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AND PONDKEEPER

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Editorial

JANUARY'S award for the most aquatic saying of the month will surely go to Senior Inspector Walter Wolfingham of the Royal Society for the Prevention of Cruelty to Animals. "Goldfish shaken about in tanks or jars of choppy water can become seasick and it has a very upsetting effect upon them" he is reported in *The Times* to have said at a court appeal against the refusal of Wimbledon Borough Council to grant an applicant a licence to open a pet shop. The Council's chief objection was reported to be that the shop was inaccessible during the night, when a fire might threaten the livestock. But it was to counter the appellant's offer to undertake to remove all fishes and birds to another shop 3 miles away each night that the R.S.P.C.A. inspector delivered his evidence: "It is the beginning of cruelty" he is reported to have said.

Now a seasick goldfish must be a phenomenon just about as rare as an airsick bird, and we can hardly believe that this statement represents the official opinion of the R.S.P.C.A. If it does, the Society should openly proclaim that it opposes conveyance of all animals because of the possibility of motion sickness and turn its attention to the most flagrant cases. It is, for example, a familiar sight at holiday times to see panting dogs with their heads protruding from windows of moving cars—not the sign of enjoyment of an outing that it is often taken to be but a sign of canine queasiness. Should not the owners of these dogs be warned that this is "the beginning of cruelty"? It might be hard to prove, but it is known that motion sickness affects dogs whereas we await evidence of this in fishes.

We are not unperturbed at the prospect of fishkeepers attempting to transport fishes being inconvenienced by some inspector's needless even if well-meaning intervention. As the remarkable statement made by its representative has received some publicity we hope that the Society will soon assure its staff in whatever way it can that fishes like their water a bit choppy.

TROPICAL FISHKEEPERS' REFRESHER COURSE:

by Pisces

Copeina arnoldi

Male Copeina arnoldi

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

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

SPECIES: *Copeina*—after E. D. Cope, an American scientist, and *arnoldi*—after J. P. Arnold, of Germany.

THIS peaceable native of South America is a good community fish of striking appearance, a streamlined gem not exceeding 3 in. in size, with the male fish almost invariably a little bigger than the female.

Apart from size in mature fish, there are other easily seen sex differences. The dorsal fin of the male is almost wing shaped, whereas that of the female is shorter and more rounded. The male possesses a brilliantly white area at the front base of his dorsal, in front of which is a darker, almost black edging, which acts as a foil to it. These markings are absent in the female dorsal, which shows a reddish spot about the centre.

Anal and ventral fins show diffused red when the fish are in condition and in suitable environment. Like almost all characins, when off colour or in unsuitable environment, the fish fade out almost every vestige of colour and then only their shape appeals to the eye.

Even were they ugly as sin, however, a pair or two of *Copeina arnoldi* are well worth keeping because of their astonishing breeding habits, which many a hardened aquarist has difficulty in believing correct until he has actually witnessed a spawning.

To induce spawning it is as well to provide the best possible conditions. In spite of their size, the breeding pairs will be quite happy and quickly ready to oblige in a comparatively small aquarium—say, a 24 in. by 10 in. by 12 in.—filled to a depth of 6-7 in. with neutral or slightly acid water. Plants are unnecessary and may, indeed, so interfere with free movement of the fish that proper spawning is impossible.

A sheet of sanded or roughened glass can be leaned at one end of the aquarium so as to emerge from the water to a height of 2 to 3 in. Alternatively a bank of sand can be built up, but to prevent this slipping back into the water, a retarding slip of glass or plastic should be fixed across its front edge. The tank should be closely covered.

Before preparing the tank the fish should be well fed on any available live food, and the temperature of the water maintained around 75°F.

Continue feeding with ample live food when preparations are complete. The female will begin to swell with eggs, and the eggs can be faintly seen through her semi-transparent sides if a light is shone through the water from the other side of the aquarium.

When both fish feel that the time has come, the male ushers the female to a spot against the slope of sand and glass. After preliminary coaxing the fish both leap out of the water to a spot on the bank above water line. Here they lie a moment or two, the female ridding herself of a small number of eggs. Then back into the water go the pair, only to return again and again and to repeat the laying jumps until the female is spent.

It is difficult to find any egg which is overlaid by another, or far away from the others. A flat jelly mass of eggs more or less evenly spaced is the final result of the exercise. Fertility is almost if not quite 100 per cent.

What now? How can the eggs be kept moist? With a sandbank, of course, water will keep underneath the eggs by capillary action, and in a closely-covered tank the surface of the eggs will probably also remain moist.

In the wild such conditions probably do not obtain—moisture underneath, perhaps, but not on the surface. The male fish takes no chances in any case. He hangs around constantly, and four or five times an hour he makes sudden dashes to the egg bank and beats his tail on the surface of the water, splashing a quantity over the eggs. He makes no mistakes; he does not dash to the wrong part of the aquarium. Every movement is purposeful—he seems to know that without his efforts there is a grave risk of the eggs drying out.

How far his fears are well founded is a matter of conjecture. Under aquarium conditions experiments could be carried out to see whether or not the eggs would hatch without his help. Would they hatch, for instance, if submerged in still water or in slow-moving water? If the parents were removed, and the eggs left on the wet bank, would they still get sufficient moisture to carry on development?

If the eggs were entirely removed, what would be the effect upon the male fish? Would he sense that the eggs were gone and take no further interest, or would he continue to splash the denuded bank?

Anyone with *Copeina arnoldi* could carry out experiments such as the above. The results might make interesting reading and add to our knowledge of animal behaviour.

In the normal way, the embryos can be seen within the eggs after 24 hours. The youngsters burst from the eggs in about 3 days from laying. They wriggle or fall into the water, and keep close to the bottom for about a week. Infusoria and powdered food should be fed liberally, but it would be as well to provide gentle aeration to prevent the water becoming foul through the possible decomposition of uneaten food. Siphoning off the food is virtually impossible owing to the presence of the fry, most of whom would be sucked into the siphon with the detritus.

In about 7 days the fry, or what is left of them, will school and begin swimming about the tank. The parents can be removed or left, according to individual taste.

Well-fed youngsters grow rapidly, and culling should begin as soon as it is possible to make out the varying qualities of the fry. This gives the best fish the chance and room to develop into healthy breeding stock, stock able to demonstrate to fresh people the amazing instincts with which they are endowed.

SOME COMMON PITFALLS IN BREEDING TROPICAL FISHES

by Dr. F. N. GHADIALLY

BREEDING tropical fishes often appears an involved and complicated business to the novice. Some beginners sincerely and quite mistakenly believe that there are secrets about breeding fishes which the experts keep up their sleeves and never speak or write about. How else, they ask, can one explain the fact that in spite of following to the letter instructions given in books and journals, they fail to get results?

There are no secrets or short cuts to fish breeding. The principles and techniques have long been laid out in various standard books. These are modified and improved constantly and the modifications reported regularly in our excellent aquatic journals. Why then, does the novice fail in spite of his keenness to learn.

I have been interested in this problem for some time now and hence I have investigated numerous breeding attempts that have failed and which have been reported to me. In this article I want to report my findings and tell you of the common errors made by the novice, for one often learns more from failures than successes.

Too Few Fish or Too Poor Fish

Well begun is half done, is an old adage that certainly applies to fish breeding. One cannot be too particular or too choosey about selecting the parent fish. The sensible aquarist does not make a practice of picking up any odd pair of adult fish from a shop or friend and attempting to breed from them. More often than not such attempts prove to be a waste of time and energy. True, sometimes one may be lucky and it works, but more often than not it fails. How often one sees aquarists struggling to breed with old fish well past their prime, with egg-bound females or obvious runts which they believe good enough to breed with. Ignorance of the past history of the fish can be a real handicap in breeding. The surest way to acquire a breeding pair worthy of the name is to obtain half a dozen or a dozen young fish from a reliable source and then grow them up yourself.

It is not good policy to buy just two fish as this reduces one's chances of success considerably. They may not turn out to be a true pair or even if they do one may be sterile, fail to grow or jump out of the tank one day. Give yourself a sporting chance to succeed; instead of buying dozens of varieties of different fishes, buy a fair number of the type which you intend to breed and concentrate your energies on feeding and looking after them properly.

Selection of the Breeding Pair

It is a common belief that if any two specimens of a pair of egg-laying fishes are separated for a week or two and then brought together they will spawn. This, however, is a misconception, created probably quite inadvertently by some writers on the subject of breeding fishes. While it is quite true that the male and the female of most egg-laying species should be separated and conditioned for spawning, it does not follow that you can pick out any pair of fish from a tank at any time, separate them for a fortnight and then bring them together and expect to get a spawning. It is a bit more complicated than that. The fish have got to be ready and ripe to breed with: separating and conditioning are just finishing touches to a process already started and not the whole process itself.

Let me explain the steps in more detail, to avoid confusion. Suppose we have acquired half a dozen or a dozen fish of a species to breed with, we give them plenty of room, food and good aquarium management. We continuously observe the fish during that time. One day we will find that the females are fattening up, i.e., filling up with eggs, and the males show heightened colours and may perhaps be seen chasing the females and sparring up to each other. This, of course, tells us that the fish are getting ready to breed. Now we step in and separate the males from the females and, at the end of a week or fortnight, we select the fattest female and the liveliest male and bring them together in a spawning tank. Success is more or less assured as a spawning is now almost inevitable.

Solitary Confinement not Necessary

Separating the male from the female does not imply keeping the fish on its own in solitary confinement in a tiny tank or jar. Such treatment, far from bringing the fish into breeding condition, will have exactly the reverse effect. They can and should have company of a few other fishes of other friendly species and they must be housed in a reasonably large tank. A fish in solitary confinement never seems to be as happy and content as when it has company, and it never feeds very well either.

Some believe in separating the male and female by means of a glass partition. I have come to regard this method as a somewhat elaborate and unnecessary refinement, and have not used it for many years. Incidentally, it is of no consequence to the final issue whether the female is introduced to the spawning tank first or the male. I mention this because some novices seem to be obsessed by the idea that some sort of ritual has to be gone through when transferring a pair of fish to a spawning tank and that the female must be introduced a few hours before the male. This is just not true. Transfer the fishes to the spawning tank some time during the evening so as to give them time to settle down. They will spawn the next day, most probably in the morning.

Green Plants, Artificial Spawning Media and Pests

There are two schools of thought on the subject of spawning media. I prefer to use artificial spawning media such as willow root, nylon scouring pad or nylon wool rather than fine-leaved plants. Artificial media can be boiled and cleaned easily and are available at a moment's notice throughout the year. On the other hand, it is almost impossible to clean plants thoroughly, the risk of transferring fry-destroying creatures such as *Hydra* and planarians cannot be therefore easily eliminated. Nevertheless, it must be pointed out that aquarists have obtained successful results with both methods.

Whatever spawning medium you use, try and make certain that no snails, snail's eggs, *Hydra*, planarians and other such menaces to eggs and fry are introduced into the spawning tanks. Many a fine spawning has been lost by accidentally introducing these creatures either with plants or water used for spawning. It is too late to do any-

thing once the fish have spawned in such an infested tank, for it is as a rule impossible to kill off the pests without seriously injuring or killing the fry also.

Do not Feed Fish in the Spawning Tank

A spawning tank is a peculiarly unsuitable place to feed fish in. It is primarily designed to hide the eggs in thick masses of plants or an artificial spawning medium, and it is often layered with pebbles so that fish cannot get at the eggs that fall to the bottom. Any dried food placed in the tank is almost certain to fall into the meshes of the spawning medium and on the pebble-covered floor. There it will go mouldy and rot. White worms will again cause similar trouble. *Daphnia* introduced into the spawning tank often effectively escape capture and may ultimately die and foul the set-up. Another complication that sometimes arises is that a few *Daphnia* left behind by the adults may breed prolifically after the spawning, then they feed on the Infusoria and soon crowd out and starve the fry. *Hydra* and planarians often accompany *Daphnia* and, if introduced into the spawning tank, these fry-and egg-destroying creatures will make short work of any spawning that occurs.

For all these reasons, it is inadvisable to attempt to feed an adult pair in a spawning tank. As the adult pair do not as a rule stay in the spawning tank for more than a day or two, and as fishes can go without any feeding for over 2 weeks, there is nothing to worry about. However, with fishes which spawn over prolonged periods, laying a few eggs every day, some provision must be made for feeding. A small corner of the aquarium may be cleared of the pebbles, or gravel can be pushed and held back by a small strip of glass. In this clear area white worms may be fed, but any that are not eaten must be rapidly removed or they will crawl out of the feeding area and bury themselves in the pebbles or gravel.

Infusoria Culture and Pollution

This, in my opinion, is the most common single cause of failure. One of the frequent tales of woe that is heard in aquatic circles is how a superb spawning of hundreds of fry vanished so mysteriously within a few days of becoming free-swimming. I have investigated scores of cases of this nature and have come to the conclusion that failure to appreciate what is and what is not "good" Infusoria culture accounts for the majority of these episodes. Any novice who intends to go in for breeding fish seriously would be well advised to lay aside all fish breeding for some time and study the problem of Infusoria culture.

There are numerous ways of making first-class cultures and most of us have our pet methods. However, what is important is not the method employed but the results obtained. You must somehow or other develop a technique which produces a culture containing thousands of organisms in, say, a spoonful or eggcupful of the culture, and yet the culture should be quite colourless and clear. No strong, unpleasant smell should accompany such a culture and at a casual glance you would mistake it for a quantity of water from a fairly well-kept aquarium. By now some of you may feel that this is a slight exaggeration; however, I can assure you that it is not. There is no secret about how a healthy culture is prepared and it can be quite easily explained on theoretical grounds.

The basis of all Infusoria cultures is some decaying organic matter placed in a quantity of water; up to a point, the nature of this decaying organic matter is immaterial. Anything seems to work and almost everything has been tried by aquarists. Arranged roughly in order of preference we have lettuce leaves, hay, flour, potato peelings, earthworms and pieces of fish. I have tried most of the above-mentioned and many others, and have now standardised my technique by using lettuce leaves. No doubt others have worked out an equally satisfactory method with something else.

Initial Growth of Bacteria

Whatever decaying organic matter is employed the first thing that happens in the culture is that a large number of bacteria (quite harmless to fish and man) begin to feed and multiply on this organic matter. If the water is examined now it will be observed that it is quite turbid and somewhat yellowish in colour and may have either a faint "organic" smell or a foul smell resembling rotting eggs. The type of smell depends upon the type of bacteria thriving in the culture.

If you set up your culture in a tall narrow container and it is overloaded with organic material the conditions will be right for anaerobic bacteria (bacteria which do not need free oxygen for growth) to grow, whereas if you set up the culture in a shallow container with a relatively large surface aerobic bacteria will thrive. As anaerobic bacteria produce a gas called hydrogen sulphide (the same as that which issues from rotten eggs and 'stink' bombs) it is easy to see why these cultures have a foul smell. Such conditions are unfavourable to the production of a rich Infusoria culture, for Infusoria need oxygen.

Hence I use a shallow enamel bowl about 18 in. in diameter and 6 in. high. In this is placed a crushed lettuce, and a kettleful of boiling water is poured over it. After about half an hour the bowl is topped up with tap water and placed in a situation where the temperature will remain between 60° and 70°F.

Clearing of the Water

The water becomes very turbid at first (bacterial development) but soon the water clears and it is now full of Infusoria. The reason for this is quite simple. The air around us contains spores of numerous infusorians. These settle in the culture and the infusorians that emerge begin to feed on the bacteria. When sufficient Infusoria develop they eat up almost all the available bacteria with the result that the water becomes clear and colourless once more. (Turbidity is produced by the presence of large numbers of bacteria and not Infusoria.)

Such a culture is termed a ripe culture, and it will thus be seen why such a culture has little or no smell and is almost colourless and quite clear. However, if examined closely, it should now be seen that clouds of swarming Infusoria are present which, like *Daphnia*, are drawn towards the light. Except for this and a few bits of coarse sediment the water in between should be as clear as water from an aquarium. Conversely, it will be realised that the foul-smelling, cloudy, turbid mixture which is so often called an Infusoria culture is not one at all, but is a culture of bacteria. If such a concoction is placed in a tank containing fry not only will it provide no food for the fry but it will kill them off rapidly, as it will certainly pollute the water contained in the aquarium.

Incidentally, barring accidents, I set up only one Infusoria culture every year. As the culture in my bowl is used I top it up with fresh water from the tap and, as the lettuce disintegrates and disappears, I keep on adding odd leaves of lettuce to make up the loss. Briefly, then, the important points to note are: (*a*) a good water surface to avoid anaerobiosis; (*b*) correct temperature, for if the culture is kept too cold Infusoria cannot flourish.

Overcrowding

Once the fry become free-swimming and are taking Infusoria freely, the aquarist must decide whether he has the space to grow all the fry in the spawning. A single spawning can produce literally hundreds of fry and it is,

of course, hopeless to try and rear the lot when only one or two 2 ft. tanks are available. One must now either get rid of a large number of fry or rush out and buy a lot of tanks and equipment. But the novice does neither of these things; he hangs on to all the fry, with the result that none of them grow well as they are hopelessly overcrowded and probably starved into the bargain.

It is very difficult, if not impossible, to feed such large numbers of fish adequately without fouling the water. Soon the youngsters begin to die off and only a few fry are left. Only skilled handling could nurse these few surviving, half-starved fry back to health. This skill and knowledge is rarely forthcoming, with the result that either all the fry are lost or only an odd few runted fish are produced. How much better would be the result if the aquarist, realising the limitations of his apparatus, facilities and available live food, culled his spawning at an early date. He could then concentrate his live-food resources to feeding a few selected fish rather than squander food and effort on hundreds of fry doomed to certain death by the lack of tank space.

A common question asked by the aquarist is: how many fish can be reared to an inch size in the standard 2 ft. tank? There is no easy answer to that question; it depends on the species and on the skill of the aquarist. The skilled aquarist, assisted by aeration, filtration, partial changes of water, etc., can rear well over 100 fish. The novice would be well advised not to tackle more than a couple of dozen; later, as experience is gained, larger numbers may be safely handled. The culling need not be, in fact should not be, done all at once, but in stages. Discard all but, say, 100 fry at the first culling (Infusoria stage). Later cull selectively, retaining the fastest growing and most colourful and discarding the deformed and runts. Do not throw the culled fish down the drain; they make excellent live food for adult fishes.

Temperature Fluctuations

Most adult fishes will not be harmed by considerable fluctuations of temperature if these do not occur too suddenly. Fry, however, will not tolerate this type of treatment. For optimum results the temperature in the fry tank must be held fairly constant at about 78°-80° F., at least for the first 2 or 3 weeks and preferably till they have reached ½ in. size. I have seen quite a few successful spawnings lost by attempts to rear fry in aquaria with make-shift heating arrangements.

Variations in the size of Fry

In a well-reared shoal of fry there should be very little variation in size between individuals. There will always be a few odd fry that grow faster than others and a few that will never make decent-sized fish. This is unavoidable biological variation. But in a badly looked-after shoal this difference is exaggerated, and a tremendous variation in size of fry will be seen. This is mainly due to improper weaning from small- to large-sized food. During various phases of fry growth the aquarist has to change over from small- to large-sized food (e.g., from Infusoria to micro worms or from brine shrimps to *Daphnia*). How this is done needs some consideration. For too early or too late a change are both undesirable.

If the change from small to large food is unduly delayed growth may be retarded, and if this is persevered in for any length of time serious damage may be done. This is perhaps due to the fact that the fry will have a hard job getting in enough food in a given time when it comes to them in unduly tiny morsels.

The result of introducing the large food too soon would be: (*a*) if the food is hopelessly too large it will not be eaten at all and will foul the water; (*b*) it may choke some fish; (*c*) the few more-advanced larger fry in the brood may be able to take the large food while others will not. The big ones will therefore have plenty and grow fast while the others will fall behind and probably die or be eaten by their larger brothers and sisters.

Too early an introduction of a large-sized food is one of the surest ways of increasing the naturally occurring variation in size among fry.

The change over should, then, be gradual and correctly timed. Be sure that most of the fry are ready for the change. Try a small quantity of the larger food and see if they can take it comfortably. If the majority can manage it then place this food on the regular menu but also continue the smaller food for the benefit of the less forward.

Just one other point: remember that fish have larger mouths than their appearance suggests, so do not delay unduly trying that larger-sized food.

In this article I have outlined the common major pitfalls. But this by no means comprises the total list. Successful fish breeding depends on attention to hundreds of details and the power to discriminate between that which is essential and vital to success and that which is superfluous and useless or even detrimental. It does not depend on any rule of thumb but on an intelligent understanding and application of fundamental principles. To copy slavishly methods without fully understanding the logic and reason behind each step can only lead to repeated failures. There are no secrets, there are no short cuts, but it can be done if you are prepared to make an honest effort.

Care of the Garden Pond in Winter

by JACK HEMS

WHEN winter comes, it does not mean that the garden pond can be left to look after itself until the following spring. It needs as much care and attention as the flower-beds and borders; for, if it is neglected, it will soon become a smelly eyesore, and a death-chamber rather than a pleasant home for the fishes.

For instance, dead and decaying plant leaves and stems should be removed as soon as they are noticed, and wind-blown leaves should not be permitted to accumulate in a soggy mass on the bottom.

If the pond freezes over, break a hole in the ice to allow the escape of noxious gases, and, at the same time, permit the entry of fresh air. But in breaking ice on a pond, do not do this with any violence. A heavy blow with axe or hammer can shock the nervous system of a fish so badly that its death may result at once, or in the very near future. It is wiser to drill a hole in the ice, or soften it with boiling water, and then twist a way through with a pointed file, poker or chisel.

During very cold weather, most fishes are dormant, or semi-dormant, and do not seek or even need food. In prolonged spells of mild or sunny weather, however, the fishes will be stirred into activity, and will look for food. A few earthworms, pieces of lean raw or cooked meat, or a sprinkling of coarse-grained dried food thrown into the water, will satisfy them.

Generally speaking, the fishes should be crammed with food during the late summer and autumn so that when winter comes their bodies are in a fit condition to with-

(*Please turn to page 245*)

MARINE CONVERSION

by M. H. ROBINSON

MARINE aquarists have a unique range of creatures available to them at the nearest seashore; these far exceed in variety and interest anything which is available to the tropical aquarist. Near my new home were the incomparable clear seas of relatively unspoiled Cornish coves, whose rock pools teemed with rare and interesting marine animals.

As a tropical aquarist cut off from the main stream of the hobby by removal to the extreme south-west it might seem inevitable that I should become a marine "convert." In fact my conversion took some considerable time. The main difficulty seemed to be, according to all the articles and books on the subject, that marine aquarium-keeping was a highly specialised, uncertain and very complicated business.

In my experience this simply is not true. Keeping a suitable selection of marine animals requires no more care than maintaining a good tropical "community" tank and the marine tank can certainly look equally attractive.

An angle-iron aquarium is quite satisfactory provided that it is glazed with a suitable bituminous glazing compound and the frame is well protected with a non-toxic bituminous paint. A pleasant appearance can be given to such a tank by covering the frame with a self-adhesive coloured plastic material such as Fablon or Con-tact. Incidentally, this improves the appearance of an ordinary tropical tank. Natural sea water is essential and can be collected from rocky coastlines or bought. If littoral species are chosen for stocking the aquarium they will be found to tolerate a wider range of temperature and more variation in salinity than non-littoral species. Filtration is not essential if care is taken to prevent overfeeding. Even aeration, though useful, may be dispensed with.

At an early stage it was decided to specialise on anemones in my marine "show tank" (36 in. by 12 in. by 8 in.). A wonderful selection of anemones was available locally, many of which are common on rocky shores all round the British Isles. Most of the littoral anemones are seldom

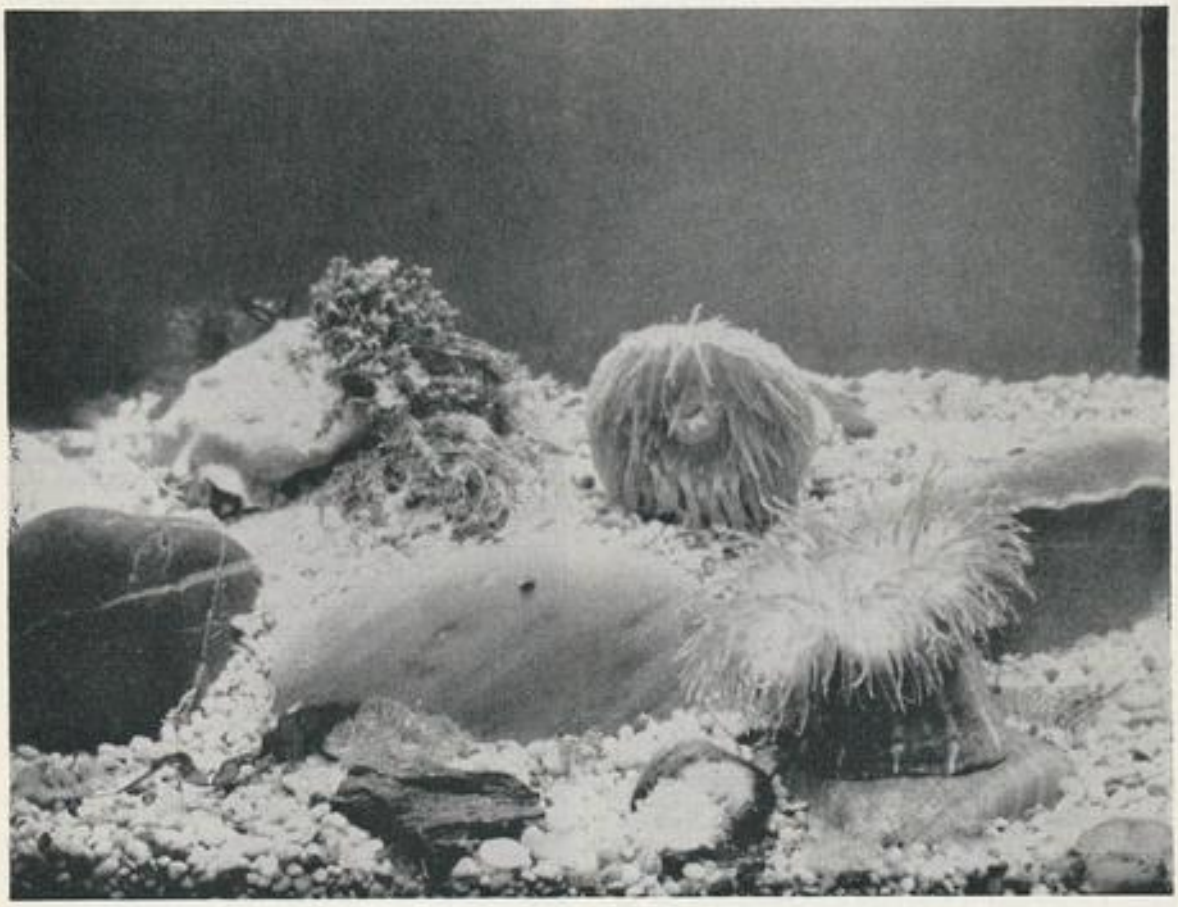


Photo: M. H. Robinson

seen in the larger public aquariums and are seen to best advantage in small "home" aquaria. A tank of sea anemones is by no means a static display of "sea flowers" but a constantly changing picture varying from delicate beauty to the grotesque other-worldliness of a Salvador Dali painting.

Marine Aquascape

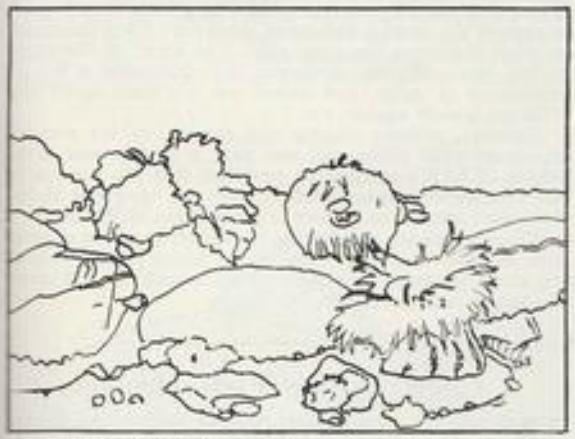
The dominant figures in the marine aquascape are two parasitic anemones which look like humbug-striped willows, but which occasionally collapse into amorphous masses suggesting "the morning after." Bright red is provided by a strawberry beadlet and also by a dahlia anemone, still alive after 6 months, despite its reputation for being "difficult." A delicate red-speckled pimplet spreads translucent pink tentacles like a leafless tree, and buried in the sand with only their flower-like disks visible are four daisy anemones ranging from pink to purple-brown. The beautiful *Sagartia anguicoma* on occasion stretches forth like a tall, graceful trumpet in brown and gold. The latest acquisition is *Corynactis viridis*, a beautiful green anemone with red tentacles, each with a knobbed end.

Besides the anemones, which are set against a background of gravel and serpentine rock, the tank also houses a worm pipefish (male), a green wrasse (4 in.) and a small rock goby. Crustaceans are represented by two large prawns and two spider crabs. The prawns, spider crabs and a hermit crab act as scavengers. Two species of the green alga *Ulva* are growing on stones.

Maintenance

The water has not been changed since the aquarium was set up and has remained perfectly clear. Aeration is provided for 1 hour per day. Filtration has not proved necessary. The inmates are fed twice a week and my experiments have shown that all the animals named above can be kept alive and healthy on a diet of earthworms and raw meat. Normally raw mussels provide the main food, as they are readily available. The anemones are fed by aquarium tongs so that food does not drop to the bottom where it might decompose unnoticed.

Collecting new and unusual specimens is a source of endless fascination. Whether one is fortunate enough to live close to the sea or merely visit it on holiday, this collecting can be made more enjoyable if the creatures so obtained can be kept alive at home in a marine aquarium.



Key to photograph of the author's aquarium: 1 and 2, parasitic anemones; 3, red-speckled pimplet; 4, daisy anemone; 5, common prawn

Occupants of a 36 in. by 12 in. by 8 in. aquarium

Anemones
- 2 Parasitic anemones (*Calliactis parasitic*).
- 1 Strawberry beadlet (*Actinia equina* var. *fragacea*).
- 4 Daisy anemones (*Cereus pedunculatus*).
- 2 Gem pimplets (*Bunodactis verrucosa*).
- 1 Red-speckled pimplet (*Anthopleura balli*).
- 1 Dahlia anemone (*Tealia felina*).
- 3 — (*Sagartia anguicoma*).
- 2 Jewel anemones (*Corynactis viridis*).

Crustaceans
- 2 Prawns (*Leander serratus*).
- 2 Spider crabs (*Macropodia rostrata*).
- 1 Hermit crab (*Eupagurus bernhardus*).

Fishes
- 1 Worm pipefish (*Nerophis lumbriciformis*).
- 1 Green wrasse.
- 1 Rock goby (*Gobius paganellus*).

My method of spawning and rearing

The Glowlight Tetra

by WALTER BISSET

THE aquarium I use for breeding glowlight tetras is 18 in. by 10 in. by 10 in., and after it has been thoroughly cleaned with ammonia it is set up as follows.

On the bottom a good deep covering of Dorset pea pebbles is placed after they have been boiled in water and cooled. Tap water (Edinburgh supply) is added to a depth of 7 in. No plants are used but strands of Nylon of the thickness of 2-ply wool are boiled in potassium permanganate solution and placed in the aquarium. The fish seem scared of the white Nylon but drive through the brown-stained treated fibres. Water temperature is raised to 76°F. by means of a submerged heater, which I cover with the Nylon strands (a procedure described in *The Aquarist*, November 1957, page 171; it was suggested that this would prevent burning of young fry attracted to the heater by its glow).

After 2 days I introduce the fish, two males and one female glowlight, and then suspend in the tank water a Nylon stocking containing two handfuls of peat. This is left in for 1 hour and then as much of the water from the peat as possible is squeezed out into the tank; after this the peat is removed. After two dawnings have passed eggs of the glowlight can usually be seen.

The adults are removed at this stage and the aquarium is covered with cardboard, which is left in position for the next 14 days and then gradually taken off (sides first, then front and top last). I start giving Infusoria after the fourth day, micro worms on the fourteenth day and brine shrimps on the twenty-first day, followed by sifted *Daphnia* and chopped white worms. At 5 weeks of age the fry are transferred from the breeding tank to a 36 in. aquarium.

I am sure that many aquarists have been successful with glowlights but have thrown the fry away without knowing it, for they are very difficult to see and are very nervous. This is why the Dorset pea stones are, in my opinion, a "must." With one spawning I had I never saw more than

(*Please turn to page* 245)

Microscopy for the Aquarist—38 *by* C. E. C. COLE

HOW are your specimens which we have left soaking in methylated spirits for the last month? Remove them, if you haven't already done so, and untie the two glass slips. Carefully separate them so that all the beetle remains adhering to one of them. Careless handling at this stage will break the creature into several pieces.

Place the slip with the beetle on it into a saucer of clove oil (if you have decided to use this in preference to Euparal Essence). If the beetle has floated off the glass slip it can be carefully removed into a smaller container of clove oil (a staining pot), and examined under a low-power lens on the microscope stage. This method of treatment has several advantages, for one can watch developments and check on the success of previous steps taken. It is now that a growing feeling of excitement is experienced if we have worked well. The beetle will show in perfect detail all its external features. Its internal organs have been removed, remember. We can use high-power lenses to examine further details of the wing structure, sex organs and suction bristles, etc. Care must be experienced, however, and it might be as well if we restrain our impatience until we have finally mounted and covered the insect.

It cannot be stressed too strongly that throughout all the processes all containers should be closely covered to prevent the ingress of dirt. Even a tiny particle of dust may be thicker than the beetle and will interfere with proper sealing of the mount when the time comes. Do everything possible to ensure absolute cleanliness. Believe me, this is a task indeed in our gritty and dusty industrial areas. Don't be put off because of difficulties, however. Remember to uncover the beetles only for the time necessary to perform some essential operation. Don't go off to lunch or answer the telephone with the creatures exposed to a rain of dirt.

After an interval soaking in the clove oil the transparency of the specimen will be appreciably increased. What actually occurs is that the clove oil brings the refractive index of many parts of the insect closer to that of glass and thus allows greater amounts of light through. It cannot raise the index of all parts to the same degree. If it did we should see nothing at all when we looked through our microscope at it. It is the differences in the refractive indices of the various parts which introduce contrast and show us details.

There is no hard-and-fast rule as to the time we must allow to obtain the best results. It depends upon the size, thickness and density of the specimens. This is another reason for checking the process through the microscope. Not that you are chained to your instrument—it will take a lot longer than 5 minutes to clear almost any specimen properly.

You will find your sable-hair brush very useful for removing the specimen from one liquid to another. Having wetted the brush, however, don't place it down on a dusty surface unthinkingly between operations. This is one of the best ways of introducing dirt into or on to the specimen. Put the brush straight into a small quantity of the same liquid you are using, and wipe off the old liquid before using another. Two or three brushes, one for each liquid, is the answer if you are like me.

When the specimen is successfully cleared it is ready for mounting. For beetles and many other aquatic creatures I prefer to use cavity slides. They possess the advantages that they will accommodate specimens which are thicker in some parts than in others and the mountant stays in the cavity and does not run all over the glass slide. For tiny creatures, of course, they are unnecessary. For very large creatures, like some of the caddis flies' larvae, however, it is impossible to obtain sufficiently large cavities, so these larvae are mounted upon flat-glass slips and covered by large rectangular pieces of cover glass.

Use whichever type of slip you find best—try with both. Place the beetle upon the slip you have selected and see that it is arranged properly, i.e., showing to the best possible advantage. Then take a drop of balsam and gently lower it upon the insect. Upon contact it will spread rapidly over, round and under the insect. Do not *drop* the mountant upon the specimen, as if you do it will probably take air down with it or trap air in tiny pockets on the insect. Air bubbles are a fearful nuisance to microscopists. They form whenever work is not perfect, and so often it isn't.

Now pick up a cover glass, holding it by the edges or in a pair of forceps, not with thumb or finger on one side and finger or thumb on the other. It is assumed that the cover glass is scrupulously clean—free from the slightest trace of grease, etc. Gently lower one edge of the cover glass until it touches the balsam and lower it as far as possible before releasing it altogether. Again do not drop it on the specimen in case air is trapped beneath it. If done correctly, the balsam will spread evenly without any air bubbles at all, merely by the pressure of the cover glass.

Frequently in the beginning it will be found that the glass is not accurately placed. This is not of great importance for it can usually be slid into the correct position by gently pushing with a needle from one side. It might happen that the cover glass will not lay horizontally because the balsam is too stiff. Should this prove to be the case, very slight heating of the balsam will soften it.

The slide is now ready to lay aside for drying. Again slight heating will hasten the process, but if this is resorted to, great care must be taken to avoid boiling the balsam, as this may disarrange the specimen, and also make the mount extremely brittle.

If Euparal Essence and Euparal are used, the procedure is the same as outlined above, the Essence being the clearing agent and the Euparal the mountant.

It is almost certain that too much mountant will be used and that the surplus will squeeze out beyond the cover slip to make a sticky mess. Cover the slides while they dry. When they are dry, the warm blade of a knife can be used to remove the surplus mountant, great care being exercised to avoid displacing the cover slip. The ideal, of course, is to use just sufficient mountant, but this takes a lot of experience to judge, and unless you are dead lucky the odds are heavily against you.

Although without ringing and removal of the surplus mountant your slides will not have a professional look, this is of little consequence provided that the surplus is not over the cover glass itself in lines and spots and blobs. You must attempt to remove any blemishes of this sort.

There is extreme satisfaction in examining a slide of your own manufacture. They are by no means expensive and the scope is almost unlimited. Next month we will carry the subject a little further.

Cacti in the Fish House

DO not try to take any cuttings during the winter months. It is more than likely that instead of forming roots the cuttings will rot. It is only when there is the maximum amount of daylight and sunshine that it is safe to take cuttings.

Fancy Goldfish Breeding—13

by A. BOARDER

13. The Comet

THE comet goldfish is a great favourite with most pond-keepers as it is a fish which moves about well in a pond and is very active. It should be as hardy and easy to keep in the pond as the common goldfish. Unfortunately there appears to be a very few good comets about these last few years.

I tried to create an interest in this handsome fish a few years ago and collected names of several aquarists who were specially keen on this variety. However, the fish seems still to be quite uncommon. There may be several reasons why this is so but it would be mere conjecture to suggest what they all are. When the Federation standards were brought out in 1947, the comet was depicted as having a large well-spread tail with a rather small caudal fin of a somewhat peculiar shape. This frightened away many comet fans, who thought that it was almost impossible to produce a fish of that proportion. Generally speaking, the fish with a large tail has a large dorsal and it is no easy matter to be able to get a strain of fish which does not conform to this rule.

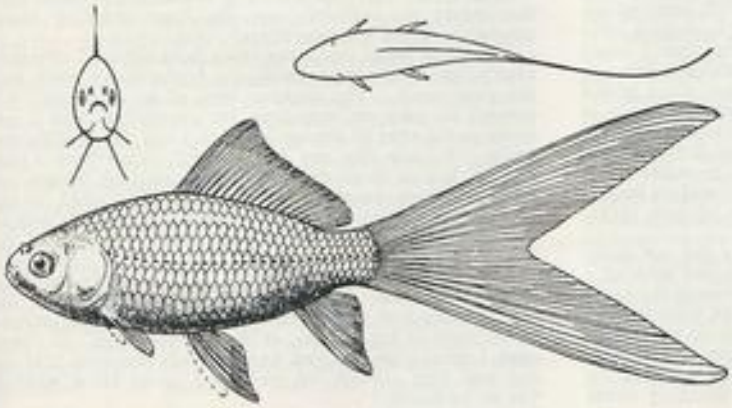
Another point about the comet which did not find favour with many aquarists was the fact that so many of the breed in existence then took so long to change colour from the original bronze to the gold or lemon. I remember seeing some quite large and well-shaped comets at one of the fine Watford shows about 9 years ago, but they were nearly all uncoloured. It is always difficult to get into any strain this tendency for quick colouring. One has sometimes to ignore a bad fault in body or fin shape to include in the strain a few fish which do change colour early. A very good plan to adopt when the breeder wishes to improve the quickness of the colour change is to watch all the youngsters of a spawning and put to one side all those which change colour early.

In no strain of scaled fishes will the colour change coincide in all the fry. There will always be one or two which change much earlier than the others of the same spawning. These are the ones to keep to see if they develop the other required points. They can then be included in the parent strain. Not that it is an easy or quick thing to do, as cold-water fishes on the whole take some time to mature and breed, so that one needs plenty of patience when trying to establish any particular feature in a strain. My scaled fantails are noted for their quick colour change, but it took years to get this tendency inbred into the strain. Even now among a few hundred youngsters will be found a few which change colour at as many weeks as it takes months for other fish of the same hatching to change colour.

One strange feature is apparent, however, in my strain and that is that sometimes the fish which change colour very early, when they are quite small, develop some silver markings on them. However, one must never expect to get 100 per cent. of ideal fish from a strain, but a few really good ones will repay the breeder well for all his trouble and patience. It will take about 3 years to know if your young comets will be good enough either for show purposes or for breeding from. As with most of the fancy goldfish the tail will continue to grow and develop long after the rest of the fish appears to have finished its development. Therefore one must not expect the comet to be a model of the standard for some considerable time. However, I do not want to put anyone off from trying to establish a good strain of these handsome fish. I only wish a few experienced breeders would get together and decide to breed all the fairly well-known varieties of goldfish. I am sure it would be a most satisfying project.

Let us examine the requirements for a good comet. First of all, as it is a swift-swimming fish it must be well streamlined to enable it to cut through the water easily. The body should have the upper and lower contours approximately equal, with graceful lines; it should be slightly compressed but have no ridge on the back. What is meant by this latter is somewhat vague, but I suppose that the back should not be thin enough to show the backbone shape on top. The depth of the body should be less than half the length, and the tail should be long with the lobes straight and pointed. The spread of the fin is to be much less than the length. Thr dorsal fin should be erect, with the front edge evenly curved, the upper margin slightly concave behind the front lobe. The pectoral, pelvic and anal fins should be distinctly pointed.

The comet should be metallic for show purposes, and is the only fish except the moor which is not allowed in the nacreous or matt colourings. The colour is to be either a rich red or rich chrome-yellow. The variegated is to be in two or more colours in a pleasing pattern, but what these colours are expected to be apart from the usual red and



Characteristic features of the comet goldfish as portrayed in the Federation of British Aquatic Societies book of Coldwater Fish Standards. Minimum length of the fish is 3 in. excluding the tail (caudal fin)

silver we are not told, nor yet what constitutes a pleasing pattern.

When breeding comets it is essential to use only those parent fish which have the stream-lined body with the long tail. The tail should not be too soft and flowing but should be well held out behind the fish. Thick-bodied fish must not be used. Do not be too particular as to colour when starting, unless you are fortunate enough to possess a pair which are well shaped and of a good colour as well. Although one should not forget the value of colour this can be obtained later on in the strain. As this fish is essentially a pond fish it is necessary to see that from the age of about 2 months no artificial heat is used for the youngsters. If a spawning can be obtained by May, then the water is likely to be in the lower seventies naturally all through June, July and August. This is quite all right; there will be plenty of time to get the fry used to cool conditions once they are about 3 months of age or more.

As for feeding, they are not fussy, and will take all the usual goldfish foods. One would think that it is better to feed extensively on live foods and to refrain from too much starchy foods, but this point is open to question. I am not too sure myself that this makes much difference; one has to breed for shape, not feed for it.

In sorting the youngsters it must be remembered that the comet is a single-tailed fish and must have a single anal; if it is double then the fish would be disqualified at a show. See that only those fry with a good-shaped dorsal fin are kept to grow on. The pectoral and pelvic fins are not likely to vary very much. Keep only those fish with a good body shape, although the feature may not be well marked until the fry are at least 3 months old, according to their rate of growth. The youngsters should be a couple of inches long over all by the autumn, when they can be introduced to the out-door pond. They are not likely to be eaten by the parent fish when of this size, and being good fast swimmers they can take care of themselves quite well. If any of the fry show signs of changing colour the same year that they were hatched then they are the ones to keep for breeding purposes, provided of course that the other necessary features are present.

When purchasing comets for breeding purposes try to find fish with well-developed tails and with stream-lined bodies. As to colour, you may not have much choice here, but if any of the fish are still bronze try to find out how old they are. If they are over 3 years and have not changed colour they are not of much use to you for establishing a strain. When conditioning the parent fish for spawning see that the fish have plenty of swimming space and that they are fed with plenty of garden worms. I know of nothing better for conditioning most fishes than the ordinary worm.

As a healthy pair can produce a few thousand eggs there is no need to try to get too many fish for a beginning. Two or three good fish are better than a dozen of doubtful parentage. Of course, as with all fancy goldfish it is most important when buying fish for breeding that you know the type of strain the fish were bred from, so that you will not be wasting time with poorly bred fish. The fish from a well-established good strain are more likely to produce good youngsters, even though they may not look anywhere near perfect themselves: it is breeding which counts.

Looking Back

by A. BOARDER

I HAVE just realised that it is 50 years since I wrote my first articles on fishes. I would be interested to see them now but no doubt they were not kept for very long. Actually I wrote a series of articles for our school magazine which appeared once a month and was all hand-written. Besides the series on fish I also wrote a serial school story. Perhaps it is just as well that I cannot see what kind of material I was producing then.

The articles on fishes were not for the aquarist but were intended for the angler. Although only 13 years of age at the time I had had plenty of experience in angling. My father was a great fisherman and from the time I could walk I had accompanied him on his expeditions as often as I could. Our summer holidays were always spent in the vicinity of fresh water and I was always eager to be up at 3.30 a.m. for a chance to catch a few choice roach or perch. I had caught all the types of coarse fishes before I was very old and my series of articles in the magazine dealt with a different fish each month. The fish and its haunts were described and then I gave the type of bait, tackle and rod required.

Not that the aquarist side of the hobby did not come into my life in those days, as I was hardly ever without a jar of fish, a pond in the garden or a fish or two in the water butt. Long before I wrote the articles I had tried to keep many freshwater fishes and I was expected to keep alive small roach and gudgeon for live bait for my father to go pike fishing. I was rarely able to keep these fishes for long and generally had more success at breeding newts than I had with fishes. My first fairly large tank was always springing a leak and gave more trouble in my bedroom than anything else. No spring ever went by without I had a few jars of tadpoles of frogs and toads.

Once I was in my bedroom I was in a world of my own. I had canaries breeding on the wall, jars of fishes, newts, caterpillars and silkworms on a table, and the mantle-shelf was filled with jars of anything which lived. It was a zoo in miniature, and a cupboard contained the museum. This had many fossils, shells, etc., and a collection of butterflies and moths, to say nothing of the birds' eggs. I know that I got far more pleasure from my live stock than I could ever have obtained from toys. The excursions I had with my brother to ponds on the outskirts of London in search for live stock are very vivid in my mind. I shall never forget the trip to Epping, when we caught several pairs of breeding frogs and had them in a bait can under the seat in the train coming home. Imagine our consternation when we suddenly saw the frogs crawling about among the feet of the passengers!

I can still recall particular trees from which I obtained caterpillars of the puss moth, the poplar-hawk moth and the goat moth. The slightest sign of an eaten leaf was enough to start me searching for caterpillars and I got to know the type of damage done to a leaf by the different grubs. I think that my first goldfish came from a fair ground, but in those days a goldfish could be bought for a penny. Even this was a bit tricky for me as I had for my pocket money one-halfpenny a week. Even this would buy 2 ounces of sweets then and so was not to be sneezed at!

Looking back I realise that I had far more fun and interests in those days than the modern boy with his almost unlimited pocket money and ready-made amusements such as the cinema, radio and television. In those days I envied no-one and had so many interests that no day was long enough for me and I never knew what it was to be bored.

AQUARIST'S Notebook——

by

RAYMOND YATES

THE use of urethane and sodium amytal as anaesthetics where fishes need to be quietened is pretty general in this country, but it now seems that another chemical aid is in use. Writing in the American magazine *All Pets*, Robert Gossington gives some interesting details of a new drug called MS-222 or Tricaine-Sandoz, an anaesthetic most useful in working with fishes or other cold-blooded animals. Present use seems to be restricted to game-fish hatcheries where it quietens the fish during stripping, marking and measuring operations. It is also being used in schools and laboratories for experiments and demonstrations with fishes, amphibians and even flatworms. In shipping fishes Tricaine is used in conjunction with oxygen. As many as 500 goldfish have been sent in closed plastic bags by parcel post, travelling for 48 hours in 2 gallons of water. The combination of the drug with oxygen was the secret; neither agent alone would prove successful under these conditions. The drug can also be used for sending numbers of pugnacious fish together, as, for example, male fighters. The tranquillising effect of the drug will be a big help with this variety and possibly with piranhas.

The sole source of supply at present is the manufacturer, Sandoz Pharmaceuticals, U.S.A. Low cost makes its use practical, only 0.14 grain of Tricaine per gallon of water is needed to tranquillise goldfish shipments (with oxygen), and a very little higher concentration immobilises fish so that they can be sorted and counted. If the fish are put in fresh water they revive quickly, as with other drugs of this sort. In lower concentrations they can be left for hours (as when shipped) but with the higher concentrations with more complete anaesthesia they must be revived within 10 to 15 minutes of immersion. If proper care is taken in administration the fish will return to normal activity with no after-effects.

* * *

Mr. Preston of Kirby Lonsdale, almost in Westmoreland, enjoys the hobby in spite of being in a rather remote area. He tells me he has been successful in breeding fighting fish by taking away the nest from the male and putting it in a glass dish for ease of observation. Some of the eggs sank to the bottom on removal but others tangled up in the floating *Riccia*. He noticed 24 hours later that the eggs on the bottom were jumping about, and at 30 hours they were very frisky indeed, so he increased the temperature from 80° to 84° F. with external-thermostat control. Four hours later the eggs hatched and, after 2 days, he fed the fry on Liquifry and micro worm for 8 days and then on brine shrimp. Three weeks later he counted over 70 young. He noticed that they seemed to hide a lot, so he put in a few newly born platys (about half a dozen) and these tended to bring the fighters out more in the daytime to feed. However, he does not advise leaving these in for too long a time as they grow much more quickly than the fighters, but they serve another purpose in cleaning up food which falls to the bottom of the tank. Mr. Preston uses a small all-night-burning lamp to encourage all-night feeding. This is a V. and F. Moonlamp transformer lamp, A.C. only, 200/250v; 50/100 N. Bulb 6 v, 3 A (600 hours for one unit). The lamp is placed over a hole in a hardboard cover and this gives a beam of light which attracts brine shrimp and the fish. The 6 v lamp does not give off much heat.

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Of all the difficulties which confront dealers the one which puzzles them most is why customers transfer their allegiance elsewhere. Hobbyists are only like all other customers, they appreciate real and personal interest, courteous attention, sound advice, dependable service, cleanliness, efficiency and honesty. They like to see the names of all fishes on display and their prices, and they prefer a shop where they are not badgered to buy and where there is a wide selection from which to choose. They dislike being kept waiting, ridiculous prices, poor service, pushing salesmanship, undersized fishes and overcrowded tanks, weak display, poor lighting, dirty tanks, assistants with little real knowledge and the "couldn't-careless" attitude. A professor at Oregon University made a survey some years ago of nearly 22,000 customers of 26 different types of stores. Each one of these people was asked to give the reason why they had discontinued shopping at a particular store, and the results when collated proved most interesting: 51 per cent. left because of faults in salesmanship and service, 35½ per cent. left because of prices and quality of goods and 13 per cent. left because of managerial faults. Itemised in full the results were: 8½ per cent. left owing to indifference of salespeople; 9½ per cent. left because of ignorance or misrepresentation of goods; 6 per cent. left owing to haughtiness of salespeople; 7 per cent. left after attempted substitution of goods or tricky methods; 14 per cent. left because of delays in service and errors; 23½ per cent. found prices were too high; 12 per cent. left because of the poor quality of the goods offered; 4½ per cent. left because of poor store management or layout and some 8½ per cent. went elsewhere as a result of wrong policies, reluctance to exchange goods or for other reasons.

* * *

Aquarists are fortunate insofar as their hobby does not expose them to the risks of catching any form of disease from their pets. Other pet owners are not so lucky, and there is a certain risk (if small) with some types of pets. I have not heard yet of any fish fancier who has developed rheumatism through getting wet hands, and so far nobody has been electrocuted whilst messing about with electrical gadgets in the hobby. Perhaps it might be possible to pick up some form of fever from carelessness with *Tubifex* but I know of no instance having occurred as yet. Psittacosis or ornithosis has troubled the bird world to some extent, but it is now reported that this disease (which humans can get) is yielding to use of antibiotics (aureomycin and Terramycin). Feeding with seed medicated with antibiotics for 2 weeks will wipe out the disease in birds.

The trouble with all this is that such seed is expensive and that people may underfeed or not keep up treatment long enough. When added to birds' drinking water in sufficient strength to be effective the birds will not drink it. Birds cleared of the disease are not immune thereafter. Antibiotics have been tried in fish foods but results have been poor, probably because these substances are highly soluble in water. Many fish troubles are cleared up, however, by these wonder drugs, and 500 mg. of Terramycin hydrochloride per gallon is highly efficient within 48 hours of the start of treatment. However, it is wise to repeat treatment daily for 5 days. Antibiotics are very costly, and fishes should always be treated in separate quarters, never in the furnished tank. It is of interest to record that in psittacosis, penicillin arrests cell division of the organisms but they continue to grow and large forms develop, whereas with aureomycin and Terramycin initial body formation is prevented and they almost completely

inhibit growth of the organism although they do not destroy it.

* * *

Some time ago I wrote on the theory of "What's in a name?", but the way things are going it will soon be quite a job to find names for new exotic fishes. Scientific names are all very well in their way but the average hobbyist prefers a popular name, a pet name for his fishes, and most of the favourites have such. Generally speaking these names are names of animals, names of types of people, names connected with natural conditions or precious stones. For example, animals supply us with tiger, leopard, cat, dog, zebra, lion, dragon, sea-horse, flying fox, peacock, penguin, parrot, turkey, cow, sheepshead, wagtail, butterfly, mosquito, bumble bee, wasp, chameleon, rabbit nose, snakehead and elephant nose; natural conditions with sun, moon, star, rainbow, dawn, fire, weather, sunset, white cloud, moonlight to name a few. Gems are jewel, pearl, opal, ruby, diamond, platinum, silver and gold whilst types of people are legion . . . dwarf, giant, nigger, clown, devil, pigmy, ghost, convict, coolie, bishop, archer, damsel, widow, harlequin, pompadour, sergeant major, angel and so on. Surprising how many fishes still have no popular name!

* * *

A friend was telling me recently about his butterfly fish, which are not in every aquarist's collection. Quite apart from being expensive to buy they are in the "difficult" class and also lack colour and frequent movement. He feeds them four or five mealworms each on the end of a stick about five times a week. Flies are rapidly accepted but any food which sinks is ignored and never under any circumstances eaten. When these fish are about to die they retire from the surface to the bottom layer of the tank (lower third) and go off food completely. When off colour they also act in this way, and all too often this sickness is fatal.

* * *

The Canadian National Fish Exhibition at Toronto was a great success, with 31,520 people visiting the show, an increase of 2,309 over the previous year. The attendance would have been even better but for the most inclement weather. It seems that Britain was not alone in the summer "wash out." The trade stands sold a lot of aquatic literature, which is usually considered a very good sign. The judge found two entries which had not been seen before and the award was therefore based on the probable appeal to the public of the fish in question. A new method of pointing!

An advertisement in a Canadian paper offers for sale a 100 gallons fish tank, 6 ft. by 2½ ft. by 2 ft., made of ¾ in. waterproof plywood, marine-glued construction with 1 to 3 in. stiffeners. The main advantage of plywood over glass tanks is said to be the heat-insulation value which assures stable temperatures, plus the high strength of plywood. Price asked was about £26. Yet another advertisement appealed for guppies. These were wanted, any size and quality and any number, for use as winter food, definitely not for resale. Price offered: 7 shillings a hundred !

* * *

I am a great believer in change and I think many aquarists could adopt a policy of change more frequently with their tanks. The opposite of change is monotony as far as the hobby is concerned and change provides interests. Change the position of your tank to another part of the room; often you will find that it makes a world of difference. Change your tanks from room to room (the matter of wiring is usually of little consequence). Change your stock —I read recently of somebody advocating that every aquarist should get rid of all his fishes every 3 years and start afresh. There is a lot in this; many hobbyists restrict themselves to two or three varieties for breeding purposes. After three years they should know all there is to know about them and must be weary of seeing the same old familiar faces. Strike out with something fresh.

Change your plants from tank to tank, change your fishes into different tanks where you have more than one. Change your rockery: if all grey, change to all blue or red. Change your fish: try all one family, or all one colour, or two colours or two families, or all small or all large. Don't let visitors know exactly what they are going to see when they come in—the same old faces, the same old plant clumps and the same old rockery in the same old tank in the same old place. Variety is the spice of life. Of course, it is good for trade, but it is also good for you, for your interest will not go stale. Do you remember the dreary monotony of so many fish shows, rows of identical tanks, the same year after year, show after show, dull, dismal and devoid of imagination? The British Aquarists' Festivals in Manchester got away from the killing monotony and attracted the crowds with something very different.

Look at your fishes, your tanks, your plants and rockwork, your set-up. Can they be improved? Try a few changes and get a new interest. Change often works wonders for those fishes which hide away when put in a tank; moved to new surroundings they lose their inhibitions and become very much to the forefront. I had some neons which refused to show themselves, yet once moved they never left the front glass. Don't ask me why, it just works that way! Many plants benefit from changed surroundings. Changing the food offered to your fish works wonders: give them real variety, not the same old stuff every day. Get out of the rut. If you are a barb expert, so what?—become a cichlid king. Finally, if you are one of the "never-change-the-water brigade," try changing a gallon a day per tank—you'll be surprised how much your fishes benefit.

* * *

Although most tropical enthusiasts use a hood and artificial lighting for their tanks it is the exception, rather than the rule, to find this being done with coldwater tanks. It may be that coldwater fishes are not considered "worth the expense" of electricity, or because coldwater plants being relatively local are cheap, replaceable and unaffected by electric light. Coldwater furnished exhibits at shows give the lie to this, and a visit to any public aquarium with coldwater tanks on display will give proof of the value of artificial lighting. Probably the real reason for our hobbyists being backward in this respect is the tendency of the lamps to heat up the top layer of the water, but this can be overcome by arranging the hood to fit flush at the front viewing portion, but to leave a 1 in. gap at the opposite side by fixing a match box as a prop. Low-wattage lamps can also be used for general running, these being replaced by higher values when visitors are expected. Fish colours show up very well indeed in ordinary electric lighting but are insipid in fluorescent. Coldwater fishes are just as at home under electric lighting as are tropicals and show no ill effects.

I have kept at one time or another about 30 different varieties of coldwater fishes and of these only the bleak seems (to me) to be uneasy in this form of lighting. Most of our native fishes are quite cheeky under artificial illumination and very ready for tit-bits dropped into the tank or left floating on the surface. In particular orfe, minnows, rudd, carp and goldfish, tench and bitterling do very well. To these must be added the American dogfish and catfish. Pike and perch are not worried but need really cold water, and other fishes such as trout, grayling and dace need cold, running water or very adequate aeration. Roach ignore the lighting but are hard to keep in aquaria, being so prone to disease. Loach and gudgeon do best in very shallow aquaria, which is not always suitable for artificial lighting. For ordinary purposes 15 or 25 watt lamps are best but stronger lighting will probably be needed (according to size of tank) if plants are to show increased growth. In any case, native coldwater plants will not grow in winter however much light you give them.

THE PEARL DANIO

by JACK HEMS

THE pearl danio or opalescent fish (*Brachydanio albolineatus*) from Burma and the East Indies, is one of the most delightful small fishes known to the tropical aquarist.

Its slender body reflects delicate metallic tints of pink, green, yellow, pearly grey and, in certain lights, sudden flashes of silver and gold. A pinky red stripe threaded with blue extends along the middle of the body to the bifurcation of the caudal fin. The eyes are dark like shining beads rimmed with yellowish silver. In the main, the fins are clear or hyaline, but the bases of the dorsal and anal fins are suffused with pink.

The pink colour in the fins darkens to a violet-tinged red when the fish becomes excited by the spawning instinct, or certain environmental conditions such as sunlight, a rising temperature or the sudden appearance of a natural live food (mosquito larvae or *Daphnia*, for instance) in the water.

Generally speaking, the male shows a little more colour than the female and, when ready for spawning, the female shows a distinct bulge or plumpness on the sides. Both sexes attain a length of about 2½ in.

Like the ever-popular zebra fish (*Brachydanio rerio*), the opalescent fish is an accommodating species, and a pair may be kept and bred in quite a small aquarium, say, one holding about 2 gallons of water. But as *B. albolineatus* is a very active fish it deserves plenty of swimming space.

Breeding the fish is not at all difficult so long as precautions are taken to prevent the non-adhesive eggs from being eaten so soon as spawning is completed.

There are several methods of protecting the eggs from the parent fish. One is to anchor bunches of willow moss, *Myriophyllum* or willow roots on to the floor of the aquarium in such a manner that the fish will be prevented from eating the eggs by the fuzzy barricade of stems and foliage.

Another way is to layer the floor of the aquarium with marbles or a carpet of broken flower-pot; for then the eggs will come to rest in the interstices of the marbles or chippings and remain out of harm's way. Then, of course, there is the so-called breeding trap. This may take the form of a small box with a perforated bottom which is suspended in the water. The fish are placed in this box overnight, and any eggs laid the next day fall through the aperatures in the bottom and so remain safe from interference. The aquarist may make his own breeding trap by tying a number of glass rods or bamboo canes in the form of a mat and suspending it midway in the water. As the fish chase about above it and the female ejects her eggs, these will fall through the grid of rods and settle on the bottom.

But whatever method of protecting the eggs is used, the fish should be removed to another aquarium immediately after spawning. The water in the spawning aquarium should average about 7 in. deep, so that the eggs will gravitate to safety in the quickest possible time.

At a temperature of 75 F., the baby fish should hatch out within 3 days. In another 48 hours they will become free-swimming. Directly the fry become free-swimming they will need Infusoria or dust-fine dried food.

Fed properly, and given a clean aquarium with a good natural or artificial light, the fry usually make rapid progress. Although fry may be raised entirely on dried food, small live food such as micro worms or freshly hatched mosquito larvae makes for better-shaped bodies and brighter colours.

A small shoal of opalescent fish creates a wonderful effect in a community tank of mixed small fishes. And as the fish is well-behaved and peaceful, it may be placed in the company of more expensive or rare species with every confidence of their not being nipped or driven away from food.

The opalescent fish has a life span of about 3 years, and can withstand a temperature so low as 65 F. without suffering any harm, though it is not a good policy to subject the species to a sudden drop in the temperature of the water, especially if it has been used to living in warmer water for a long period of time.

Care of the Garden Pond in Winter

(*continued from page* 237)

stand the subsequent months of cold. Badly fed fish, though they may survive the winter, soon show signs of physical deterioration when spring comes round again: fungus, swim-bladder trouble, split fins, eye troubles and the like.

The depth of water in a pond also plays an important part in safeguarding the fishes against the ravages of winter. In their natural state, fishes seek holes in a lake or stream bed and congregate in such depressions while intense cold lasts. In mild weather they venture forth from their frost-proof quarters and swim into the shallows. So in a properly designed garden pond there should always be one part deeper than the rest for the fishes to lie in when the temperature falls and icy conditions prevail.

A depth of 24 in. should give adequate protection in most parts of the country. If the pond is a small one, polythene or Windolite sheeting, attached to a simple wood frame, placed over the pond will help to prevent thick ice forming. But do not cover the pond with sacking or old linoleum to exclude the light. For if you exclude light the plants will turn sickly, die, and pollute the water.

Snow left on an ice-covered pond will have the same disastrous effect; so always sweep snow off the ice whenever it is possible to get out into the garden.

The Glowlight Tetra

(*continued from page* 239)

two fry at a time: in my log book entries for the fifteenth to the eighteenth days after this spawning read, "No signs of life." When I tip-toed into the dark fish room one evening and switched on the breeding-tank light I saw six or seven fry just for 30 seconds before they dived into the pebbles. Out of that spawning I reared 29 youngsters.

On one occasion no eggs appeared after I had put the adults together; then I realised that I had neglected to immerse the peat bag in the tank. I put it in and next day the eggs were present. Again, after this spawning I saw no more than 11 fry up to the twenty-first day, yet I reared 44 youngsters eventually.

In the Water Garden in February

by ASTILBES

AN interesting task for this month will be to plan improvements and alterations which can be made later on. Try to picture the pond as it will be in the summer, or at least how you hope it will look. Provided that a few essentials are taken care of there is never much doubt that the water plants will thrive well.

A question that often arises is, is it a good idea to add chemical fertilisers to a pond? This can be a dangerous procedure, especially in a small pond where fertilisers would be sure to upset the balance of the water and make it unsafe for the fishes. Any freshwater plant introduced into the pond can have some good soil to give it a start and then once it gets growing it will send out its roots into the surrounding mulm and thrive quite well. The best form of fertiliser for new plants is the John Innes potting soil. This contains all that is necessary for the plant and is sufficient to keep it growing until the roots are well established and able to search for what is required around the base of the pond.

One of the important tasks of the water plant is to assist in keeping the water pure. They do this by assimilating waste matter from the fishes and from decaying vegetation. If too much nourishment is provided by the pondkeeper then it is certain that the water plants will not be doing their clearing-up task as well as they should do.

Planning for Summer

When planning for the summer do not think of massing plant leaves all over the top of the pond, but see that the planting is so planned that there is always a vacant space where the water and the fishes can be seen. Too many leaves on the surface of the water can spoil the whole appearance of the pond; there must be a good proportion of the surface quite clear of leaves. To break the green and to enhance the beauty of the pond a good array of flowers of various shades is recommended. For this, water lilies must have pride of place; I know of no more handsome water plant than the lily.

There are so many named varieties on the market today that the newcomer to the hobby may be bewildered by the wide range. Any good nurseryman dealing in water plants will be only too pleased to advise you on which lilies are likely to do well in your pond. As a rule they are listed in three grades. One for very shallow ponds, one for medium and one for fairly deep ponds. Although the lists may be taken as a fair guide a great deal will also depend on the conditions available. For instance, a lily suitable for a medium-sized pond might remain small and stunted if it were planted in a small pot and was in a constricted space. On the other hand, some of the lilies for small or medium ponds would grow much larger if they were planted in a large natural pond with plenty of space and nourishment.

For colour in the lilies the reds give many shades, although mostly they are more of a claret instead of a true red. Shades can be had from deep claret to the palest of pinks and some of these pinks are among the most attractive flowers in the lilies. The lily *Nymphaea* James Brydon is still one of the very best, and the cup-shaped blooms of a rich carmine-red are usually borne in profusion. This is one of the best growers for the medium-sized pond. Another grand one is *N. Escarboucle*, with huge wine-crimson flowers. The flowers can get really large when the plant has plenty of space, but this lily is definitely not for the smaller pond. For a medium-sized pond, few lilies can surpass for a floral display throughout the summer *N. laydekeri purpurata*. This lily is generally the one which will thrive in almost any pond, given fair conditions. It can be kept under control quite easily and repays fairly generous treatment with a wonderful display of flowers.

A good pink lily is *N. marliacea rosea*, as the flowers are fairly large and fragrant, quite suitable for the medium-sized pond. A good white is *N. marliacea albida*; its pure white flowers are borne just above the water and they, too, are fragrant. There are several lilies bearing the name *marliacea* and all can be relied upon to give satisfaction.

Native Flowering Plants

For blue shades it is better to leave the lilies and try something else. Blue lilies are not hardy in most parts of this country, but, of course, they could be grown if a cable heater was inserted in the pond to keep the water from approaching freezing point. A very good blue flower can be obtained from *Pontederia cordata*, or the pickerel weed. This plant sends up shoots of shiny green leaves, of rather broad heart shape running to a narrow point. The flowers come on tall spikes and are a striking blue. This plant will grow well once it gets established but in a natural-based pond it can soon get out of hand if not severely dealt with every year.

For yellow flowers there is a choice of several plants but one of the best in the group is the genus *Caltha*. The kingcups belong to this, and their bright-yellow flowers can be among the first to open in the spring. The almost round shiny leaves are very attractive and the flowers are produced in profusion.

For a fine show of small white flowers there is a fine specimen in the native water crowfoot (*Ranunculus aquatilis*). The under-water leaves of this oxygenating plant are very fine and needle-like, but those which grow on the surface of the water are quite different. These are almost round and shiny, sometimes forming a dense carpet on the surface. In the spring hundreds of small white flowers the shape of buttercups are produced. In fast-running rivers this plant will produce only the fine under-water leaves, but if any piece manages to get established in a pool or sheltered part of the water the surface leaves are soon produced.

One of the most attractive flowering water plants is *Sagittaria japonica flor pleno*, which has arrow-shaped leaves held well above the water and flowers, borne on fairly long stems, which are pure white and resemble carnations. The only point to watch when growing this handsome plant is that the flowers are very subject to attacks by aphids. As it is always dangerous to try to spray water subjects with insecticides the best plan is to tap the stems to make the green fly fall off into the water.

The surroundings of the pond should not be neglected. A rockery adjoining an informal pond can add greatly to the amount of colour obtained. Provided that the rockery is near enough to the pond the reflection of the flowers on it can give a double picture. There is no end to the subjects for such a rockery and although a large number of the alpines flower in the early part of the year, it is possible by judicious planting to have something to flower afterwards throughout almost all the summer and autumn.

One of the most spectacular rock plants is *Aubretia*, which gives masses of purple flowers in the early spring. There are many varieties of this plant to be had in many shades of purple, red and mauve. Once it has finished flowering it is a good policy to cut it right back to keep it tidy. Fresh growth will then be made which will flower again the next spring.

Pond with an Underwater View

by R. G. HUMPHREY

(Photographs by the author)

MY garden pond has some unusual features, being partly sunken and partly raised with a plate-glass panel let into the raised wall, which faces the house. It is also equipped with underwater lighting, so that the fishes can be observed through the glass without them being aware of this at all.

Plans for the pond were carefully made. To include the glass panel it was necessary for part of the pond to be raised. After the excavations were made, an outer retaining wall about 21 in. high was built with broken paving stones. The deep section of the pond, giving about 30 in. depth of water, was formed with paving stones—two for the base and four forming a square box upon this base. This was fixed with timbering and a layer of concrete 3 in. thick placed all around it.

The top of the boxed deep part projected about 4 in. above the base of the part of the pond within the retaining wall, and in the centre of it. This base was sloped so as to give various depths, and then shuttering was erected inside the wall to allow for concrete to be placed to form a layer tapering from 9 in. thick at the base to 3 in. at the top. In this shuttering was incorporated a frame 36 in. by 15 in. to leave a recess for the plate-glass panel, and a reinforced lintel was placed over this frame.

With water at its normal level the top of this ¼ in.-glass panel is 3 in. below the water's surface. It is fixed in position with Ganderbak, which has proved quite water-tight. The whole job took 40 barrow-loads of concrete and five barrow-loads of rendering. A waterfall was made with the aid of an old shallow sink let in the ground and con-

In this picture the waterfall is at the corner farthest from the camera

Side of the pond containing the glass panel

An old shallow sink forms the reservoir for the waterfall at this corner of the pond. A pump feeds the sink with water from the pond

cealed with rocks at one side of the pond, and a Stuart Turner pump serves it with water taken from the central deep section.

Brick outer walls were built all round except for the viewing panel and piers of bricks were made within the pond to accommodate the water plants at different depths. The base is otherwise left perfectly clear, so that sediment is easily siphoned out and emptying is avoided. Coping stones over the top edges of the walls completed the work.

Two waterproof lights are used in the pond: one is below the surface at one side and the other, concealed by rocks, floodlights the waterfall. Both lighting and waterfall can be operated by switches from the dining room window, which faces the pool across the lawn. After a thunderstorm one night the glass panel was found to have cracked, but fortunately only a minor leak developed.

The arrangement has proved very effective, and one night last summer goldfish were seen spawning in the pond a few minutes after the lighting had been switched on at 11 p.m.!

A New Approach to Culturing White Worms

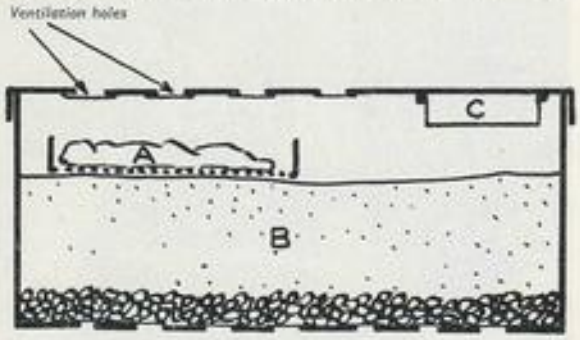
by F. M. RIPLEY

HAVING kept white worms for a considerable time in various media and in varying conditions, with results which were far from satisfactory, I decided to scrap all existing methods and evolve an "ideal home" for the worms based on observations made during my previous attempts.

I decided that the worms thrive in conditions which are: (*a*) just damp; (*b*) well ventilated; (*c*) cool. Also, a clean method of feeding is desirable.

In order to satisfy (*a*) and (*b*) I have devised a special box in which the worms live, and for (*c*) the box is placed in a place which is cool, but not freezing. A circular aquarium-type thermometer is attached to the lid of the box.

As will be seen from the figure the container is ventilated at both top and bottom, and has a layer of ¼ to ½ in. pebbles lining the bottom of the box to a depth of about 3 in.; this serves to increase both ventilation and drainage. The occupants are prevented from wandering by pieces of nylon stocking glued over the ventilation holes.



Sectional view of white-worm culture box. A, Food in perforated plastic tray; B, peat and gravel; C, circular aquarium thermometer

The culture medium consists of pure peat mixed with ordinary aquarium gravel in such a manner as to allow air to circulate through the medium. The dampness of the medium is controlled very easily because of the ventilation and drainage; the culture dries off fairly quickly and will not become too damp and sour. It therefore requires only to be watered in the same way as the wife's pet geranium.

The food (I use bread soaked in water) is placed on top of the medium in a perforated plastic tray, so that it does not come into contact with the medium.

This method has been tested over a considerable period, and has been found to be very successful, embodying as it does all the necessary conditions for the life-cycle of the white worm. An experiment is running with worms in pure coarse gravel, which will, if successful, give clean worms with the minimum of bother.

FRIENDS & FOES
No. 64
Water Beetles *(continued)*

Larva of the water beetle Helmis (magnified)

THE water beetles we have so far considered have all been of a size sufficient to render them easily visible when they reach the water surface or crawl out of bunches of weeds pulled from the depths of a pond or lake.

Now we should look more carefully—for quite small water beetles which could easily be swallowed whole by most of our native freshwater species of fishes. It is by no means certain that they are indeed consumed in quantity.

Not all are inhabitants of stagnant lakes or ponds. Some, like the members of the Helmidae and Parnidae families, frequent fast-running streams, concealing themselves beneath stones during daylight and emerging at night. They are very poor swimmers, possessing no swimming hairs on their legs, but are equipped with long claws with which to hold tight to an anchorage in strong currents.

The beetles do not exceed one-eighth of an inch in length, so easily escape notice. They are vegetarian, and are therefore no danger to the live foods of our fishes or to the fishes themselves.

I cannot say with certainty whether or not the larvae are also 100 per cent. harmless. These are broad and flat in the genus *Helmis*, narrow and worm-like in other genera of the same family. At the end of their abdomens are three bunches of hair-like "gill tufts," which they can withdraw into their abdomen at will.

Aquarists who are tempted to don waders and enter streams to look for beetles or larvae of the above are reminded that they should walk upstream so that the mud they stir up will flow away from them and not obscure their view.

C. E. C. Cole

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

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

I have several young angel fish in my community aquarium, and I have been told that as they grow in size they may become a danger to the other fishes. Is this statement correct?

Large angel fish often bully and inflict serious wounds on smaller fishes. On the other hand, in most cases where baby angel fish grow up among other small fishes they seem to accept them as one of the family and leave them alone, except, of course, if they decide to spawn, in which case they will become very vicious and attack any fish which approaches them or ventures near to their chosen spawning ground.

I have just bought a tropical aquarium to decorate my lounge. I have several large pieces of coral and wonder whether it would be safe to place these in the aquarium?

Placing pieces of coral in the aquarium can be a source of danger to the fishes. If the corals have sharp points or jagged edges the fishes often lacerate their sides on them; then, again, they are usually soaked in strong chemicals before they are brought back to this country or sold in the shops, and so, after a short while, often lead to poisoning of the fishes by pollution of the water. A good soaking in boiling water will usually render them harmless in this respect. As to the sharp edges, the only way to obviate this danger is to choose pieces with rounded or smooth sides.

I am a beginner in aquarium keeping, and find much contradictory advice about the amount of light necessary to keep the plants growing in my aquarium. Will you let me have your opinion on this subject please?

The amount of light necessary to keep an aquarium in a healthy condition is largely a matter of personal experiment. It is almost impossible to lay down definite rules, for a lot depends on the amount of natural light reaching the interior of the aquarium, or, for that matter, the proximity of bright light emanating from table lamps or other room lights. Generally speaking, two 40 watt electric bulbs placed not more than 6 in. above the surface of the water will keep a 24 in. by 12 in. by 12 in. aquarium in good condition if they are kept alight for not less than 7 hours every day; that is, in an aquarium receiving little or no other light. Certain plants need more light than others, and it might be necessary to raise the wattage of the lamps to keep plants such as *Vallisneria* in good growing condition. On the other hand, plants such as *Cryptocoryne* and *Anubias* can get along very well in a rather subdued light. Experienced aquarists usually flood their aquariums with a bright light, and regulate its duration according to the needs of the plants.

Would it be possible to breed white-cloud-mountain minnows in a tank shared by platys?

We do not think you would be successful in breeding your white-cloud-mountain minnows in a tank shared with platys. The eggs would soon be eaten by the latter fish. Remove the platys to another aquarium, and leave the minnows by themselves. Masses of fine-leaved plants will be necessary, and a temperature of about 72° F. If the minnows are given small amounts of food every day to appease their hunger, most of the eggs and fry will remain safe from the parent fish.

One of my mollies has developed an ulcer on its side. I have tried painting it with various chemical preparations, but up till now it has not responded to treatment. I have been told that I could try scraping the sore place with a sharp-pointed blade to effect a cure. Would you recommend this treatment?

Surgical treatment of an ulcer often leads to a quick recovery. But the operation must be carried out very quickly so as not to distress the fish. After the ulcer has been scraped, swab the sore place with mercurochrome or hydrogen peroxide, and smear a thin film of pertoleum jelly over the wound before returning the fish to the water.

Photo: Laurence E. Perkins

Angel fish usually behave quite well in community aquaria but as they grow larger may become bullies towards smaller fishes

I heat my tropical aquariums by paraffin lamps. I have noticed a white scum on the top of the water and wonder whether this will harm the fish. Please let me know.

The white scum which forms on the surface of the water may be removed by drawing pieces of newspaper or tissue paper across the surface every few days. We have never found it to be harmful to adult fish, though the fry of anabantids would soon die if the scum was left on the surface of the water.

A friend made me a plastic tank, but soon after I placed fishes in it they died. Can you please give any reason for the casualties?

It is not unlikely that the cement used to join the edges of the sheets of plastic is responsible for the casualties among your fishes. If the tank or water has a smell of camphor about it, regard it with suspicion. But a good soaking over a fortnight or so and several changes of water in-between-times should render it quite safe for fish-keeping.

Are tiger barbs easy to breed?

Tiger barbs are not among the easiest fishes to breed. They need a thickly planted aquarium, a temperature of about 75° to 78° F., and plenty of live food or meaty food to bring them into tip-top condition. After spawning is over remove the parent fish to another aquarium, and shade the aquarium with tissue paper to soften the light.

I have noticed that some of my angel fish appear to breathe through one gill only. Is this a symptom of disease?

We have often noticed that some tropical fishes often keep one gill closed while moving the other one, and it is unlikely that this is a symptom of disease. So long as your fish eat well and remain well-coloured and active, we advise you not to worry about them.

I have some neon tetras and other small characins. Would it be all right to set up a tank for them with peat alone on the bottom, and no sand?

Well-soaked peat pressed down hard on the floor of the aquarium will provide a most satisfactory floor for your small characins. The sole purpose of covering the peat with sand is to prevent it being stirred up by the fishes.

Should I remove parent *Apistogramma ramirezi* after spawning?

Like most of the cichlids, *A. ramirezi* are most unpredictable in their habits and behaviour. Sometimes they will turn out to be excellent parents; at other times they may suddenly decide to eat their eggs or fry. The safest course to adopt is to remove the parent fish after the eggs have been laid.

I am always careful about introducing new plants and new fishes into my aquarium. Can you please tell me how to sterilise plants freshly obtained from a dealer?

If you leave the plants to soak for an hour or so in a fairly strong (red) solution of potassium permanganate and hand-pick them for snails and snail's eggs we do not think you need worry further about them.

Is it true that the albino swordtail is more delicate than the green swordtail and other colour varieties?

Albino and other near-albino fishes always seem a little more delicate than darker-coloured fishes. In a tank containing goldfish, the pale-coloured ones always seem more susceptible to chills and indigestion than the deep-red or bronze goldfish. Albino swordtails are definitely more difficult to raise than green swordtails, and this, we suppose, is why few first-class specimens are seen on the market.

Please will you tell me the best temperature for keeping and breeding platys?

The best temperature for keeping and breeding platys is somewhere between 68° and 72° F. Fish raised in a higher temperature often develop into weaklings and soon die.

Should catfishes be kept in hard or soft water?

Most catfishes flourish best in hard or alkaline water. For breeding they certainly require a slightly alkaline water.

I recently drained off most of the water in my long-established aquarium, and refilled it with fresh from the tap heated up to the correct temperature. I have noticed that the fishes, especially the swordtails and guppies, keep rubbing themselves against the leaves of the plants and against the sides of the aquarium. Do you think that they have contracted some disease?

New water often affects fishes in this way. We do not think you need worry about them. As the water matures, you will notice that the occupants of the tank will cease to rub themselves against objects in the aquarium.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have heard it said, or read it somewhere, that if fancy goldfish are kept in deep tanks when they are young they will develop deep bodies. Is this correct?

I think that this is just one of those tales which get about but which have little truth in them. If a fish comes from a strain which have deep bodies it is likely to develop a deep body itself, whereas if a fish came from a narrow-bodied strain I do not think that a deep tank would be likely to encourage a deep body to form on the fish. Generally speaking it is necessary to breed for deep bodies, in other words deep-bodied fish are more likely to produce deep-bodied youngsters than are thin-bodied ones.

I bred a good number of fantails and they thrived for some time. After they were 4 or 5 weeks old I noticed that they appeared off colour. They seemed to be always near the top of the water at an angle with the mouth at the top. Their fins, especially the tails, seemed to close up somewhat and they did not seem to want to eat. Gradually they started to die off. Can you say where I went wrong, as I have had this happen before?

The fry could have been saved if they had been taken from the tank and given a bath in a weak solution of Dettol. About a quarter of a teaspoonful of Dettol to the quart of water would have been ample. The fish should be put into the solution and closely watched, and removed into fresh water within 15 seconds. They may seem very weak but will soon recover. Do not then try to get them to feed for a day or so. After 3 days they will start to feed and then thrive. If fish are not treated when they show the symptoms described they will die within about a week. Probably they are either infested with flukes or they have what is called velvet disease. The flukes are *Gyrodactylus* or *Dactylogyrus*, and the velvet disease organism is known as *Oodinium*. Very often the disease and pests are encouraged by foul conditions in the tank. All may be going well in a tank and a certain amount of food may have been given each day. Then one day the weather changes and becomes cold. The water in the fry tanks cools considerably but the aquarist does not notice this and gives the same amount of food as he did when the water was warmer. The fry just cannot eat as much then and so the uneaten food soon fouls the water. In the presence of infesting organisms the impure conditions encourage trouble.

Egg-clusters of Ampullaria snail showing young hatching and dropping into the water

I have a well-balanced coldwater tank containing a couple of small goldfish and a nice bunch of *Elodea*. I try to keep a few snails (*Limnoea stagnalis* and *Planorbis corneus*) but they keep disappearing. The tank is in a living room which is thoroughly searched every day but no trace of the snails can be found. They have never been seen leaving the water and yet they disappear. Where do they go?

I think that it is most unlikely that the snails leave the tank as they cannot live out of water. If the water was very foul they might try to climb out, but in such a case they would soon dry and die and their shells would be seen near the tank. It is more likely that the snails have been sucked from their shells by the goldfish and eaten. The empty shells would then be washed to the back of the tank and become buried in the mulm. The only water snail I know which deliberately leaves the water is the apple snail (*Ampullaria*) which lays its eggs above the water's level.

I would like some advice on how to treat a sick goldfish. It is in the pond and seems to have lost its balance. It lies on its side but does not seem to be ill otherwise. The fins are extended and the body does not appear to have shrunk. What can I do for it?

This is swim-bladder trouble but may not be a very severe case. If the fish is a fairly large one and this is the first attack it has had it is quite possible to effect a cure. At this time of the year a fish is often found in the pond with bladder trouble. It occurs after the pond has been frozen over. The pressure of water when ice has formed can have a bad effect on a fish, especially the females which may have distended bodies through the presence of many eggs. In all probability the fish will recover in a few days without any help from you. I have known goldfish to be upside down for 2 or 3 days, but they have recovered and appeared none the worse for it. You can improve matters in the pond by running in some fresh water. See that the majority of the water is pure and do not remove the fish from the pond. The usual cure for bladder trouble is to place the fish in slightly warmer and shallower water. The trouble is that once the fish recovers one is afraid to replace it in the pond before the weather improves in case there is recurrence of the trouble.

I have a hair-line crack in my pond which was recently made. Should I enlarge the crack and try to mend it?

If the crack has appeared soon after the pond was constructed then it is possible that it will get worse. The base of the pond may be on made-up ground and as this settles so the pond may crack more. It is not a good plan to try to make a permanent mend during the winter, and it is better to make a temporary repair job while there is still danger of frosts. Then when the weather improves a more permanent job can be made. If any repair is made and a sharp frost follows it is probable that the freezing ice will cause so much expansion and stress that the pond is cracked again. If the crack is small and is repaired with Selastic, which remains elastic for some time, the compound can stretch with the expanding concrete. Once all danger of frost is past the repair can be made permanent with cement and sand.

I am having trouble with the cover glass to my tank. It gets clouded over and I cannot remove the whitish stains. I think that it is caused by the bubbles from the aerator bursting under it and continually splashing it. How can I keep the glass clean?

First of all I suggest that you remove the cause of the trouble. Either you are using too powerful a jet of air or your diffusing stone is not working correctly. I wonder how much of the air you are pumping into the water remains there in the form of oxygen. I expect that the most benefit to the water comes from the fact that the bubbles are causing the water in the tank to circulate. This means that some of the water at the bottom of the tank gets to the surface and so can take in fresh oxygen from the atmosphere.

Lime deposited from the water is the cause of the glass getting obscured. You can try cleaning it with some dilute acid and a little cleaning powder.

I bought a number of water plants and soon after placing them in my tank I found the water filled with small white animals. I tried some potassium permanganate, which seems to have cleared them away. Now there are many brown jelly-like animals which I believe are planarians. How can I get rid of these and can I leave the fish in the tank whilst I am treating it?

The first-described creatures may have been *Paramoecium*, a form of Infusoria, caused by some of the water plants decaying or else too much uneaten food in the tank. The permanganate would clear them away. It is, however, quite possible to clear the tank by refraining from feeding the fish for at least a fortnight. Planarians are more difficult to get rid of, especially whilst the fish are still present. The surest way to rid the tank of the pests is to remove the fish and then add some ammonium sulphate to the water. One-quarter of an ounce dissolved in water for a 24 in. tank and a half ounce in a 36 in. tank will suffice. Replace with fresh water after treatment.

Many aquarists who have pests in their tanks want to clear them without having to remove the fish. It must be realised, however, that many pests are difficult to kill and what would kill them would also kill the fish. After all, they are all living creatures. When dealing with pests on fish we sometimes immerse the fish in a solution which would kill the fish if it was left in too long. The fish is removed after a time, especially if it turns over, and when replaced in clear water it recovers. It is very difficult to treat a pond for leeches or fish lice, as what would be strong enough to kill them could also kill the fish.

Much of the trouble you experienced may not have been due to the quality of the plants at all. They may have been quite clean and healthy when you got them from the dealer. If you planted them directly into an established tank which already had a good growth of plants there it is possible that the new plants could not get rooted and established among the roots of the plants already there, and died. The dying plants would soon encourage bacteria and Infusoria to form.

I have a tank 24 in. by 12 in. by 12 in., and would like to keep two pairs of rudd. I have been told that I could not keep them in such a tank for more than a week. Is this so?

Rudd would be quite all right in your tank as long as they were only small ones, but once they grew to about 3 inches in length they would not thrive. You do not say how large the fishes are which you propose to keep; this is the deciding factor.

I would like to purchase some fish set up in glass cases; can you tell me where I could get them please?

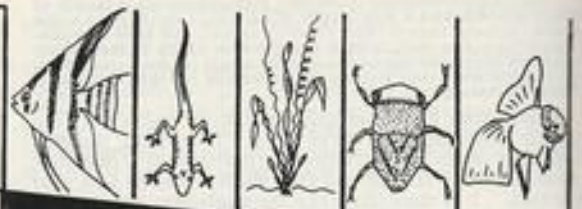
The most likely place for you would be second-hand furniture shops. I do not think that anyone would set these cases up with the intention of selling them. It is an expensive job to set up a fish, and they are generally done to the order of an angler who wishes to preserve a specimen fish which he has caught. They are then not of much value to anyone else and rarely come on the market until the owner dies. A few might be set up on a special order from a museum, but I cannot imagine anyone setting up fish with the sole purpose of offering them for sale. Perhaps a small advertisement in *The Aquarist* would be of assistance to you in your quest.

Could you tell me of a quick and easy way of getting white worms from the loam and peat in which I breed them? I usually place a quantity in a worm feeder and although the worms work through for the fishes I am concerned about polluting the water.

I appreciate your difficulty and can offer you a very good way out. I have several boxes of worms in peat;

(*Please turn to page* 253)

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

Alien Introductions

I MUST protest most emphatically against the suggestion made by your contributor, Mr. Raymond Yates, in Aquarist's Notebook (*The Aquarist*, December). In this he encourages fish enthusiasts to introduce fishes and plants to "suitable waters." What does this phrase mean? Why presume to interfere with what may very well be a most admirable existing condition?

I think that I may claim to be a "fish enthusiast," as an aquarist for a good many years, as a keen student of freshwater biology and as an angler, but I would deplore action such as is recommended. There are many occasions on which people having perfectly legitimate interests in our waters would be justifiably annoyed by thoughtless and unwanted interference on the part of some "enthusiast."

May I cite two cases in point: first the introduction from Canada of the Canadian pond weed, which well merits its title of "Barrington's Curse," and second, the complete and rapid elimination of fairy shrimp (*Chirocephalus diaphanus*) from its only recorded habitat in the Midlands, after the introduction of a mixture of roach and perch.

No, Mr. Yates, the haphazard introduction of alien specimens has very little to recommend it and is certainly not a practice to encourage.

EDWARD J. DRUCE,
Weoley Hill, Birmingham 29

A Message from Mr. List

ON my retirement, may I be allowed to say farewell to all those in the hobby whom I have had the pleasure of having contact with in the past few years.

It is obviously impossible to write each one individually and perhaps through the medium of your publication may I express my humble thanks to all those who have encouraged me in my duties.

The F.B.A.S. Council have always stuck to the slogan that those who put most into the hobby, get most out of it, and, being an exponent in the use of such a slogan, I have benefited greatly.

If by example one learns to forge ahead, learns from mistakes and suffers criticism, only then can the hobby go to further greatness and maintain the position that it so well deserves.

A lot of work still remains to be done and I look forward to the continued maintenance of good reports in your future issues, particularly from those who are standing on the threshold of our hobby for the first time.

R. O. B. LIST,
Retiring secretary, Federation of British Aquatic Societies

Appeal for Specimens

FOR some years I have been studying the *Daphnia* and *Cyclops*, etc., of some of the Welsh lakes. I have recently become interested in their distribution and I am anxious to obtain specimens from as many parts of the British Isles as possible.

As I am an aquarist I know that a great many of your readers must go out "*Daphnia* hunting," and I would like to hear from anyone who would be willing to let me have a small portion of their catch.

M. PUGH THOMAS, B.Sc., M.I.Biol.,
Department of Zoology, The University,
Manchester 13

Pen-friends Wanted

I WOULD like to get in touch with junior aquarists of your societies, the more the merrier. I am 15 years of age and I have been keeping tanks for 5 years. I have ten aquaria. I am mainly interested in freshwater tropicals, and I breed cichlids, anabantids and *Barbus bimaculatus*. My address is: Peter Lawrence Bouvier, 6958 Amestoy Street, Van Nuys, California, U.S.A.

PETE BOUVIER, California, U.S.A.

Painting Ponds

IN *The Aquarist* a reader asked about painting the interior of ponds. There is a firm now specialising in this paint. I've just made a pond 10 ft. by 8 ft. and have painted inside an opaline green. The makers of the paint say that fishes can be put in the pond straight away, but I shall stock mine in the spring from my small pond. This paint (47s. 6d./gallon) is supplied in all colours. The firm is: E. Wood, Ltd., Talbot Works, Stanstead Abbots, Ware, Herts.

E. GREEN, New Barnet, Herts.

Pets in Hospital

WE are a newly formed organisation whose aim is to make the lives of patients of this large hospital happier by widening and deepening their interests, and so speeding their recovery and return to normal and useful citizenship.

One way in which we plan to achieve our object is by fostering an interest in various forms of pets, for we have noticed that patients show more kindness towards dumb creatures than the average person. We propose to form a Pets Corner, which will include as many different forms of pets as possible so that there will be the maximum chance of any individual patient finding something to interest him or her.

We would like to provide the wards with large-sized aquaria, and would be most grateful were you to supply us

with the names and addresses of local societies who would be willing to offer us practical assistance in the upkeep of the aquaria.

LANCE EMERY,
Chairman, Band of Friends,
Hellingly Hospital, Hailsham, Sussex

Addresses of local Societies have been supplied, and any other aquarists who can help this project are invited to communicate with Mr. Emery.—EDITOR.

Answers to Coldwater Fishkeeping Queries

(*continued from page 251*)

I do not use any loam or sand. Once there is a good culture of worms there is generally little difficulty to pick out with tweezers bunches of worms for feeding purposes. However, very often small pieces of bread or peat are included in the bunch of worms. I have a small opaque ointment jar in which I place bunches of worms picked from the boxes. I can fill this jar with them and then I place it in the light. I leave it and do another job for about a quarter of an hour, and by this time all the worms have left the medium, which is usually on the top. They have packed themselves at the bottom or the sides of the jar and it is a simple matter to push the old medium back into a box and then feed from the clean bunches of worms. Any not used can be left covered up in the jar for the next day. They will be found in a solid mass round the sides.

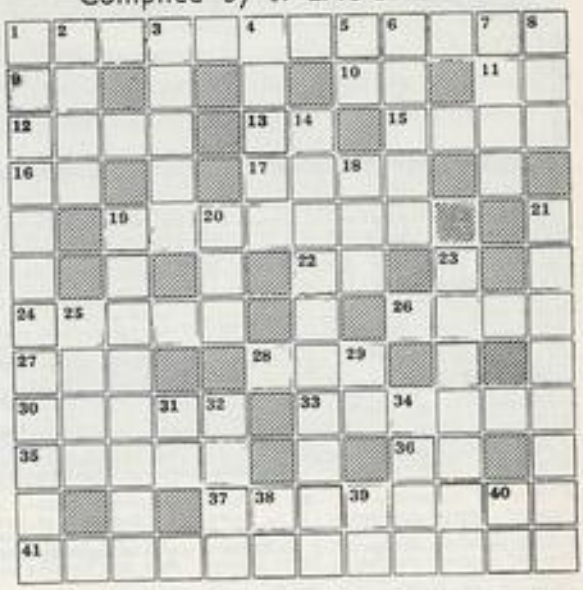
Do not start to feed from a box until there are plenty of worms in the medium. You should be able to turn over a piece of bread and find them in masses. If you do not see many then do not take any for a few days. A small piece of cheese on the medium will often attract thousands of worms to it.

I have set up a small garden pool and would like to stock it with small water creatures, such as *Daphnia* and water shrimps. So far I have been unsuccessful, as the fish have eaten them all. Would it be a good idea to introduce them into the pond during the time the fish are sluggish, and if so which month? Also where could I buy such live foods?

I do not think that any *Daphnia* would live long in a pond where you have fish. I know no month in the year when some fish, goldfish included, would not eat *Daphnia*. Goldfish will eat even when the pond is actually frozen over. Most *Daphnia* die off at the beginning of the winter, after laying eggs which hatch out in the spring. Not that they all disappear, as there are some ponds where *Daphnia* can be taken at almost any time of the year. The water shrimps would live in your pond only if there was a large quantity of water plants, especially under-water types. Otherwise they too would be eaten. They hide away from the fish, if able to do so, and so have a better chance of survival. You can generally buy *Daphnia* in season from most aquarist dealers but I have not seen water shrimps offered. These are usually collected by dragging a quantity of weed from a pond or river and shaking it on to some sheets of paper. The shrimps can then be gathered for feeding purposes. Of course, the more food you gave your fish the less are they likely to eat the live food, but I do not hold out much hope of you being able to keep *Daphnia* in a small pond with goldfish.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1. Breeding (12)
9. Fit, but a pound would make it all (1, 1)
10. Thanks for half a tail (2)
11. Ego of medaka (2)
12. Sir, you and I return to this waterside flowering flag (4)
13. Wasting disease in fishes, as in humans (1, 1)
15. Lure used by anglers, trappers, etc. (4)
16. A cold wind (1, 1)
17. Oursmen, as well as saltwater aquarists, may catch one of these (4)
19. Small Mediterranean fish much used in sauces (7)
22. You and I make a start by reducing weeds (2)
24. Turned injury (5)
26. To use grappling hooks in a pit, for instance (4)
27. The Scot sees double (3)
28. —— and beheads mackerel (3)
30. This danio is a zebra (5)
33. A hundred leads me back before the twisted net. Much used for garden ponds (6)
35. Willow used for basket-making (5)
36. Short route for Reg. (2)
37. Raw fores (anagram): deny upon oath (8)
38. Degrees of heat of importance to breeders and tropical fanciers (12)

CLUES DOWN

1. *Salmo irideus* (7, 5)
2. Irish Free State (4)
3. Amorphous substance that exudes from plants and trees (5)
4. Not the kind of water for fishes, but likely to be rich in microscopic specimens (5)
5. Standard assessment of gold content (2)
6. Would a brindled catfish be so defined? (5)
7. Honour above it, yet leave it out (4)
8. Defined as holes tied together by string (3)
14. *Aequidens portalegrensis* (5, 5)
18. Roman salute (3)
19. Artificial home for aquatic creatures and plants (8)
20. Leg-pulling sea fish? (3)
21. *Betta* to the aquarist (8)
23. The aquarist who succeeds in 1 Across (7)
25. Is in debt (4)
29. Church leads 33 Across (1, 1)
31. That is the result of ide losing a penny (1, 1)
32. —— and this another name for ide (4)
34. Mr. George Formby's Chinese friend (2, 2)
38. Alternatively head of oranda or of 32 Down (2)
39. Little angel? Not in the aquarist's way (2)
40. Dace lose eleven hundred for the Scot's one (2)

PICK YOUR ANSWER

1. 'Fishes, that . . . in the deep.' The missing word in the quotation is: (*a*) breed; (*b*) dwell; (*c*) swim; (*d*) tipple.
2. *Belonnia signata* (the comb tail) reaches a length of about: (*a*) 2 to 3 in.; (*b*) 4 to 5 in.; (*c*) 6 to 7 in.; (*d*) 8 to 9 in.
3. *Limia ornata* is native to: (*a*) Cuba; (*b*) Haiti; (*c*) Jamaica; (*d*) Trinidad.
4. Which is the largest of the following species? (*a*) *Aphanius dispar*; (*b*) *A. fasciatus*; (*c*) *A. iberus*; (*d*) *A. sophiae*.
5. The pearl-scale goldfish is known to the Chinese as: (*a*) Chu lin; (*b*) Fan su; (*c*) Shui-yü; (*d*) Tse-yü.
6. *Cryptocoryne ciliata* was named by: (*a*) Bunge; (*b*) Fischer; (*c*) Roxburg; (*d*) Villars.

G. F. H.

(Solutions on page 255)

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.

THE competition results of the aquaria section at the **National Exhibition of Cage Birds and Aquaria** held at the Olympia last month were as follow: *Interclub Tropical Furnished Aquaria:* 1. Hendon A.S.; 2. Hampstead A.S.; 3. Portsmouth A.S.; 4. Walthamstow A.S.; 5. Hendon A.S.; 6. Walthamstow A.S.; 7. Hendon A.S.; *Interclub Coldwater Furnished Aquaria:* 1. Stoke Newington A.S.; 2. Walthamstow A.S.; 3. W. Middlesex A.S.; 4. Portsmouth A.S.; 5. London Transport (CRS) Sports Assoc. A.S.; 6. Bethnal Green A.S.; 7. Hendon A.S. *Individual Tropical or Coldwater Furnished Aquaria:* 1. F. Watts; 2. R. C. Harvey; 3. R. Mayersbeth; 4. W. L. Wilson; 5. C. T. Blagrove; 6. H. Groves; 7. W. G. Farr. *Breeders' Tropical Egglayers:* 1. J. Wylie; 2. W. A. Bone; 3. B. Calrow; 4. R. Walford; 5. Mrs. B. Robertshaw; 6. Mrs. B. Robertshaw; 7. W. A. Ryan. *Breeders' Tropical Livebearers:* 1. L. Bowd; 2. J. Horne; 3. J. Northam; 4. W. G. Phillips; 5. L. G. Ayres; 6. F. Algar; 7. I. G. Flintham. *Breeders' Singletail Goldfish:* 1. H. V. Jenkins; 2. Miss D. Morris; 3. Miss D. Morris; 4. M. D. Cluse; 5. M. D. Cluse; 6. T. Sherwood; 7. T. Sherwood. *Breeders' Twintail Goldfish:* 1. C. Rosewarn; 2. C. Rosewarn; 3. R. H. I. Read; 4. Tie: J. Goodman; 5. Tie: J. Goodman; 6. S. C. Halsey; 7. M. D. Cluse. *Miniature Gardens:* 1. W. Puddicombe; 2. B. Meadows; 3. F. Oliver; 4. Mrs. I. D. Smith; 5. M. D. Cluse; 6. D. J. Robinson; 7. J. Horne.

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THE following officers were elected at **Bristol Aquarists' Society** annual general meeting: President, Mr. G. Harper; Vice-President, Mr. Macloughlan; Secretary, Mr. R. W. Savage; Treasurer, Mr. F. S. Lennox; Hon. Reporting Secretary, Mr. V. Capaldi; Committee: Mr. S. J. Davis, Mr. N. O. Grimston, Mr. W. Ham, Mr. W. Hicks, Mr. A. W. Rudge, Mr. H. C. B. Thomas.

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AMONG the many items on the agenda at the last meeting of the **Dublin Society** of Aquarists was a Brains Trust arranged by J. E. Edwards, F.Z.S., M.B.A.S.S., which dealt with all sides of the hobby.

It was conducted by Dr. J. J. Craig. An open discussion on cold water fishes which took place later attracted many of the society's non-tropical members. Large numbers of fishes were auctioned following a raffle for a fish kindly presented by G.B.

At the annual Christmas dinner the presentation of the Society's perpetual cups and trophies took place. The following were the awards: Founder Chairman's Shield for Society work: A Spurling Jewell; Moscow Cup for breeders: Mrs. E. Spurling Jewell; Aquarist Cup for Pairs: Dr. J. J. Craig; Hon. Secretary's Cup for Plants: A. Spurling Jewell; *Evening Mail* Cup for furnished Aquaria: Mrs. E. Spurling Jewell; Committee Cup for Teams: Dr. J. J. Craig (capt.), Mr. Beckett, Mr. Rooney, Mr. Deegan.

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A PROGRESSIVE year is reported with an increase in membership from **Colwyn Bay and District Aquarist Society.** The officers elected are as follow: Chairman, Mr. A. L. Clayson; Vice-chairman, Mr. J. R. Reed; Hon. Treasurer, Mr. W. Barrow; Hon. Secretary, Mr. H. Warsop; Assistant Secretary, Miss M. Walsh.

* * *

WHEN the **Northampton and District Aquarists Society** held their annual dinner, the President, Mr. A. Vernon Ashford, said a very successful society was being built up in the town. The Vice-president (Mr. G. Twiselton), Mr. D. E. Butlin and Mr. W. H. Snedker also spoke during the evening.

Mrs. A. Vernon Ashford presented awards to the following: Cup for best coldwater home aquaria and Vernon Ashford trophy for most points table shows, Mr. W. H. Snedker; cup for best tropical home aquaria and aquarist of the year trophy, Mr. N. E. Lyon; cup for best fish of the year, Mr. L. W. Roy; cup for junior member, Mr. T. Dascombe.

* * *

AT the monthly meeting of the **Carassius Club** members agreed to the loan of adult fish to each other during the coming breeding season, the resultant fry being given equally amongst the members. Experiments with the globe-eye varieties are also contemplated. Members were at variance as to the merits of some fry foods now on the market. The Club wish all coldwater enthusiasts success during their next breeding season.

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THE following officers were elected at the recent Annual General Meeting of the **Romford Aquarists' Society:** President, Mr. Hammond; Chairman, Mr. Thompson; Secretary, Mr. O'Farrell; Treasurer, Mr. Wilson.

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THE following officers were elected at the Annual General Meeting of the **Leyton Aquaria Society:** Chairman, Mr. J. Procter; Vice-Chairman, Mr. A. Offord; Secretary, Mr. F. Bland; Treasurer, Mr. J. Kasten; Show Secretary, Mr. A. Watson, Snr. The result of the Table Show for 1957 was: 1st, Mr. P. Jenkinson; 2nd, Mr. R. Watt; 3rd, Mr. A. Watson, Snr.; 4th, Mr. A. Offord. Meetings are held second Monday in every month at the Leyton Town Hall.

* * *

OFFICERS for the current year of the **Erith and District Aquarists Society** are: Chairman, Mr. E. Croucher; Secretary, Mr. D. I. Bothwell. The Society's annual trophies were presented at the January meeting. Points Trophy, Mr. A. Percival; Livebearer, Mr. G. Baker; Egglayers, Mr. E. Croucher; Plants, Mr. E. Croucher; Swordtails, Mr. D. Cooper.

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AT the Annual General Meeting of the **Hornsey and District Aquatic Society** the following officials were elected. President, Councillor G. Watson; Chairman, Frank Putterill; Vice-Chairman, Gilbert Rutt; Secretary, Bernard R. Rumsey; Show Secretary, Eric Smith. The committee is already planning the programme for the coming year which will include an open show on 12th and 13th September.

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AT the annual meeting of the **Bridlington and District Aquarist Society** the following officers were appointed: Chairman, Mrs. Lambden; Vice-Chairman, Mr. H. Trowhill; Secretary, Mr. R. Holroyd; Treasurer, Mr. A. Bland; Press Secretary, Mr. L. Wardill; Librarian, R. Bland.

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THERE was a good attendance at the **Southport Aquarist Society** annual general meeting when the chairman, Mr. J. Taylor, in reviewing the activities of the society during the last 12 months, spoke of the work done by members in connection with the Southport Zoo.

Colonel R. Hesketh, M.P., president, and Mr. J. Taylor, chairman, were unanimously re-elected, with Mr. S. Radam, Vice-Chairman; Mr. J. Ogden, Treasurer; Mr. O. Plant, Secretary; and Mr. and Mrs. P. Parkinson, Joint Publicity Officers. Members of the committee are Messrs. C. Roberts, A. Gore, Bob Rowlands and R. Rowlands.

* * *

THE final of the **East Midlands Affiliated Aquarist Society** inter-society competition was held between Corby and Bedford clubs, at Corby. Bedford won the challenge shield by nine points.

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THE highlight of the evening at the **Deal Aquarists** meeting was a lecture by Mr. Edwards, F.Z.S., of the F.B.A.S., who illustrated his talk with pictures on his epidiascope. The subject "Insulation of Aquariums to retain heat and thereby reduce cost of tropical fish-keeping" was well received by a full attendance of members.

Competition winners were Mr. J. R. Bone (pair of pearl danios), Mr. E. Hooper (pair of harlequins), Mr. Hayward (pair of beacons), Mrs. Perez (pair of angels), and Mr. Marriott, who kindly presented his pair of white clouds to the hospital tank.

* * *

AT the last monthly meeting of **Ilford Aquarists' Society** the table show of Guppies was won by Mr. Stebbing. The lecturer for the evening was Mr. H. L. White.

* * *

TO turn the previous year's deficit into a credit balance is no mean achievement in the life of an aquatic society, but this feat is reported from **Bath Aquarists' Society.** Mr. L. E. J. Challenger, secretary-treasurer, reported that the last year had been a financial success and he now looked forward to a steady improvement. The chairman, Mr. F. J. Simmons and Mr. L. E. G. Challenger were re-elected together with the members of the old committee.

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VISITORS from Mansfield and Derwent Aquarists' Societies attended the last meeting of the **Nottingham and District Aquarists' Society** at which a lecture was given by Dr. E. C. Cole. He opened his talk by describing in simple terms the basic principles of genetics

The Aquarist's Badge

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

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

and the structure of cells. Each cell consists of an envelope, containing a nucleus surrounded by cytoplasm. The latter supplies the nucleus with oxygen and removes its poisonous products. He described the structure of the nucleus and how it consists of numerous genes. It is these genes which pass on the characters from generation to generation.

By using pills of various colours, Dr. Cole was able to demonstrate what happens when a dominant is mated to a recessive, and how although the first generation are in appearance like the dominant parent, the recessive factor is still present and appears in approximately one-quarter of the progeny when the crosses are mated together. He described the test matings necessary to isolate the true dominant from the fish carrying the recessive character.

Dr. Cole gave full details of perpetuating a strain where the male carries the feature required, although he admitted that it is often preferable to buy a true bred fish of the required type at a high price, instead of taking a long time to produce the strain.

* * *

A TALK to the "Colwyn Bay Hotel and Guest House Association" on the advantages of an aquarium in hotels was given at the last meeting of the **Colwyn Bay and District Aquarist Society.** The talk was given by the Chairman, Mr. A. L. Clayton, who is an hotelier, and he pointed out that the tank in his hotel had proved an unqualified success. He mentioned that 11 of his visitors had become aquarists. Mention has also been made by the Colwyn Society that a projector and operator can be loaned free of charge from the National Gas Boards on condition that there is a half hour's showing of advertising films. Suitable films are obtainable from the catalogue. Interested clubs should contact Mr. H. Warsop, Hon. Secretary, Colwyn Bay and District Aquarist Society, 8, Abergele Road, Colwyn Bay.

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CHANGES in committee are reported from **Stroud and District Aquarist Society.** The chairman is now Mr. B. Hewlett, vice-chairman, Mr. Isaacs; treasurer, Mr. Artus, and the hon. secretary is Miss P. A. Huxford.

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THE table show trophy of **Thurrock Aquarist Club** has been awarded to Mr. and Mrs. Nichols for the second year in succession. The new club competition for home aquaria was won by Mrs. Driver. The new chairman is Mr. R. Nichols, this being an annual appointment.

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THERE are four changes in the officers and committee of the **Hendon and District Aquatic Society.** The chairman and vice-chairman remain, these respectively being Mr. R. Skipper and Mr. A. Wainwright. The new secretary is Mrs. B. Robertshaw, assistant secretary, Mr. H. White. Show secretary is Mr. R. G. Richardson; assistant show secretary, Mr. R. E. Fisher. The other appointments remain as follow: Treasurer, Mr. T. Atkinson; Committee: Mr. B. Calrow, Mrs. G. Skipper, Mr. W. Woolford, Junior—Mr. J. Chalmers.

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DR. G. CUST, of Birstall, spoke on "Cichlids and their habits," at the monthly meeting of **Selby and District Aquarist Society.** A tape recording was made of the talk by Mr. W. Michaels for use by other societies in the area.

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THE **Independent Aquarist Society's** exhibition stand at the Islington Annual Arts and Crafts Exhibition, attracted much public interest. Eight tanks were on show including a tropical community tank and separate tanks of anabantids, cichlids, catfish, angels, goldfish, shubunkins and South African clawed frogs. Many hundreds of people visited the stand and three new members were enrolled during the week. Independent Aquarist Society were also very successful at the North West London Group of Aquarist Society's show. Results were:—Independent A.S., 10 pts.; Hendon A.S., 9 pts.; Willesden A.S. and Arnold A.S., 7 pts.; Hampstead A.S., 5 pts.; Harrow A.S., 2 pts. Independent A.S. now regaining second position in the inter-club competition. Meetings are held every Monday, 8 p.m. at the Islington Men's Evening Institute, Hornsey Road, N.7. New members are welcome.

Photo: A. J. Lennie

Mr. A. L. Clayton, owner of a Colwyn Bay hotel, is a keen aquarist and recently recommended aquaria for hotel decorations in a talk given to his fellow hoteliers of Colwyn Bay

F.B.A.S. MEETING

AT the annual general meeting of the Federation of British Aquatic Societies, Mr. S. Atkins spoke of the retirement of Mr. R. O. B. List after 11 years of service as secretary to the F.B.A.S. and regretted the loss of his services. He spoke of the Council's wish to make a presentation to him, which had been opened to all societies. He then called on Mr. P. S. Campkin, a previous chairman and a senior and respected delegate, who made the presentation of a clock and a cheque for £27 4s. 2d. as well as the many letters of appreciation to Mr. List. Mrs. W. M. Meadows spoke of the encouragement given by Mrs. List to the general secretary, and presented Mrs. List with a piece of jewellery as a token of appreciation.

Mr. C. W. G. Creed presented Mr. List with bound volumes of the latest work by German aquarists, who had been unable to contribute to the presentation fund owing to existing currency regulations. New general secretary is Mr. F. Stone, 53, Nassington Road, London, N.W.3.

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THE following officials were appointed at the Annual General Meeting of the **Herne Bay and District Aquarist Society,** held on 16th January. Chairman, Mr. W. Lee; Vice-Chairman, Mr. J. Pascoe; Treasurer, Mr. S. Barnes; Secretary, Mr. J. Miles, 21, Sunnyhill Road, Herne Bay.

The cup awarded annually to the member gaining most points in the monthly table shows was won by Mr. J. Pascoe. A new trophy, for monthly competition, has been presented to the Society by the retiring chairman, Mr. J. Weaver.

Meetings are held on the third Thursday of each month at the Railway Hotel, Station Road, Herne Bay.

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THE first annual general meeting of the **Regent Aquarist Society** was held recently at their headquarters, "The Prince Regent," Regent Street, Derby.

It was decided to use the members own talents to give a series of lecturettes, the first one to be at the next meeting. Meetings are held every fourth Friday, commencing 7.30 p.m. The Secretary is Mr. G. F. Holmes, 6, Boulton Lane, Alvaston, Derby, and he would welcome enquiries or correspondence with other aquarists.

A West London Guppy Breeders Society was formed in December. The meetings are held at Westcott Lodge, Lower Mall, Hammersmith, W.6, on the last Monday in the month.

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Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies:—Erith and District Aquatic Society (Mr. D. J. Bothwell, 46, Shinglewell Road, Erith, Kent; Hornsey and District Aquatic Society (Mr. B. R. Rumsey, 11, Weybridge House, Woodberry Downs, London, N.4). Leyton Aquaria Society (Mr. F. E. Bland, 121, Forest Lane, Forest Gate, London, E.7). Romford Aquarists' Society (Mr. T. A. O'Farrell, 9, Wych Elm Close, Hornchurch, Essex). Southend, Leigh and District Aquarist Society (G. W. Hedger, 67, South Avenue, Southend-on-Sea, Essex). Bristol Aquarists' Society (Mr. R. W. Savage, 36, Sevier Street, St. Werburghs, Bristol).

Crossword Solution

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

PICK YOUR ANSWER (Solutions)

1 (*d*). 2 (*b*). 3 (*b*). 4 (*a*). 5 (*a*). 6 (*b*).