so that the seed pan can absorb all of it. It may take a few hours to get thoroughly wetted all through. The pan can then be placed in the propagating frame with a piece of glass on top to conserve the moisture whilst germination is taking place. The glass should also be shaded with brown paper until some of the seeds are up. Keep at a temperature of about 70° F., and the seeds should soon be showing. It is imperative that the paper is removed as soon as any seedlings appear; if not they will become very leggy and weak.

Whilst germination is taking place it is essential to see that the soil never dries out completely. On the other hand the pan must not be over-watered. When the seedlings are large enough to handle they should be pricked out into boxes or large pans. The soil into which these go should contain a little more nourishment than is found in the seed compost. If any of the latter is still on hand this can be made suitable by the addition of a little sulphate of potash and hoof and horn grist. The amount should only be $\frac{1}{2}$ oz. of the former and $1\frac{1}{2}$ oz. of the latter to each bushel,



Photo :

Laurence E. Perkins

and so it can be realised how little is necessary for a small amount of soil.

The seedlings can still have some warmth but more air is essential to prevent any damping off, a disease known as "black leg," which attacks young seedlings, especially those in damp and airless conditions. By the time the warmer weather arrives the seedlings will be large enough to be planted out into their flowering quarters. See that they are gradually hardened off before doing this. When planting out most pond-side subjects see that no other plants have their roots in the spot as these will prevent the fresh plantlets from becoming established.

Now for a short list of some of the plants which are suitable and can be easily grown under the above conditions. I consider that many of the *Primula* are ideal for the purpose, and they are more happy in a damp position than many plants. Be careful that you buy the hardy varieties, as many are for greenhouse culture only. The following are quite suitable: *Primula bulleniana* hybrids, in a fine range of colours, purple, mauve, rose and cream, about two feet high and in flower June and July; *P. denticulata*, a fine one with balls of flowers in lilac, 18 inches high and in flower April to June; *P. florindae*, a taller subject with sulphur-yellow flowers, quite three to four feet high if well grown; *P. japonica* in mixed colours (these flowers grow in tiers, a fresh stem of flowers appearing from the centre of a flower), most colours are found in this strain and they are about 18 inches high; *P. pulverulenta*, with tiers similar to the above but in shades of rose, pink and blush, very showy and reaching about two feet in height; *P. sikkimensis*, a pale yellow, sweetly scented but not reaching more than 12 inches.

From the above some fine flowering plants may be chosen, although many will not flower the first year of sowing. Another very handsome water-side plant is the *Mimulus*, as this plant has been improved out of all recognition from the ordinary yellow musk of long ago. *Mimulus* Red Emperor is a splendid variety with a compact growth and crimson-scarlet flowers, continuing to bloom over a long period; also *M. Queen's Prize* strain, with heavily marked large flowers, and *M. moschatus* with small yellow flowers. All these grow to about a foot in height, and they delight in a damp position.

(Continued at foot of next page)

Causes of Failures with Tropicals by AQUARIUS

MOST failures are due to some neglect or wrongful action on the part of the aquarist. Many fail to exercise the most elementary common sense when dealing with the fish. I consider the fault which is most commonly committed in the earliest stages is that of trying to set up a new tank with compost, plants and fishes in a single day. It is quite impossible to do this and have the plants in such a state of growth that they are able to do their work correctly. Time must be allowed for them to get properly established before any fishes are added. If only aquarists would have the patience to wait until the plants are showing signs of fresh growth before adding the fishes it is certain that fewer losses and troubles would be experienced.

The next bad fault is the overfeeding as soon as the fishes are put into the tank. They cannot be expected to start to feed in their normal manner as soon as they are introduced to the tank; wait until they appear to be searching around for food and sucking at the leaves of the plants, the sides of the tank and the compost. When feeding is commenced do not give too much at a time. Provided the water is in a healthy condition, that is containing plenty of oxygen, the fishes can eat at frequent intervals during the day. This is because being in warm water their whole metabolism works at a fairly rapid pace, ensuring that the food taken in can be digested in a fairly short space of time. Food taken in by tropical fishes can be digested and used within a matter of a few hours, and so the need for more frequent feeding than would be the case with coldwater fishes will be apparent.

A well-run tank should have feeding attention at least three times a day, morning, noon and evening, with a sufficient amount of food each time. Try to learn just how much food is cleared up in a few minutes. Give the fishes a little time to chew over and swallow their food; do not expect them to be able to take in all they require at one go. If live food can be obtained it can be given for one feed each day. Do not feed the majority of tropical fishes on live food only, for they are better with a basic feed of dried foods, with the occasional feed with live foods. Where only live foods are used there might be trouble with the health of the fishes if the live-food supply ran out and the fishes were suddenly faced with a dried food they had not seen before. There are a number of fishes which will eat only live foods and, of course, they must have this as a main diet. Some of the carnivorous species can be encouraged to take some forms of still foods such as dried shrimp, dried *Daphnia*, strips of meat and liver.

The next bad fault is overcrowding. It is a fact that most beginners feel that they must crowd into the tank as many and as varied types of fishes as they can get hold of, irrespective of whether the tank is overcrowded or not. This reasoning is difficult to understand. A few fishes in a tank look better and are much easier to keep healthy than too many. Also it is so much cheaper to make a start. Instead of this the budding aquarist puts in as many species as possible, and he does not find out first whether the types are suitable for one another.

Many consider that as long as an aerator is provided, swarms of fishes can be successfully kept. This is not so. It may provide sufficient oxygen to keep them alive but they will not thrive. Before long some of them appear to be failing; they start to get thin and lose their bright colours. All the aeration possible will not keep fishes healthy if they are in an overcrowded condition. Do not lose sight of the fact that where the fishes are in good health they will soon grow to an adult size and may breed. The increase in size and numbers may not be apparent until some of the fishes start to fail. Always check up on the adult sizes of fishes for the tank.

Another fault with older-established tanks is that the water becomes stale or impure. The weekly servicing can ensure that the water is kept in pure conditions as long as some of it is changed whilst servicing. The old idea of straining the water and returning it to the tank can be a dangerous one. The failure of some fishes in old established tanks can be due to the fact that the water has become charged with minerals or salts to a harmful extent. Signs of this may be in the falling off in condition of some of the fishes, and a change of most of the water will often bring an improvement in their condition. When changing some of the water make sure that it is of the same temperature as that of the tank, and if either acid or alkaline water has been used see that it has about the same pH value.

Should any fish appear off colour do not start to dose the whole tank. Any ailing fish should be removed immediately from the community tank for treatment elsewhere. Also do not pour in several kinds of supposed cures, especially if you do not know what the trouble is. Many aquarists see a fish a bit queer and then add salt and permanganate of potash to the water regardless of what it is supposed to cure. Certain chemicals can cure certain diseases and troubles, but do try to make sure first from what the fish is suffering, and then only treat that one fish, not the contents of the tank. Remember that if salt is added to a tank it usually remains there and if more is added at a later date the concentration may become dangerous. Do not forget that some types of food can contain some salt and so the salt content of the water can be altered considerably just by feeding. Types of such foods are dried shrimp, brine shrimps and some packet foods.

However, the weekly servicing should take care of most of these troubles as long as the water removed when siphoning is thrown away and fresh is added. When taking fresh water from the tap make sure that it is exposed to the air for a time to ensure that most of the chlorine passes into the air; strongly chlorinated water can kill fry.

When exhibiting your fishes see that you are aware of the requisite sizes for the species; small fishes stand little chance against fully grown ones. For instance, a tiger barb needs to be about two inches long, and a scissor-tail can grow to seven or eight inches long, although three inches is not a bad size for an aquarium fish. The Show Standards for tropical fishes at present published deal only with a few of the species and for these the minimum lengths for showing are given; therefore it will pay all intending exhibitors to keep abreast of the times by obtaining copies of these Standards, obtainable from the Secretary to the Federation of British Aquatic Societies (Mr. R. O. B. List, 1, Coronation Court, Willesden Lane, London, N.W.6).

In the Water Garden in March

(continued from the preceding page)

Do not forget the forget-me-not, *Myosotis*, as this can be raised and flowered fairly quickly, given good conditions. Two good varieties are *M. Royal Blue* and *Victoria*; the former grows to 12 inches and flowers very freely. For a taller plant try *Trollius* var. *Golden Queen*, which grows like a giant buttercup with rich golden to orange flowers and reaches about four feet in height.

To get the best from these seedlings it is necessary to see that the soil in which the plants are finally set out is very good, and if a quantity of the old soil is removed and replaced by some fresh, the plants will make better headway and flower sooner.

AQUARIST'S Notebook



by

RAYMOND YATES

WHENEVER I see an aquarium shop in a strange town I always find time to call in and have a good look round. Often I find these newcomers well set up with good fishes and a friendly air. Quite frequently one comes across new ideas, even in old shops. In one such shop each tank is numbered and at the counter is a list of all the fishes they have in stock, the tank number for each variety and the price. Many dealers keep their tanks very well furnished and one enterprising owner allocated the maintenance of his tanks to his junior assistants, each having a block of about 12 tanks to keep in first-class condition. Each week a customer was asked at random which block he considered to be the best-kept, and the winning junior assistant took home a bonus with his salary. Unfortunately, all too often we find the reverse of the medal. No names on the tanks, no prices anywhere on view, no encouragement to the customer in any way. Some time ago I was in a shop which displayed two notices: one to the effect that no money could be refunded on livestock and the second to the effect that if a customer was in doubt he should think before purchasing. I cannot imagine anything more likely to put off prospective hobbyists!

Most aquarists use a scraper, complete with a safety-razor blade, and this certainly makes a good job of thick algae growths on the glass of tropical tanks. However, even the scraper will not remove all the fine growths which tend to mist the view, and this is best accomplished by wiping over the inside of the viewing glass with a small pad of cotton wool. You will be surprised how much algae this picks up and at the difference it makes to the clarity of a tank. With electric light this inside growth is considerable although not all removed by the scraper. Cotton wool is also ideal for removing algae from the broad leaves of aquatic plants, which need not be disturbed as they can be wiped free whilst growing under water. Nowadays, there is an *ersatz* 'wool' on the market which consists of small cotton and other fibres. This is best avoided because it breaks up into small pieces and has to be siphoned off the bottom. A useful tip for the removal of hard "dried-on" algae, which often disfigures the insides of tank covers, is to rub the affected parts with a stiff nail brush soaked in hydrogen peroxide. Although some algae survives elbow grease, it cannot stand up to peroxide.

The bane of most fishkeepers' lives is probably white-spot disease but few experienced aquarists worry overmuch about it. True it can be a great nuisance and cause a lot of real inconvenience, but actual losses are few because effective prompt action can be taken once it is seen in the tanks. Most of the troubles set out in such frightening fashion in aquarium books are rarely met with by the average hobbyist, and when such troubles do occur they are isolated examples which affect one fish and are rarely endemic. Many of these rare troubles have no known guaranteed cure and one learns to accept the occasional loss from relatively unknown causes as just "one of those things."

There are two troubles which cause quite considerable losses, often because they are well advanced before the aquarist realises anything is wrong. The first appears as a white slime or scum on the skin of a fish, in isolated patches, and also appears on the fins, the pectorals being 'glued' together so that the fish seems unable to swim. The fish lies motionless at the surface, refuses food and

generally dies within 48 hours. The most prone are young angels, harlequins, guppies, zebras and other barbs or rasboras. The colours of the fishes fade away and unless something is done nothing can save them from an early death. Salt is very useful, particularly with harlequins, and the amount used depends on the fish concerned. Guppies can stand most. It is better to provide the fish with a hospital ward in the form of a floating fish bowl immersed in the ordinary tank. Two or three days in a slightly saline surround generally works wonders, and if the disease should return a second treatment can be given. Old fish do not always respond, nor do cases which are very far gone. This disease can attack odd fish in a tank without bothering the majority, although overcrowding may result in several fishes showing the signs. A sure cure is Terramycin, which cures in up to 48 hours where 50 milligrams is used per gallon, half the water being changed in seven days. (Veterinary Terramycin is obtainable only on prescription from a veterinary practitioner.—EDITOR.)

The second major trouble is what are commonly called skin and gill flukes. The fish keep to the surface, breathing is very rapid, there is no interest in food, colours are drab and there is often the appearance of very fine spots on the skin and fins. These spots can best be seen on pectorals and tail. Of all the possibilities available the best seems to be a dip in Dettol. This involves a 15 seconds dip in a quart of tank water in which a teaspoonful of Dettol has been stirred up. The fish struggle wildly, then are quiet; some turn over and appear dead. However, on return to pure water they rapidly recover. Harlequins almost always turn over, as also do gularis, but recovery is swift.

The way to work is to have the Dettol bath ready with a large net suspended in it. In addition have a large jar of clean tank water alongside. Now catch your fish and immediately tip it from your net into the Dettol bath, where it will still be confined within the limits of the Dettol-bath net. At the end of 15 seconds raise the bath net, drain, and then empty the fish from the net into the jar alongside. Here it can recover at leisure. This method allows a large number of fishes to be treated with fair rapidity. As a rule all the fishes in a tank may need treatment and a repeat bath will probably be needed about two days later. The effect on them is obvious once they have got over the shock of the exposure to Dettol. The use of the second jar does away with any risk of getting Dettol into your aquarium. Solutions must be warmed up to tank temperature, of course, and readers are warned that in winter jars lose heat very quickly.

Another method is to add to your actual aquarium water hydrogen peroxide (20 vols.) at the rate of one teaspoonful to five gallons or a little more. This can affect plants, and it is unwise to use it for very small fishes. Dettol will kill fishes left in it for long, so do not exceed a 15 seconds dip. This method of the Dettol bath is not new, but it is one which many keen fish-lovers have never been able to bring themselves to do because it seems impossible for any fish to survive the smelly, milky solution which constitutes a Dettol bath; but they do!

We have had tropical-fish wallpaper, coldwater fish wallpaper and also layered rock-wallpaper effects which have proved very popular for surrounds at fish shows. Now a new Crown paper is on the market which represents rough, irregular dry-wallpaper, of larger blocks of rock, which is very similar to the backgrounds provided to the very large tanks seen at public aquaria. The colours are natural and subdued, being mainly the colour of concrete interspersed with tinges of black, green and yellow. For certain purposes in show surrounds this paper would be ideal, as it produces quite a cave-like effect. The number is D.1746.

A well-known Cheshire breeder (Mr. H. Vernon of Romiley) tells me of two interesting experiences he has had lately. He breeds large numbers of *Ampularia* snails and has tried out tiny specimens in his planted tanks. However, in next to no time his plants begin to suffer, so he now rears the snails in bottling jars. This type of snail can and will climb out of its tank, so he keeps the jars covered with metal lids. Recently he covered one jar with several thicknesses of heavy tissue paper, only to discover that the snails found this new addition to their diet very attractive indeed! After lettuce and decaying plants real paper must have been quite a change, judging by the holes they made.

Some time ago he decided to rear brine shrimp according to American methods, and set up a large tank, the salt concentration being made up of four tablespoonfuls of common salt, two of Epsom salt and one of borax to each gallon. This proved very successful, with aeration. By chance a small golden guppy got into this tank and was overlooked. In a fortnight its growth merited the use of Hollywood superlatives, and after its removal the change from salt to normal water seems to have caused it no inconvenience.

Hobbyists with private fish houses often have a separate meter installed and this usually registers up to 9,999 units. Some time ago I heard of one hobbyist who was lucky enough to have one which only went up to 999, after which it returned to zero and began again. Like all good things this happy state could not last, and after one glorious quarter of "rocking round the clock" the authorities fixed a new and larger meter.

One of the most popular plants for the furnished aquarium is the spatterdock, but it is not seen so often as might be expected. Dealers generally offer for sale only small seedlings and these often fail to make much headway. There are many reasons for this. Spatterdocks like large tanks and small plants often fail in small aquaria where they are knocked about by boisterous fishes and their young leaves are pulled to pieces by fishes with vegetarian tastes. Hungry fishes find the spatterdock quite a tit-bit, and even the meat-eaters sometimes show a liking for this plant, in particular festive cichlids, whom nobody would normally suspect.

The plant is delightful when small but once established vigorous growth begins and with its aerial leaves shoot up to the surface. These are quite attractive and provide shade from surface light, but they are not always wanted. The fact that surface leaves are appearing does not mean that no more submerged leaves will grow; on the contrary, submerged leaves will continue to show up. If desired the aerial leaves can be cut off and it will be quite a time before any more of the lily-like pads appear. Cutting the leaves which are damaged or not wanted from a spatterdock does it no harm, and fresh leaves soon take the place of those discarded. This plant produces very long roots to its tuberous base, often a good 12 inches in length, and these need to be buried in the compost with the tuber resting on the gravel, for good results.

These plants like a good light and will not do well if

sediment settles on the leaves or if they are often moved. When moved they should be kept completely immersed in water, but even so, the leaves often show signs of damage from exposure to the air, crushing or folding against other moved plants, or through having been kept in rather warmer water than necessary. Spatterdocks need considerable weighting with lead when they are large, to hold them in place, although small rockwork does the job equally well. If the plant grows too quickly the outer leaves can be pulled off; this often results in a fuzzy scum showing on the rhizome but is of no consequence. Spatterdocks should not be exposed to chemical cures as these will set them back a great deal.

It is a mistake to imagine that fighting fish will never bother other fishes. It is the custom for many hobbyists to keep a single fighter in a community tank and, as a rule, no trouble results. True, these fish can be a nuisance with very small fish such as neons but by and large most fighters live blameless lives in furnished aquaria. However, they do sometimes take a dislike to other fishes in their tank and these are mainly large, well-coloured males of such species as nigger barbs, thick-lipped gouramies and paradise fish. When this happens the only thing to do is to take the fighter out, because he will go on looking for trouble and will always get the worst of it. The other fish seems to get annoyed by the constant bickering of the fighter who is out for a fight, and sails in. As a result the fighter gets badly ripped whilst his rival suffers no harm. The reason for this is that fighters like to lie close up to their adversary, showing off before attacking; the other fish don't play this game but make an all-out attack. I have found that fighters which have been allowed to fight with other fighters are very prone to attack other species of suitable size. It is as if they had tasted blood and simply must have another fight. Cichlids are never worried, so fighters obviously have some sense.

When buying angels make sure you are getting a well-shaped, defect-free fish which is plump and looks as if it is a hearty eater. Mis-shaped bodies are common and badly formed or damaged ventral 'feelers' frequently found. You will often find the eye is all one colour instead of being striped right through. Eyes should be bright and clear and not too pronounced. Many angels have weak dorsals, often far too short, and it is no use hoping for the best. The black-striped effect is easily damaged and rubs off. Damaged parts of stripes regrow a light colour and spoil the look of the fish. A tendency to red round the mouth is fairly common and in most instances is no cause for worry. Colour in angels is variable and comes and goes. It is perhaps better to buy fish which show up vivid black markings because then you know what they can do, but this does not mean that lighter coloured ones cannot darken at will. In a shop, all cichlids when disturbed by the dealer with a net, lose their colour and look very ordinary.

In a large department store I came across two tanks of fishes, one tropical, one coldwater. Interested, I stopped to look. The tropical tank seemed warm, and I found the temperature to be 86° F. This tank had an external thermostat, the knob of which could be turned by any small boy who chanced along. I felt this was rather a poor advertisement for the hobby, and turned to the coldwater tank, which contained about a hundred small goldfish. One glance was enough: one and all were covered with white spot. It is not often that one sees white spot on coldwater fishes, and many fanciers would hardly recognise it if they had not, themselves, had experience of it in coldwater tanks.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

I have a tropical catfish (*Gorydonis paleatus*) whose barbels or "whiskers" seem to have worn down to mere stumps. The fish is in perfect health, but I wonder whether there is any way in which the barbels could be encouraged to grow again?

Catfish often rub their barbels down to stubs when they are living on a very coarse or gritty bottom. You will find, however, that the shortened barbels do not seem to inconvenience the fish in any way. If you place the fish in a tank having a fine-textured bottom you will probably find that the barbels will start to grow again.

Is it a wise policy to place guppies and mollies together in the same tank? I want my aquarium to be a place of peace, and not a battlefield!

Mollies and guppies get on very well together, and they like the same conditions and food; that is, a well-planted aquarium situated in a sunny or well-lit position, a temperature of about 75° F., slightly saline water, and some mossy algae in their diet. A water depth of about seven or eight inches suits them best.

I am a comparative newcomer to tropical fish-keeping, but I should very much like to try and breed some of the smaller, more colourful characins. Will you please tell me whether neon tetras are easy to breed?

Neon tetras are not easy to breed. The difficulty lies more in keeping the eggs from disintegrating soon after they have been laid rather than in getting the fish to spawn. Among the known requirements for spawning this fish are: clear, not too old water having an acid reaction, not too much bright light, and no dirt or decaying matter fouling the bottom. Aquarists in America and on the Continent—particularly in Germany—seem more fortunate in breeding neon tetras than we are in this country. Perhaps this is not due so much to greater skill, but to having water on hand more suited to the fish's requirements.

I have bred several of the egglayers, but always lose a lot of the fry because I cannot maintain a regular supply of small live food. Can you tell me what I can use as a substitute for live food to keep the fry alive over the first few difficult weeks of their existence?

Small pieces of hard-boiled yolk of a fowl's egg crumbled between the fingers in water will provide a satisfactory first food for newly hatched fry. Then again, pea flour is often used with great success. But the aquarist must always guard against introducing too much artificial food into the aquarium in case the water becomes polluted.

Some of my *Vallisneria* plants have produced small, pod-like growths close to the crowns. After a short while, these pods seem to split and send tiny flowers to the surface. I cannot understand this, for all the other *Vallisneria* plants I have grown in the past have always sent their flowers to the surface on long, spiralling stems. Can you offer any explanation, please?

The *Vallisneria* plants you have in your possession are male plants. These produce flowers close to the crown. After a time, the flowers become detached from the plants and float to the top of the water. When male and female plants are present in the same tank, fertilisation should take place and seeds form.

I have a pot of *Helsine salicifolia* growing on my window sill. I have been told that this plant can be grown completely submerged in the aquarium. Is this true?

Helsine can be grown in the aquarium, but it will not prosper if it is anchored in deep water. It prefers shallow conditions, and nothing suits it better than when it can ramble over just-submerged rockwork, or a peat-filled rocky shelf.

My aquarium has developed a slight leak along the front bottom edge. I have been informed that the only way I can stop

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

the water from oozing out is to empty the aquarium, remove the glass and glaze it all over again. Can you advise me, please?

A slight oozing of water along the bottom of an aquarium will usually seal itself after a very short time; that is, as soon as particles of sand and sediment become tightly lodged in the more porous parts of the mastic. Sometimes two or three coats of aluminium paint applied along the edges of the cement will prove most successful. If, however, the leak persists, we are afraid that your only course will be to glaze the tank afresh, making sure that the cement used is a reliable one, and pressed well down onto the frame before the glass is introduced.

We set up a tropical aquarium some time ago, and have just introduced a fighting fish to enliven the underwater scene. But this fish, unlike the others, keeps coming to the top of the water for air. Has it contracted some disease?

The fighting fish is a member of the family Anabantidae, and the anabantids breathe atmospheric air. They obtain this by visiting the surface of the water every so often. During cold weather it is advisable to keep the top of the aquarium well covered to prevent cold air being gulped in by the fish. Baby anabantids soon die if they take in mouthfuls of cold air.

I have two tanks available for spawning purposes, and for my first attempt at breeding I should like to try and spawn the beacon fish. Will you please tell me the best way to condition these fish and use the tanks to the best advantage?

Your best plan would be to spawn the fish in one tank, and transfer them to the other tank so soon as spawning is over. Furnish the spawning tank with plenty of fine-foliaged plant life, and place a glass division across the middle of it so that the fish are kept separated. Raise the temperature of the water a degree or two above normal, and introduce plenty of live food, pieces of lean meat and the like into the fish's diet. When the female is noticed to be fuller in the sides, and the male has assumed richer colours, it is time to remove the glass division. If the fish can be introduced into each other's company overnight so much the better, for then it is not unlikely that they will spawn early the next morning. If the fish do not spawn after all these preparations, then repeat the process of keeping them separated and well nourished, and try them again after an interval of about a week to a fortnight.

Recently I introduced two kuhli loaches into my aquarium. For the first few days they were often in view, scurrying about the bottom and looking for food, but now I seldom catch sight of them. Is it right that they should keep hidden away most of the time? All the other fishes in the tank are as lively as ever.

Most of the loaches and catfishes known to the tropical aquarist keep hidden away during the day time, and become active after dark. They are excellent scavengers, and will eat "left-overs," but it is a good policy to introduce some fresh food into the tank just before retiring for the night, because if the other fishes in the aquarium have hearty appetites they will not leave much, if anything, for the species eating nocturnally, which, without proper and sufficient food, will soon go into a decline and die.

My fishes have developed the habit of rubbing themselves against the leaves of plants, and the rockwork. A more experi-

enced fish-keeping friend has told me that my fishes have got what he calls "itch." Is "itch" a serious disease?

We wonder whether you are confusing "itch" with "ich"? Itch is probably caused by tiny organisms setting up an irritation in the skin of a fish, which, to relieve the irritation, often dashes over the sand, and rubs itself against it, and against the rockwork, plants and glass sides of the aquarium. The condition seldom lasts for long, and often clears up of its own accord within a few days. Fishes often behave in the way you described in your letter in a newly set-up aquarium, in an aquarium with very fine sand on the bottom and in an aquarium having a very thick layer of sediment and decaying matter on the bottom. "Ich" is a contraction of the word

ichthyophthiriasis, better known as white-spot disease. This disease manifests itself as tiny white spots on the fins and body of the afflicted fish. If neglected, a fish with "ich" may die within a few days. There are several treatments which may be given, but the one we favour is to raise the temperature of the tank water a few degrees above normal, and colour the water distinctly blue with drops of a 5 per cent. solution of methylene blue. Keep the bottom well siphoned to exclude all dirt and uncaten food, and add more "blue" as the water gradually reverts to its normal appearance. When the spots have left the fish, maintain a high temperature for a week or two before finally permitting it to return to normal.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have a tank of goldfish which measures 36 in. by 12 in. by 12 in. and it is kept in a living room. When the gas fire is lit in the evening the fish come up to the surface of the water. The temperature of the tank is 65° F. Two 30 watt strip lights are on from 7 a.m. until 11 p.m. When an aerator is put on, the fish go down to the bottom. Do you think the gas fumes are causing the trouble?

Gas fumes are not likely to be the cause of the trouble. The warmth of the water, together with possible pollution, may be making the water unsafe for the fish. The fact that they go down once the aerator is switched on appears to me to indicate that the water is not pure enough. If the air in the room was badly affected by gas fumes then this would only make matters worse for the fish once the aerator was forcing such fume-laden air into the water. The warmer the water the less oxygen will it hold; added to this, if there has been a fair amount of pollution through over-feeding then foul gases will be present. The length of time the lights are on could be lessened and then the water may remain cooler. Reduce the warmth and the amount of artificial food and the tank condition should improve.

I have a garden pond of fair size containing six goldfish and a pair of golden orfe. Recently I added some golden carp. One of these, about six inches long, lies on its side on the bottom of the pond and sometimes at night I have found it floating at the surface still on its side. When disturbed it swims off in a normal manner. What is the matter with it?

The fact that only one fish behaves in this manner indicates that it is not the pond water at fault. If the pond water was foul one would expect the orfe to be in trouble first. The fish may have slight bladder trouble which has been accentuated by the colder weather. Many fish are all right whilst the water is not too cold, but once the winter starts and the temperature of the water drops below 50° F. any weakness of the swim bladder becomes apparent. There is another possible reason; the fish may be a female which has an over-developed roe or egg mass inside. The eggs can cause pressure on the swim bladder and then the fish would be unable to keep a proper balance. If the fish can be removed from the pond and placed in shallower and warmer water it should be all right. If it is not possible to remove the fish to another container then it can be left where it is and it may be that it will recover in the spring. If it does not survive it will not be of great loss as it is unwise to attempt to breed from any fish which shows a tendency to swim-bladder trouble.

I recently bought a moor about 1½ in. long. It had a good black body colour but the belly was bronze. After a few days I noticed that the whole of the fish is turning bronze. The conditions are as follows: 24 in. tank with gravel and plants; food consists of earthworms and liver; temperature 65° to 68° F.; 100 watt light is on for 12 hours a day. Can you give any advice please?

There are two main features which can be affecting the fish. The first is warmth and the second is light. I consider that moors should not have too warm a water and that they should not have too much light. My own experience

with them is as follows: I once lent a very good moor¹ which I had kept in fairly cool and dark surroundings, to a club for exhibition purposes. It was kept for four months before being returned, and it had been under tropical conditions all that time. When I received it back it was quite ruined, as it had turned completely bronze. There is, of course, a very important point to remember: all moors do not develop the sooty blackness which is so desired, but those that show this tendency are better kept at a fairly low temperature (about 60° F.) and they should not have too much light. As you say that you only require the fish to go into a community tank there is nothing you can do and little to worry over; it is not likely to affect the health of the fish, and if you do not need it for show what matters? The colour of the surroundings of a fish does sometimes have an effect on its colour; for instance, if uncoloured young goldfish were caught from a deepish dark-sided tank and placed in a white bowl they would change from a dark brown, almost black, to a light greenish brown in less than an hour. They would return to the dark colour when returned to the original tank.

One of my goldfish has become infested with white rod-like streaks which resemble wood splinters. They are mostly on the fins but some are on the body. It is a female fish and has spawned not long ago. It has a lowered dorsal but does not seem to be ill otherwise. What is the trouble?

It appears as if the fish has an infestation of flukes, but I doubt if you could see these without a magnifying glass for they are very small, and practically transparent, which makes them more difficult to see. When a fish is bothered with flukes there are usually other signs present such as fine blood streaks and then a gradual wasting of the body, with a tendency for the fish to mouth at the surface and show a loss of appetite. You say you isolated the fish and gave it a bath in water with two teaspoonfuls of salt and approximately one-quarter of a grain of potassium permanganate. It is unwise to mix salt and permanganate together in a bath for fish, and if the fish has flukes I do not think that either would be effective. A bath in a Dettol solution is the best action to take when a fish is infested with any external parasite. Use one-half of a teaspoonful of Dettol to the gallon of water and leave the fish in for only five minutes. Watch the fish whilst it is in the solution and remove it immediately to fresh water if it should turn over. This treatment can be repeated after a week and the fish should not be replaced with others until it is clear of trouble.

I am writing to ask if there is anything I can do to stop a fine dust-like substance from forming on the plants in my tank?

The dust can be from the sand or from fine particles in the food. Sift the food for a time and see if this improves matters, and if not, cover the bottom compost with a layer of coarse sand—that which is known as washed river sand or grit.

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our readers



write

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

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

Egglayer Breeders' Class

IN view of the growing practice of transferring eggs from one owner to another, I have been asked by the Judges and Standards Committee of the Federation of British Aquatic Societies to point out that fish raised from such eggs do not qualify for entry in the breeders' class at shows.

Rule 1 for this class states: "All fishes must be the property of, and have been bred and reared by, the named exhibitor." In the view of the Committee, "bred" means, in the case of egg-layers, spawned from parents owned by the exhibitor at the time of spawning.

For the time being, fish raised from eggs that have been hand-stripped will qualify for entry, provided the parents were owned by the exhibitor at the time of stripping.

I should be grateful if you could give publicity to the above.

JOHN H. GLOYN,
Secretary, Judges and Standards Committee,
Federation of British Aquatic Societies.

Tropical Marine Species

I HAVE read Mr. H. J. Vosper's letter (*The Aquarist*, February) on the above subject with much interest. I, too, have been keeping British marine creatures in aquaria for a considerable time, and like Mr. Vosper have achieved moderate success. I cannot agree with him, however, regarding the fluctuation of temperatures in British coastal waters. In the south-west of England the extremes are from about 45° to 62° F., and in north-east Scotland from about 38° to 55° F. These extremes cover the year and not the day or the hour.

Rock pools vary in temperature to a much greater degree, and as a result of this, animals from such surroundings are more suited to aquarium life than those from true coastal waters where the temperature is more or less constant. Many shore-haunting animals migrate to deeper waters before the advent of winter cold, and early spells of severe cold can kill many littoral animals.

I have had some experience with marine tropicals, and while I agree that temperature is important there are other factors that make the keeping of these fishes something of a problem. Often they are not in the pink of condition when reaching the aquarist owing to the fact that they have, of necessity, endured a very long journey. Purity of water is, I think, as important as temperature control, and last, but not least, is the problem of diet. Nearly all exotic marines are carnivorous, and some of them demand specialised diets.

Much experiment is needed in this branch of the hobby,

and I hope that Mr. Vosper, and others, will tell readers of *The Aquarist* the results of any experiments they may make, whether these be successful or otherwise. Given more guidance many aquarists would take to marine tropicals, and if the demand for them increased, the price would drop to some extent. They can, of course, never be cheap fishes, for all marines are "wild fish," and there is little hope of them ever being bred commercially.

JOHN S. VINDEN,
Birmingham 15.

Weight of Perch

IT was with great interest that I read Mr. Yorke's article "Perch in the Garden Pond" (*The Aquarist*, February). I feel, however, that the caption beneath the photograph was not only optimistic but rather misleading. I refer to the statement that perch can attain weights of three to ten pounds. Whilst I admit that all things may be possible in the unseen world beneath the surface, I think the presence of a ten-pound perch in the British Isles to be unlikely.

The rod-caught record stands at five pounds, fifteen ounces, six drams, taken from the Suffolk Stour. Even under ideal conditions the growth rate of the perch is not likely to exceed four to six ounces per year, and as the maximum estimated life is from 12 to 14 years then the ten-pounder is rather improbable.

Perhaps in the not-too-distant future some fortunate angler may prove me wrong.

R. A. CHADWELL,
London, S.E.6.

We agree that the caption to the picture of the perch did not make it clear that the weight range given represented the extremes of upper values recorded. A record of a perch (not British) weighing ten pounds is mentioned in the literature, and a number of reports of perch with weights between this extreme and the lower value of three pounds (this is not common) exist. Perhaps some aquarist will see what he can achieve with a captive native specimen by good feeding!—
EDITOR.

Canadian Cartoonist

WHAT a pleasant surprise to be referred to as the best cartoonist in "Aquarist's Notebook" (*The Aquarist*, December 1956)! Most of the cartoon ideas mentioned by Mr. Raymond Yates were suggested by actual situations arising in my home, although one cartoon in particular was actually drawn up and reproduced before the real situation developed. I refer to the one in which the lady of the house, all ready to leave on vacation, says to her spouse:



"IF YOU ARE THROWING OUT THE AQUARIST MAGAZINE THAT HAS MY NAME MENTIONED I'LL NEVER FORGIVE YOU."

"What do you mean—'cancel our vacation, the angel fish are spawning'?" The night before we were due to leave on our vacation our angel fish spawned. (We didn't cancel our vacation either!)

E. G. GREEN,
Toronto, Ontario, Canada.

Tubifex

FURTHER to the letter regarding *Tubifex* published in your January issue I would like to add the following.

I frequently have to leave my fishes for anything up to a fortnight at a time. The first time this was necessary I arranged for a friend to feed them. When I returned I found he had "thought they were hungry" and fed them accordingly. The result was that nearly all my fishes were dead and I had a smelly mess to deal with.

Since then I have made a point of buying *Tubifex*, leaving it under gently running water for a couple of days with occasional bursts to break it up, and then, on the day I go away, I put approximately 1 cubic inch in each 24 in. by 12 in. by 12 in. tank, and in the other tanks in proportion.

On one occasion, when a power failure killed all the fishes in my 36 in. by 15 in. by 12 in. tank on my first day away, the *Tubifex* were still alive and the water fit for further use when I returned 12 days later.

E. W. QUICK,
Hextable, Kent.

Hardy Barbs

I AM a member of the North Staffs. Aquarist Society, and a few months ago I was unable to attend our monthly meeting, but to save me losing points in our table show, my mother took my fishes (one tiger barb and one *Barbus cunmingi*) for me. A friend of mine brought them back, but took them to the wrong house, and it was a week before I found out where they were. The man who had them told me that he put them in clean, cold water every day! They were alive and well. This just goes to show what some fishes will stand, and I thought it might be worth mentioning in your very enjoyable magazine.

W. D. ROSS,
Newcastle, Staffs.

Automatic Heat Circulation

WITH the new type of air-lift filter that operates beneath the sand I find it fulfils its object most perfectly when the leads of the air pump are connected in parallel with those of the heater. In this way as soon as the heater switches on, the filter will commence to draw the heat beneath the sand and will continue to operate until the aquarium's temperature is equalised. The heat saved and utilised will work out that the air-lift filter costs nothing to run. Heat lost at the surface is reduced and the arrangement will certainly prevent chilly base temperatures during the winter months. Another advantage to this method is that when heater failure occurs filtration will be continuous, thus giving a warning of such failure.

J. MAYES,
London, N.20.

Angels Oblige

I TOOK the enclosed picture of a pair of angel fish I keep in a 24 in. by 12 in. by 12 in. community tank on Sunday, 20th January. On the following Sunday I cleaned the tank and changed about three gallons of water.

Imagine my surprise when, on coming home to lunch the following day, I saw the front of my tank covered with newspaper. I asked my wife why it was there and she told



me there were some eggs sticking to the end glass, which the angels had been picking off rapidly. So, fearing for their safety, she had turned off the tank lights and shaded the tank.

I thanked her and proceeded at once to siphon the eggs into another small tank, which I filled to a depth of four inches with water taken from the aquarium in which they were laid. On the advice of my brother, who is a keen aquarist, I added three drops of methylene blue and fixed an aerator to supply a gentle stream of air. The temperature of this tank is 80° F. I am now daily removing eggs which have turned white and are covered with fungus. Yesterday I noticed that a lot of the eggs had grown tails, and were spinning themselves round with the aid of these. I understand they will be free swimming by Sunday, but the sorry part is that out of a total of at least a hundred there are now only about a dozen left.

I think the angels may spawn again within the next week or two, and I shall remove all the other fishes first and hope for the best.

D. BUTTERS,
Bradford, Yorks.

Bound Volumes of "The Aquarist"

ONCE again we are asking you to help our work by bringing our book-binding service to the notice of your subscribers. Our charge for binding twelve issues of *The Aquarist* in full cloth (any colour) and with lettered spine in gilt is 13s. 6d. plus actual postage. We shall be very grateful if you will let this be known.

The Sir Robert Jones Memorial Workshops,
74, Upper Parliament Street,
Liverpool 8.

Society librarians and other readers may also be interested to know that the workshops (which exist for the training and employment of severely disabled men) will provide a utility binding for books such as "Penguins" for 2s. 6d. each.—EDITOR.

A Statement

TO answer numerous enquiries from friends about my resignation from the honorary secretaryship of the West Middlesex Aquarists Association may I state that I resigned because of ill-health resulting from gas poisoning, as previously announced in *The Aquarist*. If you can find room to include this statement it will assist me greatly as I still receive letters asking about my resignation and it is becoming increasingly difficult for me to type letters to explain this.

ALIC H. CHARLES,
Hanwell, London, W.7.

Coldwater Fishkeeping Queries

(continued from page 276)

I have made some concrete rockwork for my tanks and have placed it on an outside roof to weather. Is this all right or should I place it in water?

The concrete will be much more quickly cleared of free lime if it is kept in water and given an occasional scrub. A soaking for a fortnight, with the scrubbing, will be enough to make it safe.

- Heros spurius* is a former name of: (a) *Cichlasoma biocellatum*; (b) *Cichlasoma fuscum*; (c) *Cichlasoma ferrugineum*; (d) *Cichlasoma severum*.
- Gymnocephalus ternstroemi* (the black widow) was named by: (a) Boulenger; (b) Day; (c) Gunther; (d) Regan.
- Corydoras macropterus* is very similar in appearance to: (a) *Corydoras aeneus*; (b) *Corydoras melanostomus*; (c) *Corydoras paleatus*; (d) *Corydoras punctatus*.

PICK YOUR ANSWER

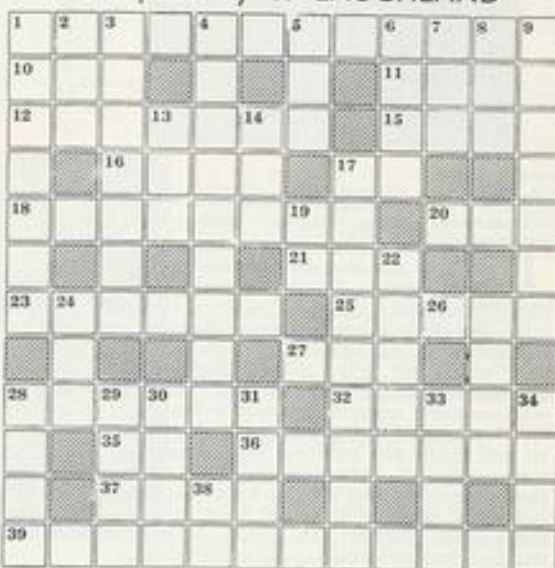
- In the London swordtail, the sword is: (a) black, edged yellow; (b) orange, edged black; (c) red, edged yellow; (d) yellow, edged black.
- The genus *Gallirivche* (water starwort) is found in all countries except: (a) Australia; (b) Canada; (c) New Zealand; (d) South Africa.
- Pylularia* (pillwort) is represented by: (a) 4 species; (b) 6 species; (c) 8 species; (d) 10 species.

(Solutions on page 281)

G. F. H.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Rearing of fish by artificial methods (12)
- Girl from Idaho ignores the hall (3)
- Swift, golden, surface-swimming British fish (4)
- Popular name of *Mollinina latipinna* (4, 3)
- A very different fin from 12; and you, Alan! (4)
- Sediment (4)
- His decision is final, briefly (2)
- Mind orfe in a way to be briefed (8)
- This collection includes an aquarium (3)
- One way to get down to the fish food (3)
- Tossed in a Dee for Virgil's epic poem (6)
- The end of the fish is not in (5) —but the beginning is here (3)
- Quenched with a whole lake inside it (6)
- Bearing of the kingfish? Large, somehow (5)
- The French of sole, thus departed (2)
- Iris and ide combine to provide a spectacle of glittering and changing colour (7)
- Stockton's river sounds a pest (4)
- Or, more precisely, an aquarium heated to temperatures suitable for certain exotic, but not necessarily tropical, fishes (8, 4)

CLUES DOWN

- Classical fish tank (7)
- Help confused for 10 across (3)
- Fails in a way for a mollie (4, 3)
- Not capable of reproduction (9)
- Run for the vessel (3)
- Natterjack, perhaps (4)
- The tea this is welcome (3)
- Gunners from far (1, 1, 1)
- Burbot or blenny (3, 4)
- Sign of the lionhead? (3)
- Is in schism, and schisms may be in it (3)
- Ide back to lair back for my chief's homily (9)
- and here, briefly, he is (2)
- Covetousness (3)
- Slippery fellow (3)
- Three this may not be safe in a community tank; white this is a plague (4)
- Second part in a quartet (4)
- Maintain (4)
- Sucker of octopus. Is this a record? (4)
- This monster is a large poisonous lizard of Arizona (4)
- One of these may form a lake (4)
- London postal district (1, 1)



BOOK

REVIEW

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

THIS is not a book about aquarium fishes or plants, nor is it just another book for beginners as its title might imply. On the contrary it is a very well-thought-out and eminently readable symposium on the many aspects of selecting, lighting, heating, aerating, filtering and furnishing aquaria. This is the first book I have seen which has been devoted completely to aquarium accessories and equipment. A large portion of the contents is presented in question and answer form, and the answers are very detailed and thorough. There is nothing sketchy, no half truths and no broad generalisations. The author seems to have thought of everything and is to be congratulated on such a useful addition to existing aquatic literature. Some nine chapters cover 128 pages, with 45 photographs and a dozen diagrams. In addition, there is a table of 24 standard tank sizes giving capacities in gallons (U.S.) and an end table listing 126 different tropicals with data on their adult size, breeding habits, tank size needed, schooling tendencies and suitability for community tanks.

The author gives us much that is new. For example, he advises periodical cleaning and re-oiling of piston pumps with the aid of carbon tetrachloride, which can be put in a small oil-can. His advice is to turn the flywheel by hand and keep filling the various oil holes until the cleaning fluid runs through clean, then to allow several hours for the carbon tetrachloride to dry completely, inside and out. All the old oil and dirt will have been removed and the pump is re-oiled before putting back into use. He has some interesting observations on back-flow from pumps, where these cannot be kept above water level. He states: "Back-

flow may be started by several actions. (1) The tendency of water to rise in a narrow tube is known as capillary action. If the water in the tank is very close to the top it is possible for water to rise in the air tube by capillary action to a point where it starts a downward flow and a siphoning action occurs. (2) The cooling down of a warm pump can cause the air inside to contract and draw the water down. (3) Overoiling the pump can cause excess oil to enter the lines. Air pressure will keep the oil clinging to the inside walls of the vertical tubing, but with the air pressure removed, the oil starts to run back. As it collects in droplets, a vacuum is created behind it strong enough to start a siphoning action."

Overfeeding is recognised as the cause of many tank troubles. Mr. Schneider rightly reminds readers that few fishes can eat in the dark and that no feeding should take place immediately before turning off the tank lights or turning them on. Fishes need 10 to 15 minutes to adjust themselves to the light after having been in the dark. The stomach of the average tropical fish is about the size of its eye. It can eat at one meal only as much food as would cover one eye. There are exceptions (like cichlids) but this is a good rule of thumb.

For all hobbyists except the very old-stagers and out-and-out "experts" this book will solve many problems.

RAYMOND YATES.

Key to the Names of British Fishes, Mammals, Amphibians and Reptiles by R. D. Macleod. 71 pages. Sir Isaac Pitman & Sons, Ltd., London. 12s. 6d.

BY the weight of their numbers fishes take first place in this interesting work on the derivations and meanings of scientific and common names of British vertebrate animals other than birds. Of the total 503 species and sub-species included the fishes (marine and freshwater) make up 374, and amphibians and reptiles 14. The book has three main parts: an Introductory section that introduces the elements of scientific nomenclature in a readable way, a list of scientific names arranged alphabetically and a list of common names similarly arranged. For each entry in these two lists is given the origin and meaning of the name with just enough fullness to avoid the irritating "bittiness" of some dictionaries. A scholarly reference book that is recommended for the serious aquarist's library.

ANTHONY EVANS.

News from AQUARISTS' SOCIETIES

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

AT the annual general meeting of the **Portsmouth Aquarists Society** the following officials were elected. President, Mr. T. Bennett, chairman, Mr. F. G. Lush; treasurer, Mr. B. Nunn; secretary, Mr. C. Smith. The meetings are held the first and third Wednesday of each month at the Senior Modern Boys School, Doyle Avenue, Hilsen, Portsmouth, and new members will be welcome. The hon. secretary is Mr. C. J. D. Smith, 18, Brompton Road, Mile End, Portsmouth, Hants.

A NEW Society has been formed at Clacton, the title being the **Clacton and District Aquarists Society**. New members will be welcome and should write to the hon. secretary, Mr. H. T.

Lewis, 29, Warwick Road, Clacton-on-Sea, Essex. Correspondence would also be welcomed from other clubs.

THE **Riverside Aquarium Society** held their annual meeting recently, the following officers being elected. Chairman, Mr. H. Ainsworth, vice-chairman, Mr. A. Huxley; secretary, Mr. N. W. Webb. Full particulars of membership can be obtained from the secretary at 90, Wellesley Road, Chiswick, London, W.4.

THE annual general meeting of the **Leeds and District Aquarists Society** revealed a sound

financial position. Future events include a talk by a leading aquarist on the 14th March.

WE are informed that the **Bethnal Green Aquatic Society** will be holding the annual show at Men's Institute, 229, Bethnal Green Road, London, E.2. on the 6th and 7th September. The show has been dated early so that it may be of help in enabling other clubs to arrange their shows.

DURING the last few months an interesting series of lectures on subjects closely related to fish keeping were given by members of **Catford Aquarist Society**, who met every Monday evening in Holbeach Road School, Catford.

Electricity was the theme of the first talk when the correct type of wire to use, safeguards to take, etc., were explained. The Catford Club are very interested in the use of low voltage lighting for plant growth and this subject was discussed at some length.

The second lecture discussed the chemical properties of water relating to that oft-used mysterious symbol pH. The symbolic meaning and how the pH value of water can be altered was explained.

On another occasion aquarium decor formed the subject—how to make the home aquarium as attractive as possible.

The last of the series dealt with aquarium photography. The speaker who was a keen amateur photographer suggested that it was

well worth while obtaining pictures of one's prize winning fishes whilst still in their prime. He explained various ways of taking the photographs and concluded by offering to take pictures for any members not having the necessary equipment.

THE proposed date of the annual general meeting of the **Mansfield and District Aquarists' Society** is the 23rd March. On the 18th March there will be a "Tape Recorder" half hour by Mr. R. Heath and on the 1st April Mr. A. Atkins will give a talk on Fish Diseases and Treatments.

AT the last monthly meeting of the **Yeovil and District Aquarist Society** a presentation was made by the President, Mr. N. Stainer, on behalf of the Society, of a chiming clock to Mr. D. Silver in appreciation of his services during the three years as secretary.

PETROL rationing has, no doubt, produced more difficulties for club secretaries, and in the case of the **Coventry Pool and Aquarium Society** they have found obtaining lecturers almost an impossibility. However, at their last monthly meeting a "General Quia" was held which was enjoyed by all. The attendance was, as usual, very good.

THE North West London Group of **Aquarists Societies** has now completed its first year of inter-club competitions. Each club has been host in turn to the other five clubs in the group, and each species of fish has had an opportunity of being benched. In addition, a Breeders Class was shown and so also was a furnished Aquaria Class, the latter gaining double points for places. The results were as follows: 1, Hendon and District A.S., 2, Willesden and District A.C., 3, Arnold Aquarists, 4, North London A.S., 5, Hampstead A.S., 6, Independent A.S. The points Shield will be presented to Hendon and District A.S. at the next inter-club show, taking place at Willesden during April.

It is announced, with regret, that North London A.S. is not able to participate in the competition this coming year, and has therefore withdrawn from membership of the group. They state, however, that they hope to be in a position to rejoin fairly shortly.

THE theme of an aquatic colour slide programme featured by the **Merseyside Aquarists Society** was entitled "Society Progress".

Subjects included pictures of the exhibitions staged by the society last year, tropical fish breeding methods, and a visit to a member's new fish house.

A topical note was struck by a slide showing members who enjoyed the annual dinner and social, held in conjunction with the Birkenhead Aquarium Society, in January.

For future programmes the accent will be on inter-club activities and informative talks rather than specialist lectures.

THE annual meeting of the **Taunton Aquarist Society** was held recently. The following officers were elected: Chairman, Mr. C. Scutt; treasurer, Mr. K. Jolly; secretary, Mr. R. L. Bickham. If arrangements can be made a show will be held in March of tropical and coldwater fish.

THE untiring efforts of the **Scottish Aquarist Society** were amply rewarded when their recent show proved to be not only extremely popular but also the most successful financially. Inspired by this success arrangements are already advanced to make this year's event in October even more attractive and on a larger scale. The principal prizewinners were as follows: Robin Kerr Trophy (best exhibit in coldwater section)—Black Moor—K. A. M. Robertson. The Beltrees Shield (best fish in show)—Black Moor—K. A. M. Robertson. Peter McNish Trophy (best exhibit in tropical section)—*Apteronotus agassizii*—A. Watt. Inter-Club Trophy (for tropical furnished tank)—Greenock and District A.S. Breeders' Trophy (best exhibit in any of the bred 1956

classes)—Glowlights—D. Muir. Sawers' Cup (best school furnished tank set up by team of four pupils)—Bellhouston Senior-Secondary, Glasgow. The Strachan Kerr Trophy (best furnished coldwater tank set up by a junior or juvenile member)—Master A. Young. The Water Life Cup (best furnished exhibit set up by junior or juvenile)—Master A. Young. The President's Cup (best exhibit by member competing for first time)—A. Christie. Society Prize (best common goldfish)—Miss Philp.



Members of the **Brockley Breeders' Circle** recently visited the London Zoo Aquarium, when these pictures were taken. With the party were four schoolboys (above) in whom an interest in aquarium-keeping is being encouraged. The group was conducted behind the tanks to see the filtration system and was allowed to feed the large carp.



The Strachan Kerr Trophy—competed for for the first time—was subscribed by aquarist enthusiasts and friends of the late Mr. Strachan Kerr, secretary of the Scottish Aquarium Society for almost 20 years. The meetings of the Society are held on the first Tuesday of each month in the Christian Institute, 70, Bothwell Street, Glasgow, C.2. The hon. secretary is Mr. R. B. Dickson, "The Gantocks," Beaufort Avenue, Glasgow, S.3.

THE **Hendon and District Aquarist Society** will hold the 8th Open Show at the Brotherhood Hall on the Edgware Road, at West Hendon from 23rd to the 25th May. Provision

is being made for a record single entry display and there will be the usual furnished classes. Entry forms may be obtained from Mr. A. Baldock, 239, Squires Lane, London, N.12. All aquarists are invited to visit this "early in the year" show.

THERE is a change in headquarters of the **Reading and District Aquarist Society**. These are now at The Elephant Hotel, Market Place, Reading. The new secretary is Mr. A. C. Masters, 12, Patrick Road, Caversham, Reading.

AT the annual meeting of the **Aylesbury Aquarist Association** Mr. Allan Shaw was unanimously re-elected President. The 1957 programme shows a variety of events and new members would be welcomed to this progressive club. The hon. secretary is Mr. C. L. Stephens, 79, Abbey Road, Aylesbury.

AT the recent meeting of the **Hampstead Aquatic Society** Messrs. Walker and Utton were appointed delegates to the North West London Area Group. Mr. F. Stone was re-elected delegate to the F.B.A.S. At the Area Group Show the Society used its new steel stand for fish tanks for the first time. This stand which is made from a well-known manufactured steel strip is conveniently assembled and dismantled after use for storing.

MR. Jack Martin, a member of **Pontypool and District Pondkeepers' and Aquarists' Society** is the first man in South Wales to win a gold pin awarded by the Federation of Guppy Breeders' Societies. This was reported at the annual meeting of the Pontypool Society by Mr. D. R. Bowers, the secretary. He also stated that the membership was increasing.

AT the last monthly meeting of the **Widnes Aquarist Society**, a lecture was given on coldwater fish by Mr. J. Bowler of the **Warrington Aquarist Society**. Mr. Bowler dealt with the subject at great length, which was thoroughly enjoyed by those present.

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies: **Isle of Ely Aquarium Society** (S. A. Canham, 10, Kingswood Road, March, Cambs.). **Huntingdon and District Aquarist Society** (Mrs. E. J. Masters, 73, Irmine Street, Huntingdon). **Reading and District Aquarist Society** (A. C. Masters, 12, Patrick Road, Caversham, Reading).

Crossword Solution

P	I	S	C	I	C	U	L	T	U	R	E
I	D	A	N	R	O	R	F	E			
S	A	I	L	F	I	N	A	N	A	L	
C	L	E	E	S	E	D	E	P			
I	N	F	O	R	M	E	D	Z	O		
N	I	T	D	I	G			U			
A	E	N	E	I	D	T	R	O	U	T	
E			L	R	O	E	P				
S	L	A	K	E	D	R	E	C	A	L	
P	L	E	I	R	I	D	I	S	E		
O	T	E	E	S	A	L	L	A			
T	R	O	P	I	C	A	L	T	A	N	K

PICK YOUR ANSWER (Solution):

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

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