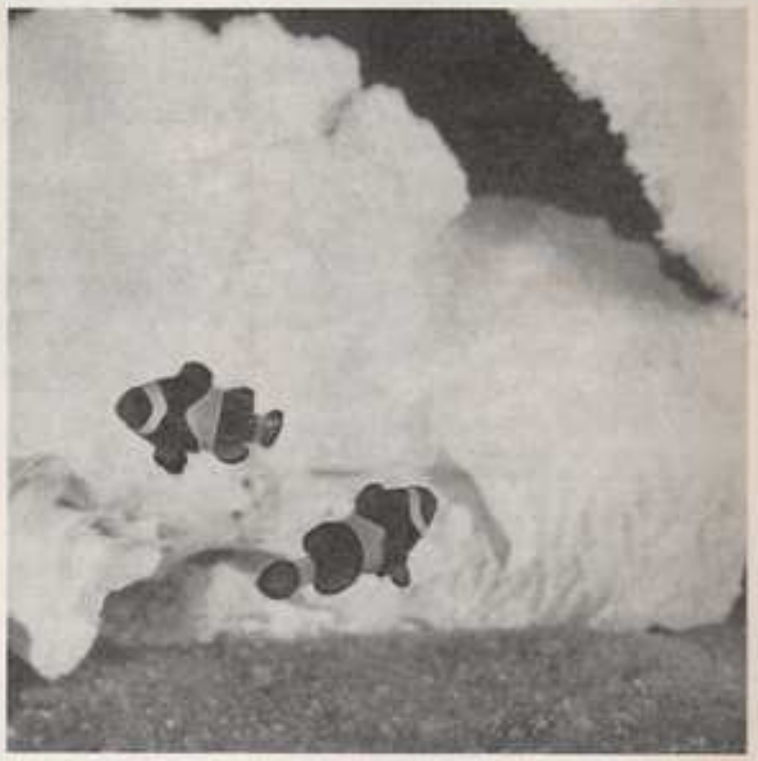
The Aquarist

and Pondkeeper

JUNE, 1961



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TWO SHILLINGS

The AQUARIST
AND PONDKEEPER

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Contents

VOL. XXVI No. 3 1961

Editorial

CONUNDRUM of the month: what name is given to a building used to house a collection of veteran motor vehicles? We are not giving prizes for the right answer nor will we keep readers in suspense by withholding the solution until next month. The building is an Aquarium. That is to say, that is what it is at Brighton in dear old Sussex by the sea. A permanent display of more than 100 old cars, motor-cycles and cycles has now been arranged at Brighton Aquarium, which itself became a has-been, as far as large-scale exhibition of fishes is concerned, some time ago. When opened in 1872 it was the most ambitious Aquarium in the world and for many years maintained an internationally renowned collection of marine life, as a public exhibition, in its large tanks. The building is now owned by Brighton Corporation and it is on lease to an entertainments company. Is it not overdue that the name of this building should be changed and the memory of its one-time glory be respectfully recalled by a discreet and sober wall plaque?

WE have been pleased to find that our series of articles on the maintenance of tropical marine aquaria, by John Boursot, has been enthusiastically received by readers, many of whom are being stimulated into developing this speciality in aquarium-keeping. The indications are that the time has come for dealers to offer more facilities for the large number of aquarists attracted by the colourful and interesting tropical marine fishes. The provision of sea water is not really a major problem but if packs of sea-salt crystals for aquarists were made available this difficulty would be lessened. Supply of specimens is not good and we would like to see more marine fishes imported for the home aquarium. We have had several letters asking about books on the subject, and we can recommend *The Salt-water Aquarium in the Home* by Robert P. L. Straughan (Thomas Yoseloff Ltd., London). Next month's issue of *The Aquarist* will contain full-colour photographs of some of the marine tropicals suitable for the aquarium.

Hydra Captures a Water Flea

Photographs by LAURENCE E. PERKINS

Brown hydra (Hydra fusca) with young appearing as "buds." The animal is adhering to the aquarium glass by its "foot" (top) and its tentacles are spread to catch passing prey (natural length ¼ in.)

A water flea (Daphnia) has made contact with the tentacles. The mouth of the hydra can be seen at the point from which the tentacles radiate

Slowly the water flea is ingested by the hydra. In this picture more than half of the water flea has entered the hydra. The tail spike of the Daphnia is seen pointing downwards between the tentacles

With the water flea completely inside it the hydra spreads its tentacles again. The eye of the Daphnia shows as a dark spot just below the hydra's foot at the top and to the right of the young hydra "bud"

With the water flea still distending its body and visible within the hydra the animal is seen capturing a second Daphnia

The Home Aquarium for Marine Tropicals

by JOHN BOURSOT

THE disconcerting matter of disease must inevitably be the marine aquarist's concern from time to time. As might be imagined, the pathology of marine fishes is as vast as it is little understood. Listlessness and lack of appetite followed by death without other apparent symptoms may be caused by harmful bacteria in the intestinal tract and body cavity. When this is the case there is nothing to be done but abide the visitation and start afresh.

Fortunately, the usual diseases are amenable to treatment and somewhat resemble those of freshwater fishes. The first of these is a variety of marine white spot closely resembling the freshwater form both in appearance and in the course it runs, the only difference being in the size of the spots, which are a trifle smaller. The usual treatment is the addition of either sulphathiazole sodium or copper sulphate to the water, but there is a strong difference of opinion among authorities about which drug is the less dangerous. Mrs. Helen Simkatis, a leading American authority, advises dissolving 1 gram of chemically pure copper sulphate in 1 litre of distilled water to produce a solution of 1 milligram of copper sulphate to each millilitre (ml.). This solution is added to the aquarium at the strength of 7.43 ml., a little less than two teaspoonfuls, to each gallon. This treatment has successfully cured black and white coral fish, cardinals, rock beauties, clownfish, banner fish, high hats, neon gobies and others. In order to insure the highest degree of accuracy the solution should be made up at a chemist's, and used in a separate empty tank to prevent its abstraction from solution by sand or shells or coral. The temperature of the water should be slightly raised. Stock solutions of copper sulphate are often sold by dealers, but it is wise to use less than that recommended on the label. It is sometimes suggested that a copper sponge left in the aquarium is the simplest way of building up the required lethal dose gradually. But as the following story shows, this suggestion is a dangerous one.

My lion fish suddenly developed white spot, and being afraid of copper solutions of any sort, I put a copper sponge into the 40 gallons tank at about 6 p.m. On the following morning at 6.30 I was horrified to see that the water had assumed the colour and appearance of a "pea-soup" fog. A heavy rust-like precipitate covered the sand and visibility was reduced almost to nil. I quickly removed the copper sponge and, with the strong light of an electric torch, searched the bottom for the dead fish. It was not to be found, and I took it for granted that it had wedged itself into some crevice to die. I now subjected the tank to a minute scrutiny, but could see almost nothing. Then suddenly a vague leisurely movement in the dim upper reaches of the fog allayed my fears. The lion fish was not only alive, it was unharmed! Its unconcern now gave me time to prepare a temporary tank to which to transfer it. Apparently the salt water had violently attacked the copper sponge, which would probably have completely poisoned the whole tank had it not been for the lucky circumstance that sand and coral were present in sufficiently quantity to remove the deadly copper products from the water as soon as they were formed. Thus the fish and the white spot had a narrow escape from certain death. Although copper sulphate has obtained many cures, its deadliness to fishes cannot be questioned.

Sulphathiazole sodium may be used at a strength of one teaspoon to each 5 gallons of aquarium water in conjunc-

Photo: R. P. L. Straughan

A mated pair of clown fish

tion with a rise in the temperature. Its use is vehemently deprecated by Mrs. Simkatis, though on the second of two occasions I successfully cured an outbreak of white spot on my two clown fish, which remained in their tank while undergoing treatment in order to avoid the additional shock of capture and new surroundings. On the first occasion I witnessed a complete cure through heat alone, when the temperature was raised to 95 F and kept there. The clown fish ate seven or eight meals a day, played with each other and thoroughly enjoyed every minute of the cure. As clown fish are normally at their best in a temperature of about 82 F, 90-95 for a short period merely represents a brief spell of hot weather. The careful aquarist will do well first to try the thermal treatment when battling white spot, only turning to sulphathiazole sodium as a last resort. Such fishes as French, queen and black angels are less likely to stand high temperatures, especially in the confines of an aquarium. In conclusion, then, I think that a cure involving either copper sulphate or sulphathiazole sodium is not so much due to the aquarist's measured doses as to a happy combination of circumstances in which all the factors except the disease itself are in harmony.

The following cure for white spot now to be described is for those aquarists who, like myself, fight shy of all dangerous chemical aids. The cure consists in a series of 2 minute freshwater baths in water to which a few crystals of potassium permanganate have been added to colour the water a pale cyclamen. The sick fish must be removed to a hospital tank. This is best set up by putting two plastic bags (one inside the other for greater safety) into a cardboard shipping container whose flaps are held vertically erect by a few strips of gummed paper on the outside. The edge of the combined bag is then rolled outwards and under until flush with the top of the box, on which it should hang to prevent the bag from slipping. The entire unit is then set upon a large biscuit tin only slightly smaller in size, and containing an electric bulb of sufficient wattage (10-15 watts) to maintain a temperature of about 85 F, and the whole wrapped round with a blanket held in place by string. This arrangement will insure an even distribution of heat. The hospital tank is now filled with clean new sea water to a depth determined by the size of the fish. About 4 inches is usually deep enough for the average marine tropical. After the water has been put in, the plastic bag should be grasped in both hands, lifted up and lowered back into position. This simple action will immediately smooth out wrinkles on the bottom, making uneaten pieces of food easier to see. The water must be of the same temperature as that of the tank from which the fish are to be taken, and should be circulated by a diffuser placed to one side and run at a pressure which will not keep the fish swimming in a constant current.

The fish are now introduced. Two or three fishes of 1½ to 2 inches to a hospital tank will be enough. The electric bulb is turned on and a sheet of glass placed over the top in such a way as not to exclude all air. The temperature will slowly rise, but must be watched. Should it go above the desired limit a bulb of lower wattage must be substituted. Many aquarists will prefer a thermostatically controlled heater. This is not only more difficult to instal because of the shallowness of the water, but the barrenness of the tank will make it an irresistible and dangerous refuge for the fish. Artificial lighting should be provided, and turned on and off at the accustomed hours. If the light fixture is suspended above the tank the glass cover may be removed at feeding time with less frightening disturbance.

A much needed sense of security during treatment in the necessarily austere surroundings of the hospital tank may be supplied by two smooth aquarish stones and a piece of slate. These pieces may be built into a simple refuge best placed against the wall of the tank to make a three-sided retreat. Owing to a strong sense of ownership it is wise to provide each fish with its own retreat, which it will defend against all comers. The sense of safety afforded by these shelters is most marked and invaluable in keeping the fish feeding.

The actual treatment of the disease itself requires the following items, which should be in readiness in order to secure a series of smooth and efficient operations: two small enamelled pails with lids, or saucepans with plates for covers, a bottle of potassium permanganate crystals, a watch, a tumbler and a magnifying glass. First remove the stone shelter and diffuser and siphon off some of the "hospital" water into the first pail. Then gently dip the fish out with the aid of the tumbler and put them into it. A tumbler is safer than a net as the fish escape both exposure to the air and possible damage through getting their tiny scales and gill spines hooked in a net's meshes. The pail with the fish now safely inside should be covered to prevent their jumping out. Marine tropicals are superb jumpers.

The plastic bag of the hospital tank is now lifted out of the cardboard container, emptied and refilled with hot freshwater. This is swished about by hand, emptied and the bag returned to the container, where it is filled to its former depth with clean new sea water of the same temperature as before. The diffuser and shelter stones are rinsed under the tap or in hot water and returned to their original positions. The second pail is now filled with freshwater (not sea water) of temperature the same as the sea water in the first pail, in which the fish are waiting. A few crystals of permanganate are added to the freshwater and allowed to dissolve completely. The fish are then quickly, gently but firmly transferred to the solution for 2 minutes by enclosing them in both hands so that as little salt water as possible is introduced, and their breathing kept under constant watch (with a magnifying glass if necessary). When the time is up each fish should be put back (not dropped) into the hospital tank by hand, in one quick, clean but gentle manoeuvre. Repeat the treatment once a day until a cure is effected. It will be seen that the temperature has remained, as it should, constant during the entire process.

Some fishes will stand freshwater for longer than 2 minutes. Cowfish become very apprehensive but seem unaffected after 5 minutes, and lion fish will quietly stand as long as 10 to 15 minutes without showing discomfort. Butterflies and blue-and-gold fairy basslets, on the other hand, cannot stand longer than 2 minutes, and when put into the freshwater soon lie down on their sides. Their rhythmic breathing is the only sign of life, but if touched they will swim about for a moment or two and again lie on their sides. It is here that close and constant observation with the magnifying glass is most important. Upon being returned to the hospital tank they instantly regain their normal behaviour.

Fungus infections are easily eliminated in 24 hours or less by adding 250 mg. of chloromycetin, 250 mg. of penicillin and 250 mg. of streptomycin to 3 gallons of sea water and treating the fish in this solution in a separate empty tank. Aeration is advisable and the rule of even temperature must be observed.

Marine tropicals are sometimes hosts to large numbers of marine trematodes; cowfish, cofferfish and trunk fish are specially suited to their attacks because of the ideal surface presented by the hard inflexible bodies of the fishes. Immersion of the fish for 2 minutes (or longer if the fish can stand it) in freshwater of the same temperature as that of the aquarium will dislodge the flukes. These flukes are very small and transparent in a healthy condition, but become slightly clouded when subjected to freshwater. They should be sought for with a magnifying glass at the bottom of the receptacle in which the fish have been cured.

Next month some suitable fishes for the tropical marine aquarium will be discussed.

Feed Your Fishes with Daphnia

by E. FOSTER

Photographs by the author. Drawings by Brian Hopkin

HEALTHY fishes are maintained through being given a well-balanced diet including a regular supply of live foods. Of all the available live foods the water flea (*Daphnia*) is the most highly rated. Your efforts to feed this to your fishes once or twice each week will be highly repaid by extra activity and colour in your aquarium.

Questions often put to me are "Do you feed with *Daphnia*?", and, by newcomers to the hobby, "What is *Daphnia*?", "What is it like?", "Where can I get some?". On occasions some non-aquarist visitors have asked on seeing *Daphnia* in my tanks if they were baby fish!

Daphnia is a small member of the crustacean family, about $\frac{1}{16}$ to $\frac{1}{4}$ inch in length and is rather similar in shape to a flea. There are several species, some large and some small, and these also vary in colour. The larger ones have a hard shell and are really not suitable for tropical fishes, except for the larger members of the cichlid family; *Daphnia* can be found to be red, grey, green and at times even black. The red is the most popular and I have seen ponds at various times full of what seemed to be red water. Actually the ponds were literally alive with swarms of red *Daphnia*. The shell is transparent and the colouring is due to a pigment, haemoglobin, in the blood. This pigment is oxygen-carrying and allows the water flea to live in polluted waters; hence the ideal hunting grounds are the old farm ponds used by cattle. Such ponds are on the stagnant side but are rich in Infusoria and bacteria, these being encouraged by the droppings of the cattle into the water. When experience has been gained one can usually tell at a glance whether the *Daphnia* content of a pond is rich or poor and whether it is worth fishing or not.

As for the variable colour of *Daphnia*, this can be largely due to conditions. For instance, if a pond goes green in prolonged sunlight in high summer the *Daphnia* feeding on the green water may also turn green or grey. *Daphnia* is unpredictable in supply; one day you may simply have to dip in your net to obtain your requirements and a couple of days later you may have to carry out an hour's hard "fishing" to acquire the same amount. If you wish to collect your own *Daphnia* (I know it is far easier for the one-tank man and also for those who are not within reach of a pond to visit the local pet shop and ask for a "bob's worth"), make sure you are well prepared for the job, so that your expedition will be successful as well as being enjoyable. Put on some old clothes and a pair of good Wellington boots; take with you a long-handled net and a suitable container.

The actual process of removing *Daphnia* from the pond is known as "sweeping" or "sweep netting," and by many a figure-of-eight movement is employed. This movement causes a swirl in the water, bringing the *Daphnia* together in large numbers so that they are netted easily. Another method is to make a long sweep and turn the net back into this, collecting *Daphnia* drawn into the wash caused by the first sweep. At this point may I mention two very important "don'ts": (1) do not collect too many *Daphnia* in one sweep as they may suffer damage by crushing; (2) do not put too many *Daphnia* in your water container as they will soon exhaust the oxygen supply and die before you return home.

There are two ways of transporting *Daphnia*, the most common one being the use of glass jars or tins full of water. The other method, not so well known even by some experienced aquarists, is transport on muslin- or nylon-bottomed trays without the use of water. This method is superior for the aquarist who requires *Daphnia* in large numbers. I

"Sweep netting" a pond for Daphnia

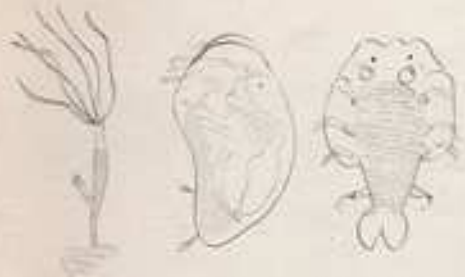
Tray loaded with Daphnia ready to be transported

Box and trays used for transport of Daphnia

have transported *Daphnia* in this manner for quite a number of years with great success, and have found that they will survive for much longer periods than when carried in water. The procedure is to lay the *Daphnia* on the cloth trays, which have previously been well soaked, in layers of about a quarter of an inch deep. It appears that *Daphnia* can take in oxygen from the atmosphere and provided that the layer can be kept cool and moist it can be kept alive for several hours. The trays are stacked on top of one another inside a suitable container. I use an aluminium box for this purpose, and in very hot weather I place a few pieces of ice in the bottom of the box.

As with all live foods there are certain risks attached to feeding live *Daphnia* to fishes as all ponds contain many other creatures as well. Some of these are also fish foods, such as *Cyclops*, mosquito larvae, bloodworms and glass or ghost worms. However, one must take the bad with the good and look out for such undesirable creatures as the water boatman, other beetles and their larvae and the larvae of the dragon fly. Fortunately, these creatures are as a rule larger than the *Daphnia* and are easily eliminated if the catch is properly screened.

However, certain pests can be introduced into the aquarium even after careful screening. Once again these pests are really no more than a nuisance in a tank of adult



Hydra *Cypris* *Argulus (fish louse)*

fishes, although they can be very dangerous in a tank of baby fishes. Of these pests I will put the emphasis on *Hydra*, a freshwater polyp with a large appetite that really can create havoc amongst newly hatched fry. It has a thread-like body, at the end of which is a mouth surrounded by eight or more tentacles. These tentacles, though very delicate, can easily trap tiny fry. If allowed to, *Hydra* will multiply quickly, reproduction being by "buds" which form and break off the parents. These creatures can be disposed of by introducing leeri or blue gouramies, as these fishes will eat them.

Cyclops

Cypris are other pests, which in my experience are more or less harmless as they are scavengers, although they should not be allowed in a spawning tank as they will destroy fish eggs. This creature is what is known as a "filter feeder" and will clear a tank of bacteria and Infusoria. It has a habit of casting its skin frequently and the cast floats on the surface of the water.

Argulus or fish lice can be introduced with *Daphnia*. These creatures have a disc-shaped body and have hooked feet, with which they attach themselves to fishes. They can be pulled off with forceps whilst the affected fish is held in a net; afterwards the spot should be dabbed with acriflavine.

Planarians, of which there are several species, are dangerous to fish eggs and also to new-hatched fry. These are small transparent worms with an arrow-shaped head and, as a rule, can be seen sliding on the glass, although they are able to swim. Planarians can be eliminated by putting ammonium sulphate into the water and raising the temperature to 90°F. Of course, the fishes must be removed and the water changed afterwards.

Planarian

When the *Daphnia* has been caught and brought home it should be "screened" before use in the aquarium. This "screening" helps to eliminate the pests and unwanted creatures and also enables one to sort out the *Daphnia* into different sizes. "Screening" is carried out by washing the *Daphnia* through various sized sieves or strainers. In this way the large *Daphnia* can be used for the bigger fishes, the smaller for the half-grown or smaller fishes, and by using a

Muslin bag on wire frame, used by the author to contain Daphnia used for clearing green water and for feeding with small specimens

fine-meshed strainer the very tiny *Daphnia* can be fed to your baby fishes.

It is not unusual to find *Cyclops* nauplii amongst finely screened *Daphnia*, these being young *Cyclops*. Instead of dancing up and down in the water as *Daphnia* does, *Cyclops* swim with jerky movements in more or less a straight line. Much has been said both for and against the merits of *Cyclops* as a fish food. Some breeders recommend it, others regard it with doubt and accuse it of attacking young fishes. Personally, I find that *Cyclops* are eaten by my fishes but not with the relish as for *Daphnia*. It is often found that when the supply of *Daphnia* has disappeared from a pond there seems to be plenty of *Cyclops* in the same water.

However, let us not be too morbid about these pests, for the advantages of feeding *Daphnia* by far outweigh the disadvantages. About a year ago, Dr. John Olive, Professor of Zoology at Colorado University, U.S.A., announced that water fleas were the ideal food for space men as they were packed with vitamins, and that he eats them himself. Personally, although I feed my fishes with food I eat myself, I do not intend to start eating their food! Much has been said of setting up a culture of *Daphnia*, and provided that one gives it the correct conditions it will easily breed, but if the food is required in large quantities I think it is best to collect it when required.

I have a polythene pond at the rear of my fish house which I stock each week, and as a result I have a constant supply. *Daphnia* will soon clear a tank of "green" water. For this purpose I have a muslin bag attached to a wire frame, not unlike a net, which is placed in the tank and supported in position by the frame. *Daphnia* is then placed in the bag. When the water is clear the whole lot can be lifted out. This bag can also be used for feeding tiny fish, as only the very small *Daphnia* can get through into the tank itself. As *Daphnia* soon rob the water of its oxygen content it is not wise to introduce too many at a time as it could cause distress among the fishes.

Daphnia can be bought dried from the pet shops and is readily eaten by aquarium fishes. Freshly caught *Daphnia* can be dried by spreading them out on a newspaper or blotting paper placed in a warm oven or better still in very hot sun. The drying process must be quick, otherwise the *Daphnia* will start to decompose and be of no use at all.

Even though I am a hardened aquarist and have been fishing for *Daphnia* for the past 15 years I still do not care to go "fishing" on my own. There are many times, of course, that I have to, but should I be by myself I approach the pond heart in mouth in case I should collect an audience. If I do, I carry on fishing, tongue in cheek, waiting for the inevitable question: "What are you catching, Mister?". Then comes the explanation, which at times can be very painful, the inquirer finally walking away, shaking his head and muttering "He must be a nut case!" As a rule I am accompanied by my very good friend, Bernard Dean, who is the young man in the photograph showing sweep-netting.

A few years ago I used to visit a pond every Sunday morning. This particular pond was about 4 or 5 miles out of town and to reach it I had to go down a rough cart track for about half a mile. Because of this I used an auto-cycle and to this I fitted a special carrier to accommodate a 2-gallons container. On these journeys I often met a police patrol car, and one morning the inevitable happened; the officer waved me down. "Excuse me," he said, "after seeing you every week I am very curious about what you carry in the tin." Smilingly, I said "*Daphnia*," and was very amused at the perplexed look on his face. Anyhow, I finished up by opening the can and delivering a lecture on *Daphnia* and tropical fish. The following week there was another policeman waiting for me. He was a beginner and wished to go with me. This chap since turned out to be a keen aquarist.

Yes, I have been chased by a bull, and at different times have seen at least three of my over-enthusiastic pals join the *Daphnia* in the pond. On one occasion a friend of mine sank into the muddy edges of a new pond, which we were investigating, and had to be pulled out leaving his Wellington boots stuck in the mud.

One last word of advice: if you do find a pond, please ask the farmer or owner of the land for his permission to fish. He probably will not know what you are talking about, but nine farmers out of ten are most co-operative and agreeable. Once permission is granted, please close all gates behind you and you can be assured of a pleasant outing whenever you wish.

Sieving Daphnia into a bowl, from which the water fleas are scooped into a flat net ready for feeding to fishes

The Garden Pond in June——*by* ASTILBES

IF plenty of underwater plants are growing in the pond the goldfish will probably spawn on these, especially if some of them are near the top of the water. Although the fish will spawn almost anywhere once they get the breeding urge, it is a fact that they prefer shallow water in which to deposit their eggs. It is well known that goldfish will eat their own eggs once the excitement of the chase is over and that the tiny fry are also in constant danger of being eaten. However, it is possible to breed plenty of fry if there is enough cover for them. Dense masses of water plants such as *Elodea canadensis* will give a good anchorage for the eggs and then prove a good place in which the fry can escape from the attentions of the parent fish.

Now comes the problem of feeding these small fish. Any food put into the pond will soon be eaten by the older fish, as although most of them are very greedy and take the largest bits of food they will also eat dust-fine food by sucking at the surface and so drawing this floating food towards them. It is rather difficult to keep the fry to themselves so that they can be fed separately but if the pond has a removable partition this can be of great help during the period when the fry are young. A barrier can be constructed to keep the large fish from one area with little trouble, but unless this is almost sealed completely the fry will get through with the larger fish and be in danger of being eaten.

Separate Hatching Tank

By far the best way to breed a few fish is to have some bunches of water plants at one side of the pond, floating at the surface and secured to the side so that they keep to the shallows. Once eggs have been laid on the bunches they can be taken out and placed in hatching tanks in safety. Not only will this ensure that the parent fish cannot eat the eggs or fry but the pondkeeper will be able to watch the development of the fry in the eggs. The hatching tank need not be anything elaborate. A washing-up bowl makes an ideal receptacle as it is fairly shallow and easy to move about. If the bowl can be placed in a warm position the fry will soon hatch.

Hatching is controlled by the temperature of the water. At 70° F the eggs hatch in 3½-4 days. At 60° F they will take 9-10 days and at 50° F they may take over a fortnight. It is a good policy to get an early hatch as whilst the fry are in the egg they are liable to attacks by snails and pests such as the larvae of insects. Once the fry hatch they will not need feeding as long as the yolk-sac with which they are born lasts out. Once this is used up the fry start free-swimming and then search for food. This is taken in very small quantities almost all day long, and while there is plenty of the right kind available the fry will thrive well. Infusoria is the finest first food and this can probably be obtained from the pond. If some of the pond water is examined with the aid of a microscope of about ×70 magnification it will soon be apparent if there are enough Infusoria in the water to feed the fry.

Infusoria Culture

It is possible to breed the Infusoria by crushing lettuce leaves and pouring boiling water on these. Allow the mixture to stand for a few days and plenty of life should then be visible. It is possible to use many other media instead of the lettuce, such as potato peelings, banana peel, spinach etc. It is, however, essential to make sure that there are actually some living creatures in the medium as otherwise the fry can be starved and perhaps choked by evil-smelling liquid which contains no food at all. If it is too much trouble to make the culture it is now possible to buy some fry food in tubes, which is quite suitable and fry can be reared easily on this. The point to watch is that too much food is not given at any time. One of the most frequent causes of losses of fry is overfeeding with dried foods. See that little and often is the rule.

Be careful with fresh tap water. If fry are placed suddenly into freshly drawn tap water they may soon be in trouble. The water has been treated against tiny forms of life and so it can be quite dangerous to small fry. Tap water can be used safely if it is allowed to stand in the open air for several hours.

Return to the Pond

Once the young fish are about an inch in length they may be returned to the pond. Although occasionally one may be eaten it is a fact that once they are more like small fish and do not resemble mosquito larvae they are not likely to be interfered with by the parent fish. If these are fed fairly regularly this will ensure that they are not too hungry most of the time. Garden worms can be broken and given as well as the usual goldfish foods. Use common sense when feeding; take note of the number and size of the fish in the pond and the amount of natural food which is likely to be there. Remember that all varieties of goldfish will eat plenty of vegetation and will find plenty of this in the well-planted pond. Many forms of life are also likely to find their way into the pond and so care should always be taken at this time of year only to supplement the natural feeding by the addition of small amounts which are soon cleared up.

Barbus stoliczkai

ONE does not often come across this species of barb in aquarists' tanks, and more is the pity, for I consider that of all the barbs this is perhaps the most beautiful.

Do not confuse *Barbus stoliczkai* with *Barbus ticto* for in general appearance they are very similar. I have noted, however, that whereas the ticto has a round black marking behind the gill plates, the same marking in *B. stoliczkai* is more irregular in shape. It will also be seen that the male ticto barb shows a definite red hue in the dorsal fin whereas in the male *B. stoliczkai* this is more golden in colour and edged with black.

These fish are very lively and peaceful, easy to feed, readily conditioned for breeding and no trouble whatsoever to spawn. Given the right conditioning and then being placed in a tank of reasonably soft water (slightly acid) and with a plentiful supply of spawning medium, willow root being preferred, a pair of these fish will commence courtship immediately. They will spawn at a temperature of 78°-80° F and this temperature also suits the fry.

The eggs are opaque, light green in colour and hatch in 36–48 hours. After the free-swimming stage, the fry seem to take to brine shrimp very quickly. One very interesting feature noted with these fish was their extreme sensitivity to distant vibrations.

B. stoliczkai are a very hardy fish, and there should be no trouble about keeping this species, which have at least a 3 year life span.

R. A. Thomas

AQUARIST'S Notebook——

by

RAYMOND YATES

PROBABLY because of the present ease of air travel holidaymaking in Ireland has increased considerably and there must be quite a few hobbyists who visit the Emerald Isle during the summer months. Some of these must have wondered just what outlets for the hobby existed in Ireland, but with no information available they have made little contact with Irish aquarists. Public aquaria are hard to find. There is a small one at the Belfast Zoo but this is a very modest affair. There is talk of an aquarium being opened in conjunction with Dublin Zoo and further news is awaited.

It is hard to estimate the number of private aquarists but about eight or nine clubs operate and names and addresses of the secretaries of these are given here in case readers may wish to contact them: The Irish Federation of Aquarist Societies is affiliated to the F.B.A.S., whose guides and standards are used for shows (Mr. H. S. Pate, 21, King's Brae, Belfast 5); also in Belfast are The Ulster Aquarium Society (Mr. G. E. Crisp, 31, Lismoyne Park, Belfast 15), The St. Anne's Society of Aquarists (Mr. N. J. Baines, 42, Mount Charles, Belfast 7) and Gallaher's Aquarist Club (Mr. A. R. Bell, c/o Messrs. Gallaher Ltd., 138, York Street, Belfast 15); in the north can also be found The Bangor Society of Aquarists (Mrs. W. D. Martin, 12, Hamilton Road, Bangor) and the Larne and District Aquarist Society (Mr. R. Tilney, 1a, Greenway, Larne, Co. Antrim); Dublin has two societies, The Tropical Fish Society (Mr. P. J. Robinson, 56, South Richmond Street, Dublin) and the Dublin Society of Aquarists (Mrs. E. Spurling-Jewell, 89, Walkinstown Road, Dublin); finally there is the Cork Aquarium Society (Mr. P. Gunn, 11 Barrack Street, Cork). Club membership is probably small, the St. Anne's Society for example having a hard core of roughly 15 members and a floating population of up to 25 members.

There are probably several small dealers' establishments scattered about but I know of only two main ones: Ulster Aquatics of Montgomery Street, Belfast (well known to readers of the advertising columns of *The Aquarist*) and one in Dublin run by Mr. Jebis. In the Belfast area it is now much easier to obtain fishes than was previously the case. The local dealer is always prepared to obtain fishes in demand and carries a fair stock. Prices are much the same as in England. Supply of live foods is good as the Irish are in rather a fortunate situation with the country being still mainly rural. Once away from Belfast it is comparatively easy to get *Daphnia* etc. One lake in particular is exceptionally good, in spite of holding a large population of well-fed fishes, and one can obtain in 10 minutes enough to fill a 2 gallons bucket. *Tubifex* supplies reach the dealers fortnightly.

Shows are held twice a year by the I.F.A.S., an inter-club knock-out competition in March and the inter-club championship in May. The I.F.A.S. also stages, in conjunction with the Forces Help Society, a furnished aquaria competition. The Dublin Society stage a 3 days annual open show in early autumn. Showing of fishes is somewhat complicated by the Eire—Northern Ireland border, as customs men simply refuse to believe that anyone would transport fishes on a round trip of 200 miles! The border-police patrols are even more difficult to convince when they stop a Minibus loaded with people and suspicious-looking parcels, at a time well into the small hours!

Breeders have few difficulties. The water in the Belfast area is very suitable as it is very soft. This, combined with a climate which gives a high output of clean rain water, removes some of the difficulties in breeding experienced in other parts of Britain. However, it is only within the last few years that breeding has been carried on to any major extent and now the problem is the old one of how to dispose of the fishes. There are a few coldwater enthusiasts, some being members of the Goldfish Society, and their keenness knows no bounds. Lecturers are very hard to come by but local enthusiasts take kindly to being bulldozed into speaking, and this system works well. Any readers who may be visiting Ireland who would like further information on the area of their stay should contact the local club, where one exists. Otherwise Mr. Neville J. Baines of the St. Anne's Club, Belfast, has offered to be of service (but don't forget the stamped, addressed envelope, please).

* * *

When talking to a dealer recently, I asked him if a certain new species had proved popular. The answer was very much in the negative. It seems that dealers can sell fishes with ease if they appear in the pages of the major books on the hobby, but if they are not listed there is no interest.

* * *

I remember remarking in this column many months ago that the reason why there were no fish in the ornamental pond at Chester Cathedral was because so many people had fallen for the "coins in the fountain" idea. The large number of copper coins on the bottom suggested that fish life would be impossible. At a later visit I was proved wrong by the presence of large goldfish, obviously in the best of health, and I mentioned how stupid one can be in forming hasty conclusions. Recently *The Guardian* reported the appearance of an eel on the cathedral lawn, which had puzzled those concerned about how it had got there, in the very centre of the cathedral. A local boy has now confessed that some 5 years ago, when a choirboy, he and other boys put thousands of tiny elvers into the pond after a visit to the canal.

* * *

Fishes, like humans, should have a table from which to eat their meals. This is not just a fad but a must. One of the supreme joys of the hobby is watching your fishes enjoying a meal, and the first thing any visitor thinks about is watching your fishes being fed. Visitors to zoos always turn up in large numbers at animal-feeding time.

Of course, one can purchase gadgets for this purpose, usually Perspex shelves, but these are, at best, very artificial. The centre of the tank is the place for your fish table and you can kill two birds (fish) with one stone in setting it up. Nothing is more unsightly than a heater, which can be seen in an otherwise well set-up tank. Also, the aquarist is wise to remember that fishes can and do move heaters in the tank by scraping themselves on the flex, and if a heater is allowed to come into contact with the side glass a crack will often result. The heater should therefore be placed between a large, flat stone lying horizontally on the gravel and a similar flat stone lying vertically against the back glass. Over the horizontal stone and the heater place another, rather larger flat slab. This is your fish table-cum-heater hider. If the second slab is somewhat larger there is a pronounced overhang, which gives a pleasing effect. Food dropped on to the stone is often pushed off

A view of a service passage between two rows of concrete tanks at Chester Zoo Aquarium, showing the overhead glass panels providing daylight illumination for aquaria

on to the gravel, but this is immediately in front of the tank, in full view. If and when necessary this small portion of the tank gravel is easily siphoned out and cleaned. The value of this system is that the fishes are always ready for food in the centre, where you can see them, and tend to spend more time in this area, which they associate with food. The set-up is quite natural and tends to minimise left-overs and the disturbance of sediment. I use a piece of mill-stone grit for a table, about 1½ inches thick and 10 inches long, of an ovate-triangular shape. This is raised about 2 inches above the gravel of a 4 feet tank.

* * *

The big business executive was asked why he always had a bowl of goldfish on his desk. The answer was sharp and to the point: "Because" he said, "they are the only living creatures in this establishment who do not ask for a rise every time they open their mouths."

* * *

Hobbyists are quite satisfied with fishes quite irrespective of any trimmings, but other people need to be introduced to our hobby in some form of fancy dress. The wearisome rows of tanks one used to see at shows might have been all very well for the initiated but for all other visitors they were a dreary eyesore. Since those days some good efforts have been made to present fishes in more attractive surroundings and some dealers have taken the trouble to make their stalls look as little like a shop as possible. Public aquaria have not done too much in this line and all too often one enters near-Stygian darkness illuminated only by endless tank windows. Chester Zoo Aquarium is quite different, as here the lighting is daylight from the all-glass roof, and the fishes

Terylene, Glass

READERS will remember reports of my experiments with a polythene pond some years ago. A few other hobbyists have also written short accounts of their experiences in making a pond with this medium. As a result there must be many aquarists who have made their own informal polythene ponds, good, bad and indifferent, on the lines suggested but of whose results we know nothing. Polythene has been in use long enough, however, for us to realise that it has disadvantages and fanciers have been heartened by the appearance of other forms of "plastic" pools. Little, if anything, has been written on these new forms of plastic-pool media by aquarists and the average pond enthusiast is very much in the dark about how these compare with the ordinary polythene type of pond.

In these circumstances I thought readers would welcome the advice and comments of an expert on these materials, Mr. H. Dennis, a director of a large plastics firm, Plastic Products Service (The Styal Company Limited), Quarry Bank, Styal, Wilmslow, Cheshire, who specialise in fabrications, corrosion control and re-inforced polyester-resin mouldings. Mr. Dennis was good enough to go into the whole question in great detail when I explained to him the aspects on which aquarists were likely to be in doubt, and I have tried to summarise his comments in as non-technical a way as possible.

"Plastic" Media

There are four media used for making "plastic ponds" of a flexible nature: 1, polythene; 2, unsupported polyvinyl chloride (P.V.C.); 3, glass fibre-supported P.V.C.; 4, Terylene-supported P.V.C. Many readers will have imagined (as I did) that polythene and P.V.C. were one and the same thing. This is not so. Polythene is a polymer produced by the polymerization of ethylene, and P.V.C. is produced by the polymerization of vinyl chloride. As far as the layman is concerned the main difference is that the former is a material chemically similar to a wax and in practice has a waxy feel. Under certain conditions it tends to crack or give a crazed effect similar to a waxed surface. On the other hand, P.V.C., when used with a suitable plasticizer to make a flexible sheet, produces a rubbery substance which is extremely flexible and will not give the crazed effect under the conditions that would cause this with polythene.

If one takes samples of polythene 1000 gauge (0.01 in.

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probably look the better for the more natural illumination. Blackpool Tower aquarium really sets itself out to give effect with the grotto surrounds, the stalactites and stalagmites and the concealed floodlighting. The seating for visitors is also an amenity all too often overlooked by most public aquaria. The crocodile pool in the reptile house at Chester Zoo was always amazingly beautiful. I have often wondered if, instead of providing such idyllic surroundings for mere saurians, would it not be possible to have a shallow, clear water pool with shoals of tropicals such as angels etc.?

* * *

Willow root is excellent for spawning purposes, if suitably sterilised, and it is found so easily along the banks of lakes. The waving red-brown roots are most inviting and provide a really natural medium. Nylon enthusiasts can say what they like, but nylon remains nylon, an artificial substitute which looks artificial; willow root looks natural and gives one the feeling that one is following Nature's way. Try it sometime.

Fibre and other "Plastic" POOLS

by RAYMOND YATES

thick), unsupported P.V.C. (0.014 in. thick) and Terylene-supported P.V.C., which is about the same thickness as the other P.V.C. (although it has an irregular surface because of the re-inforcement); and if these are crushed in the hand it will be observed that the polythene is quite harsh and will show signs of cracking, the unsupported (un-re-inforced) P.V.C. is considerably more flexible and the Terylene-supported P.V.C. is more flexible still, yet both these last two samples are nearly half as thick again as the polythene.

Strength and Durability

Glass fibre-supported P.V.C. is completely flexible but this type of material has caused trouble as the glass is not extensible; any ground movement due to weight of water or caused by seasonal disturbances can cause stress on the liner, which can result in bursting at the seams. P.V.C. can be calendered in only relatively narrow widths, so that all pools, except tiny ones, are made of several pieces of P.V.C. fabricated by welding to make the liner. Generally speaking, the weld, even on P.V.C. materials, is solely between the P.V.C. surfaces, and no re-inforcement is taken through the weld, which means that if the material is inextensible and is stressed, then the weld gives as it is the weakest link. Although glass fibre-supported P.V.C. is very strong, Mr. Dennis considers that it is not as good as the much cheaper unre-inforced P.V.C. because it is inextensible. However, Terylene-supported P.V.C. has a bursting strength of 115 lb./sq. in. and "extension on break" of 230 per cent. across the weft and 30 per cent. across the warp; thus this material will give considerably, and, in conjunction with its flexibility, makes an ideal material for pool liners.

Glass fibre re-inforcements, when used with flexible plastic material or with rigid mouldings, in contact with water or moisture will absorb it by capillary action, causing delamination or breakdown. With rigid glass fibre pools this should be overcome by making sure that the glass fibre is everywhere completely covered by resin, but cases have been reported of the breakdown of car bodies, rigid pools, boats etc. due to water absorption, which is caused by the glass fibres being exposed either through faulty workmanship or by damage. If there is accidental perforation and a repair is made with the liner in position, that is to say on one surface only, then moisture can be absorbed through the other surface. Terylene, on the other hand, does not absorb water by capillary action so that it has the advantages of glass fibre-re-inforced material with none of its disadvantages.

Mr. Dennis considers that P.V.C. used for a pond should have a life of 10 years or so. As regards accidental damage the main worries of the pondkeeper arise from rocks or stones falling into the pond, ice or frost and the possibility of underground roots puncturing the material from the outside. Normal rockery or stones should prove quite harmless but rockery with jagged edges could be a risk. Mr. Dennis has a pool built some years ago for test purposes of 0.008 in. thick P.V.C. and it has been used as a paddling pool. It has had a rocking-horse chassis thrown into it, pram wheels, numerous bricks and a large alsatian dog is a frequent visitor. The only leak was when a small boy pushed a cane through the bottom. This was repaired by the use of P.V.C. tape, and it has not leaked since.

P.V.C. tape is a quick and easy way of effecting repairs; it is essential that the tape is P.V.C. and not a cellulose tape. Cellulose tape, which is the type most commonly used for household purposes, is hygroscopic and would quickly fall away, because of moisture absorption, if used. First wipe the surface clean and then apply the P.V.C. tape with as much pressure as possible. The other method of sealing is to use a patch of P.V.C., again applied with as much pressure as possible, with an impact adhesive. A temporary repair can be made with the P.V.C. tape under water. Some time ago, as an experiment, Mr. Dennis made a surface pattern swimming pool, with P.V.C. in a circle of 2 in. agricultural chain-mesh as support. The mesh wires were loose and not bonded together. Subsequently the wire mesh itself bellied out like a balloon and the P.V.C. liner took on a quilted effect. The P.V.C. protruding through the mesh was damaged and water spurted out. However, the pool was only temporary and it was repaired with P.V.C. tape, under water, which sealed it completely and it gave not the slightest vestige of a leak for the 2 to 3 weeks in which the pool remained filled. When the pond was taken down there was no sign of the tape coming away from the P.V.C.

Damage from Roots

Underground roots are not likely to cause damage to P.V.C. in a properly prepared site and the risk seems negligible. However, in the United States it has been reported that plastic film up to 800 gauge (0.008 in.) has been punctured by a type of couch grass, possibly not unlike our own type, which has a sharp spear-like shoot where it branches out towards the surface to make new growth. It is doubtful if this grass would want to spread where there is no light, so it would be unlikely to be a risk in pools except perhaps those using clear polythene or clear P.V.C. Probably no advantage would be gained by using multiple layers of 500 gauge polythene as, once the first layer was punctured, moisture would get between that and the next layer by capillary action, opening up the intervening space and preparing the way for the next layer to be punctured. With the use of a heavier gauge of pigmented (dark blue) P.V.C. it is doubtful if this could be punctured by grass roots. Clear P.V.C. gives a natural effect in ponds, but does not have the life of the pigmented product; ponds made with black plastic look effective and it gives an impression of depth and does not show dirt as does ordinary polythene. Pond and pool liners can be supplied in other colours.

Frost and ice will not damage P.V.C. Whatever expansion is caused by ice has a negligible effect because of the degree of "give" which the material affords. Like dirt, frost can be wiped off and the surface of the P.V.C. will be found to be completely unaffected.

The use of plastic film for the control of water is not new. In 1955 a 4½ million gallons Australian reservoir (built in 1920), which would not hold water, was lined with plastic sheeting with excellent results. About 4 years ago two 6 million gallons plastic-lined sewage-disposal reservoirs were made and there are numerous similar examples from the U.S.A., where plastics are more extensively used than anywhere else in the world. In the U.S.A., P.V.C. is used for liners for reservoirs to a greater extent than is polythene, mainly because of its extreme flexibility, ease of handling and ease of repair.

Crucian Carp

by W. J. HOWES

CRUCIAN carp, sometimes referred to as prussian carp, are a small species of carp which originate from Asia, and they make ideal inmates for the home aquarium. The body colour is of a grey-brown to green-brown along the back, with olive, amber or bronzed flanks, shading to a yellow, cream or white abdomen.

There are unmistakable differences in the appearance of crucian carp (*Carassius carassius*) and common carp (*Cyprinus carpio*). The most notable is the absence of barbels in the crucian, and a much less indented caudal fin. The dorsal fin is convex, unlike that of the common carp. The general body shape of a crucian is also different, being shortish, deep, hump-backed and strongly laterally compressed. It is rarer and less widely distributed in England than the common carp.

Crucian carp spawn naturally in the period of April and June. If the aquarist wishes to breed them then he will do best if his fish are in an outdoor pool. But if they are kept in aquaria a large-sized one will be needed and a similar breeding procedure to that used for goldfish can be followed. Thick bunches of water plants will be required, for the carp shed their eggs amongst plants.

As with goldfish, it is extremely difficult for the inexperienced to distinguish the sexes. The best time is in the breeding season, when the males develop small tubercles around the gill covers and parts of the head; and females are then much fuller in the region of the abdomen.

Although crucian carp grow rapidly they do not attain the same proportions as the common carp. Dr. C. Tate Regan, in *British Freshwater Fishes*, credits the crucian carp with attaining 18 inches in length and about 7 lb. in weight.

Photo: W. J. Howes

Crucian carp

However, crucian carp rarely exceed 4¼ lb. and the largest on record weighed 4 lb. 11 oz. and was taken from Broadwater Pond, Godalming. But common carp can reach massive proportions, like the 44-lb. specimen which is in a large tank at the London Zoo Aquarium. Many readers will have seen this magnificent fish.

Crucian carp are not faddy in the matter of food and they will eat almost anything. Their natural food consists mainly of bloodworms, *Daphnia*, freshwater shrimps, snails, various insect eggs and larvae, algae and other vegetable matter. In addition, they may be fed on biscuit crumbs and proprietary dry food. Anglers have caught many carp by using small boiled potatoes as bait.

There is a hybrid between the crucian and common carp, and it is intermediate in appearance between that of the parents. A hybrid usually bears stunted barbels and sometimes only two and not four. You may be able to identify a specimen by these details, otherwise expert knowledge is needed.

INBREEDING—
IS IT HARMFUL?

by A. BOARDER

WHEN the question of "inbreeding" arises it is often stated that this procedure is very harmful if indulged in to any large extent. I wrote several years ago that I thought that as long as fish to be kept for breeding purposes were well chosen and that no weaklings were ever allowed to remain with the breeders I did not think that much harm could be done to the strain. I had been used to breeding Norwich canaries and had had it instilled into me that inbreeding was a bad thing and that after a few years the youngsters would be weaklings and of little use. I did not keep the strain of canaries long enough to make up my mind about whether it was harmful or not. I know that many breeders of fishes as well as birds occasionally inbreed to try to fix a certain characteristic, but it seemed to be the general opinion that to indulge in the practice for long is very harmful to the strain.

Let us see what has happened to my own strain of scaled fantails. In 1937 I started with half a dozen fairly good fish. I kept them in an outdoor pond all the year round and bred from them each year. The spawning was always done in the pond and the eggs were removed for hatching elsewhere in safety from the parent fish. Each year I saved the very best fish to continue the strain and any weak fish were destroyed. I do not believe in patching up sick fish for breeding purposes; this practice can only lead to trouble later on. Each year I obtained a rather mixed bag of youngsters: some were single-tailed, some were tri-tails and some web-tailed. Some of those with good tails had single anal fins and some had no anals at all. Most had good deep bodies, and I have never had any trouble with this feature. Most changed colour within a year and I had a preponderance of self-reds. Occasionally some of the very best fish had some silver on them, but their red was always brighter than that of the selfs. However, I preferred the self-reds and so the silver ones were eliminated.

During the years 1947-1950 I exhibited at many of the leading shows and my fantails were never beaten. As I was then asked to judge at most of these shows I decided to give up showing. However, my strain of fantails continued to win at leading shows and I continued to breed from the same strain. After some years I realised that I must be inbreeding, and that most of my stock was related. I endeavoured to buy in some fresh fantails of the same type to strengthen the stock but although I tried at every show I could visit I could not find any fish near enough to the standards to be

Continued on opposite page

Gandak Loach

by JACK HEMS

Gandak loach

BOTIA lohachata is a recently introduced loach of distinctive appearance and remarkable charm. It is native to many of the fresh waters of northern India, and was first discovered in the upper reaches of the River Gandak, a lively tributary of the Ganges, as long ago as 1912.

Aside from the fish's hardiness—it has a temperature range of roughly 60° to 90° F, the Gandak loach takes kindly to life in the aquarium, and makes a perfectly satisfactory occupant of a community tank; for though it will sometimes thrust its company on other fishes, it never harms them in any way.

In shape of body the Gandak loach is much the same as the well-known clown loach (*B. macracantha*), but rather slimmer. It has the typical cluster of barbels around the mouse-like snout and a tiny spine beneath each eye.

The basic colour is a milky-white to ivory overlaid with a silvery sheen. The sides are ornamented with about seven dark-brown to blackish Y-shaped markings (which unite on the back), and a number of short, irregular dark bars, some of which have pale centres. The dorsal fin is adorned with a dark horizontal band near its top edge and a dark spot in its base. Two dark bars extend obliquely across the pointed lobes of the deeply forked and dusky marbled caudal fin. All the other fins are specked or blotched with black. Those parts of the fins which are not dark coloured are clear to silvery white.

Whenever possible, the Gandak loach will make its home under a piece of stone, or among a clump of plants, where it is partially or completely screened from close observation. And from this refuge it will sally forth, every now and then, in search of food.

Feeding it is easy, because it will eat almost anything small enough to go into its underslung mouth. Food is taken after dark as well as during the hours of daylight. Like other loaches, it is a painstaking scavenger.

It is also an exceedingly fast swimmer and, on occasions, its darting movements in the aquarium are so unpredictable and so rapid that it is impossible for the eye to follow its erratic course. Its wildest gyrations in the aquarium take the form of vertical leaping movements at or near the top of the water. This amazing "dance" may continue without pause for an hour or two at almost any time of the day or night. Perhaps, like the Japanese weatherfish (*Misgurnus anguillicaudatus*), it is more than usually sensitive (for a loach) to changes in atmospheric conditions.

In its chosen shelter-place, and sometimes in full view of its owner, the Gandak loach often assumes the most disturbing postures—disturbing, that is, to the aquarist who is not familiar with loaches and their eccentric ways. For example, it is not uncommon to find one lying on its back on the sand, or among plant life. This posture is often held for minutes on end. Then, suddenly, quite instantly, it will twitch its "whiskers" and twist round to the normal position before shooting off to another part of the tank.

There appears to be no difference in the outward appearance of the sexes, and, as to size, a large Gandak loach, presumably full grown, averages 3 inches in length.

When better known, there is no question that this interesting fish will become a firm favourite and an aquarium entertainer of long-lasting and exceptional merit.

Inbreeding — is it Harmful?

(continued from opposite page)

bought in. When I did find a fine one that I would have been glad to use I discovered that it, too, was from my strain!

After 24 years of breeding with the same strain, what are the consequences? I still breed enough fine fish for my interests and I still breed some grand show-quality fish. Last season's hatchings have provided me with a fine bunch of fish, several having no visible faults at all, and examples which could win in any company. I do not get weaklings among the youngsters but still get the odd-shaped ones, such as single-tails etc. I think I can safely say that the quality of the best fish is as good as any I have previously bred.

I have not noticed any weaklings among the youngsters. A few die off when at the fry stage, but I have always had this happen. I usually breed far more than I can cope with, because of lack of space. I had just over 20 breeders of first-class quality in my pond all last winter and I have not lost one of them or had one sick. They appear to me to be as strong and healthy as any I have bred. Some late-hatched youngsters have wintered out of doors with no artificial heat and they were only an inch long overall.

Although I can give only the results of 24 years' inbreeding I can safely say that so far I have had no regrets and have failed to discover any harmful effects of this practice.

Fence Lizards

by ROBERT BUSTARD, B.Sc.

Photographs by the author

THE genus *Sceloporus* contains 102 forms of remarkably uniform lizards. Twenty-seven occur within the boundaries of the United States and all the members of the genus come from the New World. The species most commonly available in Europe belong to the *undulatus* group and are the northern fence lizard (*Sceloporus undulatus undulatus*) and the southern fence lizard (*S.u. hyacinthinus*). The price of an adult specimen is about 20 shillings. From time to time the giant fence lizards may be available and the *Torquatus* group, to which the largest members belong, can be taken as typical of these lizards.

The two common species mentioned above grow to a total length of only 6 to 7 inches. The scales are large and spiny, giving the lizard a rough appearance. The dorsal coloration is greyish brown with transverse dark bands. The underside of the throat and also the edges of the belly are a bright dark-blue or green and on the belly are surrounded towards their inner edge by a black line. These bright colours tend to be reduced or absent in the females in all the members of the genus (a paper on this is to be published shortly in the *British Journal of Herpetology*). The head of these lizards is conspicuous and held well above the ground, on which the lizard sprawls since the legs arise at right angles to the body.

These lizards live well in captivity, where their diurnal habits and constant activity, especially when food is introduced, make them of great interest. Little is known about the breeding habits of many of these lizards so collectors may have the chance to make original observations on their pets. The vivarium should conform with their habitat, which according to H. M. Smith (*Handbook of Lizards*, Comstock, New York, 1946) is, "relatively dry, open, sunny woods, usually on hillsides." My specimens live in a 36 in. by 20 in. by 20 in. vivarium which has 2 inches of dry sand on the floor. The back of the vivarium has some rocks piled against it and at one side is a log. When alarmed they retreat behind the stones, and during the day when the light bulb is switched on to bring the temperature to about 75 F they bask on the log and stones. A small water dish must be provided.

Blue scaly lizard (Sceloporus cyanogenys)

Blue scaly lizard with several young under a week old

Like most small lizards they are insectivorous and the method by which they catch their prey is quite different from the slow stalk of the chameleons, which is followed by the rapid protrusion of their long tongue. Some small insectivorous skinks run up till they are near their prey (when it is a winged insect such as a bluebottle) and then creep stealthily nearer until they can grab it with a lightning lunge. Not so the fence lizards: they are content to use sheer speed, unaided by strategy, to catch their food. The success of this method and their amazing speed can be seen if some dozen bluebottles are put into a large vivarium housing a few of the lizards. No sooner has a bluebottle landed on the ground or sides of the vivarium than a lizard rushes to the spot and jumps at the insect. So fast does it move that its victim seldom has time to escape.

I have been amazed by the method by which they are enabled to track a bluebottle in flight as it zooms around the vivarium; so carefully do they keep watch that should it happen to fly past them they jump and catch it in mid-air. I have often seen this happen and have been surprised to discover that they could judge its speed and react to it so quickly. The food of these lizards is any insects, and a good basic diet is gentles and the resultant bluebottles.

Grasshoppers, moths and spiders will all be greedily devoured.

One of the most attractive of the giant species is the blue scaly lizard (*Sceloporus cyanogenys*), measuring 10 to 12 inches. They require the same treatment as the smaller species described above, although they will have much larger appetites and can deal with larger prey. I have been unable to sex these lizards according to the coloration of the ventral region, as I have found that both males and females possess the bright markings on the ventral region. This is contrary to the findings of H. M. Smith.

Most of the fence lizards lay eggs but the members of the *torquatus* group (the giant scaly lizards) give birth to live young. Little is known about their reproductive behaviour and I was, therefore, most happy when I was able to watch one of the 16 specimens in my collection give birth to some of its 15 young. These lizards arrived from Texas in March, 1959, and the birth took place on 12th June. The birth has been recorded in detail in the paper mentioned above (*British Journal of Herpetology*). The young, which were active at birth and able to cope with small gentles and houseflies (some successfully caught and ate bluebottles but only with some effort), averaged about 70 millimetres in total length.

The fence lizard group is one which can be strongly recommended to both beginner and experienced hobbyist.

Don't Blame the Breeder

by PETER DENDY

COMPLAINTS are sometimes heard from aquarists who have acquired guppy breeding stock that they don't breed true. They suggest that they have been "sold a pup," sometimes a very expensive pup, by the breeder from whom they obtained the stock. There have been several cases where bad feeling and hard words have arisen because stock has not bred true and the would-be guppy-breeder has become discouraged. When this happens the breeder always gets the blame, which can be unfair.

You would think that true-breeding stock in one man's tank would continue to breed true if transferred to another man's tank, and, of course, theoretically this should be so, but in practice it does not always work like that. We know that the guppy is a very unusual fish in that it can be persuaded to produce finnage shapes of almost infinite variety and that, further, one particular finnage shape can be more or less fixed in a true-breeding line. Nevertheless the factors controlling this phenomenon would seem to be precariously balanced and a violent change of environment and water conditions appears to be able to throw things out of gear.

This statement may well be challenged and if it is I can put up no logical arguments to support it. There may be a better explanation for this failure to breed true, but I have never heard of one and the fact remains that guaranteed stock and even stock removed from the breeder's tank in the presence of the purchaser has gone haywire in the next generation. It is always said that when this happens the true strain will re-emerge if selective breeding is carried out for a couple of generations; but the recipient, with what he considers to be "duff" stock, rarely if ever attempts to prove or disprove this, but slings the lot down the drain and puts a black mark in his names and addresses book against that of the breeder.

A change in the characteristics of the strain can occur without any help from the effects of varying environment, as many breeders have found. I have experienced marked changes in finnage shape and coloration, which can be a clue to weakness in the strain because of inbreeding or to the emergence of normally suppressed inheritance factors arising from the combination of chromosomes in the particular pairing of male and female.

Outwardly, of course, the male guppy shows what is in his make-up by his colour and finnage, but remember he is showing only the dominant factors in his biological equipment and there are many recessive characteristics which may not even be guessed at. The female's appearance tells us practically nothing at all and you are relying on luck when you chose the mother of future broods. It requires only the combination of what would normally be two recessive characteristics to perhaps produce a dominant factor which materially influences the breeding strain.

To guard against this sort of thing and to try and ensure that the right female is used to carry on the strain, serious breeders adopt the policy of mating a selected male to three females and raise the resulting broods independently until near maturity, when the inherited characteristics can be assessed. The poorer broods are then dispensed with and the same procedure is adopted for each succeeding generation, always building towards that unobtainable perfection.

The choice of the right female is and always has been one of the biggest headaches that beset a breeder of guppies, simply because what is hidden within the female is unknown. After long experience, coupled with detailed observation and the making of notes for reference, it is possible to observe certain characteristics of finnage or colour patterns on the female which will produce better offspring, but this sort of information can only be obtained after years of study. It is just this kind of knowledge, in fact, that makes the expert breeder and differentiates him from the average aquarist, who simply flock-breeds. Unfortunately, too, there is no short cut to this specialised knowledge and you cannot find out about it from books.

One or two simple basic points about the choice of the right female are given and I leave you to follow on from there if you want to improve your knowledge. The shape of the female caudal fin varies from true round to almost triangular, and in breeding veiltail guppies the triangular-tail female should be chosen; the round-tail female is more suitable for short-tailed varieties. In other words you are trying to match the female to the desired shape of tail in her offspring. When breeding for colour in veils and scarves, or for really dark-black veils, the female chosen should show as much colour as possible and for black veils should have really deep-coloured finnage.

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 Botts, Half Acre, Brentford, Middlesex**

Stickleback Breeding Behaviour

CONCERNING the article "Stickleback Photography" (R. Guppy, *The Aquarist*, June, 1960), the author says that he does not know why the male "rams" the nest head-on. I have recently bred some of these interesting fish and observed the following. The male "rammed" the nest and immediately swam to a certain corner of the aquarium, where he "spat" out a mouthful of sand and gravel. He repeated this several times, each time going to the same corner of the aquarium to "spit" out. He soon covered his "dump" in fresh sand and gravel; from the amount moved he must have done this action many times. I conclude from this that he was excavating a space under the nest for the eggs. He was also observed to "ram" when bringing a new piece of building material for the nest, presumably sticking it into place.

G. MITCHELL,
Wolverhampton.

Of Fishes and Owls

MAY I beg a small amount of space on your letters' page for the rebuttal that seems to be called for by Mr. Fuller's letter (*The Aquarist*, April).

In the matter of owls taking fish it has been proved, as I stated in my article, that these birds will eat fish. Remains found in owls' stomachs could be from fish found dead on shore. Quite true, but the point is, that having shown that owls will eat fish if they can get them, it is now up to the opponents of my theory to show why they cannot get them. Mr. Fuller's arguments accomplish absolutely nothing in that direction. Why, I wonder, does he pick on 10 inches as the depth of water through which an owl would have to strike, in order to seize a goldfish. It should be obvious to the most inexperienced of all aquarists that no goldfish can be relied on to remain always more than 10 inches below the surface, or 2 inches for that matter.

I will wager that the cat described in Mr. Wright's letter, on the same page of *The Aquarist*, did not reach through 10 inches of water in order to strike its victim. It is plainly ridiculous to admit that cats can catch fish, while denying to owls the same capabilities. We have two nearly parallel cases, involving animals designed by nature to subsist on terrestrial small game, which are confronted with large sluggish fish, confined to small shallow ponds. Can the predator learn to take advantage of this new source of food? Mr. Fuller thinks that the cat can, but the owl cannot. Yet the advantages all lie with the owl: it has more efficient grapplers and it can fly.

Concerning the disappearing trout, lacking any definite information to the effect that the water in my pond was stagnant, Mr. Fuller would have been well advised to hold his peace. In fact there is a running stream a few yards from the pond. I have merely to divert whatever flow of water is necessary to meet the requirements of the occasion. Mr. Fuller has also omitted to note that the trout, when I first found them, were in extreme distress from the very cause which he postulates. Yet I did not see them exhibit any disposition to escape from their predicament by jumping on to shore. As it happens, I am quite ready to accept the theory that the fish committed suicide, but there will have to be a better reason than that advanced by Mr. Fuller.

In conclusion, could it be possible that the artist who did the cartoon on page 7 had seen Mr. Fuller's letter?

RICHARD GUPPY,
Wellington, B.C., Canada.

White Worms and Dropsy

I WAS most interested in the theory that white worm, fed in excess, may cause dropsy. About 12 months ago, I had several deaths from this disease, and I recall that at the time I was using white worm in quantity. I still use it, but only as an occasional treat, and since adopting this procedure have had no more cases of dropsy. I suppose it may be coincidence, and as Mr. Boarder says in his letter to *The Aquarist* (March), why white worm should cause this disease is difficult to understand. But, I wonder if it is possible that in certain circumstances the worms may harbour the germ which causes the trouble?

M. J. BROOMFIELD,
Tiverton, Devon.

Insemination in the Guppy

I HAVE followed Mr. P. Dendy's articles on guppies with keen interest and, concerning the one in last August's issue, I would refer Mr. Dendy, and others interested, to page 13 of the late Dr. Myron Gordon's *Guppies as Pets*. Dr. Gordon states that females are only inseminated during prolonged attachments and never following a thrust, or series of thrusts, of the gonopodium. This has been proved repeatedly, he says, by testing vaginal smears for sperm. The gonopodium is not used as a "gun," and the idea that it is should be discarded as it is based on "unverifiable observations."

As a guppy fanatic I agree with Mr. Dendy that it is an academic point; but I think it far better to have the correct facts, and as Dr. Gordon devotes considerable space to the

subject I hope Mr. Dendy will read the booklet mentioned.

Also, on page 10 of the booklet, is what may be the answer to Mr. Dendy's troubles with under-gravel filtration, mentioned in last September's issue. I quote: "Curiously, formaldehyde is the base for many plastic products—one of which is bakelite. These plastics are fine but not for fishes." Formalin is an aqueous solution of formaldehyde and we all know how potent formalin is.

Finally, I would also like to hear, as would Mr. Boarder in the March issue, how white worms cause dropsy. These worms are the only live food I use and I feed far more than the one or two a week advised by Mr. Dawson. I have not yet lost a fish through dropsy. The worms, incidentally, are themselves fed exclusively on fresh bread and milk.

W. A. CLEWS,
Chorley, Lancs.

Formaldehyde resin plastics are not likely to have any free formaldehyde present in the moulded products made from them, and the clear plastic used for aquarium apparatus is not of this type.—EDITOR.

Under-Gravel Filtration

AS I was browsing through the May, 1960 edition of *The Aquarist*, I noticed the letter by P. Dendy about the way his guppies died. He suggested that the cause may have been his under-gravel filtration. I am inclined to agree with him, because my female guppy (which is in a community tank) died the first day I installed my filter in my tank. A few days later my male guppy died. Is there anything to suggest that under-gravel filtration affects fish, especially guppies? Could we have readers' views on this subject?

R. SZUR, London, W.3.

Chromosomes in the Guppy

REFERRING to the article "Inheritance in the Guppy," by Mr. Peter Dendy in *The Aquarist* (March), is the author correct in his statement that the guppy zygote contains 46 chromosomes? I was led to believe that this was only the condition in *Homo sapiens* and that the number of chromosomes diminished as the animal became less complex in its characters.

Congratulations on you excellent articles on genetics, colour changes, inheritance etc.; they form the basis of many arguments, especially concerning the effect of environmental factors on inheritance!

S. BUTTERWORTH,
Royton, Lancs.

The figure given for the chromosomes of the guppy is the correct one.—EDITOR.

Hardy Mollie

THROUGH carelessness, a 4 weeks-old black mollie was left in a jam-jar in about ½ inch of water on the floor under the aquarium stand for a whole week. When I found the jar the water was very cold, and I thought the fish must be dead, but I put it in the aquarium just to make sure. Within a few minutes it was quite active and feeding. I have had my aquarium only since Christmas, and have very little experience yet this seems to me to be unusual.

I would like to thank your magazine for the help it has given me as a very new fishkeeper.

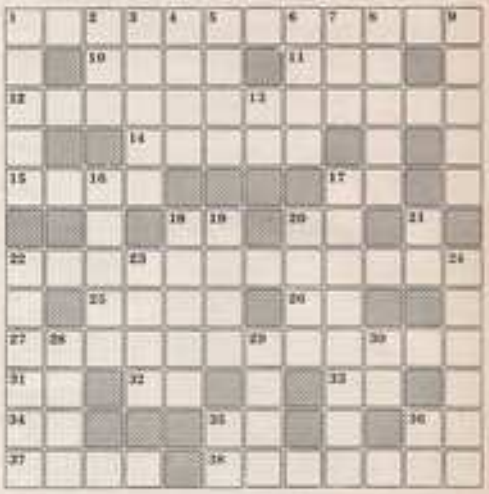
(Miss) E. E. PEGGREM,
Southall, Middlesex.

Reciprocation

Sequel to the school tours: We gave everything we had to make the school tours of the Aquarium a useful and educational experience for the children. The children reciprocated by giving your Curator the mumps. *From "Aquarium Newsletter" of the Vancouver Public Aquarium.*

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1. British nest-building fresh-water fishes (12)
10. Oho! I am in a state (4)
11. The lot (3)
12. Water game like water polo, or funny freak? (7, 5)
14. A shilling at each end of the rail despatches (5)
15. A penny on the ace for a British fish (4)
17. A short hand! (2)
18. And a short but holy man (2)
20. Half East in two ways (2)
22. Watery vegetable? (7, 5)
25. Luncheon meat (4)
26. It is flirt another way (2)
27. Crew send sets for aristocratic reptiles? (7, 5)
31. That's a laugh (2)
32. This is that in (1, 1)
33. Sapper starts the reptile (1, 1)
34. Alternative of cranda (2)
35. Afterthought of the *Cyclops* (1, 1)
36. Male of the herring (2)
37. Natural supply for the pond (4)
38. Would one expect angels in a tank of this glass? (7)

CLUES DOWN

1. Beetle's wing-case, hard after a bob (5)
2. Admission of debt among the peon (1, 1, 1.)
3. Hunt (5)
4. Flying toy (4)
5. Cut of the lion (4)
6. Marine fish allied to perch (4)
7. Friendly mountain sprat? (3)
8. If it's a white this mountain minnow it's a beauty in the aquarium (5)
9. Half horse, half man (5)
13. Civil Defence (1, 1)
16. Mixed sauce may bring about a result (5)
17. *Xiphophorus* this, the sword-tail (8)
18. Condition (5)
19. A mire confused (4)
20. Period of life (4)
21. Guess this and you will not be far out (2)
22. No char anyway but two or more flukes, holds craft (6)
23. Semicircular recess (4)
24. Thrown (6)
28. A rare fish might, oddly, be called a this awe (4)
29. Remove dust (4)
30. You and I (2)
35. Footnote (1, 1)
36. Male (2)

(Solution on page 59)

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 NORTH WEST LONDON GROUP OF AQUARISTS SOCIETIES

THE first competition meeting of the N.W.L.G.A.S. was held recently, Hendon and District A.S. being the host club. The chairman of Hendon, [illegible], welcomed the group to the meeting and introduced the president of Hendon, [illegible], who presented the N.W.L.G.A.S. Shield to Willesden (who were last year's winners).

The results of the competition were: [illegible]

* * *

THIRTY members attended the May meeting of **Corby and District Aquarist Society.** A table show was arranged in order to select the six best fish to represent the Society at a future exhibition and the results were as follows: [illegible]

The judge was Mr. Stuart Buss of Peterborough who then gave a talk on the conditioning of fish for exhibition.

* * *

"FEEDING Fish" was the title of an illustrated talk given by Mr. D. Hammond to members of the **Blackpool & Fylde Aquatic Society.**

Mr. G. Gower, chairman of the show committee, told members that Mr. B. Pearson had been elected show secretary and details of the society's annual show can now be obtained from Mr. B. Pearson, 71, Station Road, South Shore, Blackpool.

[illegible]

* * *

THE results of the **Slough Aquarium Society** Open Show which was held recently were as follows: [illegible]

* * *

AT the **Romford A.S.** meeting it was announced that Romford had won the Three Club show at Thurrock in spite of one car breaking down and a few members not being able to turn up with the entries. The results were: Romford, 49 points; Thurrock, 46 points; Thameside, 28 points.

The rest of the meeting was given over to a series of three minute talks by members which ranged from Mollies to Spawning of Egg-laying Tooth Carps of various types, handling of fish by importers, [illegible] and a very interesting account of the spawning of Polycentrus schomburgki, one of the Leaf Fish family.

* * *

THE **Yeovil and District Aquarist Society** entertained **Taunton Aquarist Society** in May with an inter-club show. The winners were: [illegible] The quiz winner was K. Pilkington. A large attendance made an enjoyable evening.

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AT the April meeting of the **Nottingham and District Aquarist Society**, Mr. R. Atkinson gave a talk to the members of his experiences and methods of culturing "white worms" etc. [illegible]

* * *

THE **Thorne A.S.** were visited recently by the Woodwell and District A.S. and everyone enjoyed the talk given by Mr. Bunting on pond life.

The result of the table show for Characins was: [illegible]

* * *

THE Willesden Open Show will be held as usual at Roundwood Park, N.W.10, on the 9-10th September. Organised in conjunction with the **Willesden and District Aquarists' Club** and the Willesden Borough Council, the Aquarist section has increased the number of classes to over 30. In addition there are rabbits, birds, poultry, bees, photography and horticulture sections. Full details for the aquarists' show and entry forms may be obtained from Mr. J. R. Heron, 24, St. John's Avenue, Harlesden, London, N.W.10.

* * *

THE open table show held by the **Sheffield and District Aquarist Society** was extremely successful. While the judges, Mr. W. Owen, Manchester and Mr. E. Chapman, Sheffield, were judging the 216 entries, the exhibitors and visitors enjoyed a film entitled "A Tale of Two Worlds." This was presented by Mr. A. Faulkner-Taylor, a well-known naturalist in the district.

The Best Fish In Show award was won by

An effective display by the Thorne A.C. at the local evening institute

Mr. A. J. Blake of Mansfield with a Bleeding Heart Tetra. The other results were as follow: Guppies: 1, Mr. Eaton, Nottingham; 2, A. Lindley, Nottingham; 3, C. Dracken, Skipton. A.O.V. Livebearers: 1, T. D. Smith, Nottingham; 2 and 3, K. Bartlett, Skipton. Characins: 1, A. J. Blake, Mansfield; 2 and 3, F. Davies, Middleton. Goldfish: 1, A. Penning, Sheffield; 2, R. V. Dyson, Sutton-in-Ashfield; 3, C. Wilson, Worksop. Barbs: 1, J. Shore, Ossett; 2, I. Beaumont, Sheffield; 3, J. Bailey, Sheffield. Labeos: 1, F. Davies, Middleton; 2, F. Holloway, Derby; 3, G. Green, Sheffield. Egg-Laying Toothcarps: 1, Mr. Holroyd, Goole; 2, L. Pearsonbough, Sheffield; 3, G. Taylor, Bradford. Labyrinths: 1, C. R. Wilson, Shipley; 2, A. Lindley, Nottingham; 3, K. Riding, Bradford. Fighters: 1, A. Penning, Sheffield; 2, F. Reynolds, Leeds; 3, C. R. Wilson, Bradford. Danios and Rasboras: 1, J. Bailey, Sheffield; 2 and 3, G. Lloyd, Sheffield. Breeders: 1, J. E. Short, Ossett; 2, A. Penning, Sheffield; 3, S. F. Reynolds, Leeds. A.O.V.: 1, F. Davies, Middleton; 2, K. Bartlett, Skipton; 3, R. Pearsonbough, Sheffield.

• • •

MR. R. Jones of the Tropical Study Group gave a talk on "Wayside Jewels" to the **Bristol A.S.**, which was very instructive and also amusing.

The Annual Dinner was held at the Royal Hotel and proved a great success, thanks to Mr. L. Emery who organised the entertainment.

The Table Show results were as follow: Barbs: 1 and 2, Mr. F. Brown; 3, Mr. J. Mapson. Characins: 1 and 2, Mr. J. Mapson; 3, Mr. F. Brown.

• • •

THE **Dewsbury and District A.S.** was given a colour-slide lecture by Mr. Pengilley (Barnsley), which included information about a wide range of fishes from coldwater, through tropicals to marine tropicals.

The members are busily engaged with plans for the F.N.A.S. show at Belle Vue and the Society's own display at Batley Agricultural Show, both of which are being held in June. Current individual efforts include at least two garden ponds at present in the course of construction.

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A TABLE Show for Labyrinth, Rasbora and White Cloud Mountain Minnows was held by **Southend, Leigh and District A.S.** The result was: 1 and 2, Mr. J. Wylie; joint 3, Mr. J. Wylie and Mr. N. Sellers; 4, Mr. D. Chesswright. Also at this meeting the members heard a tape recording made by Mr. L. Willis, on the Challenge of the Rasbora.

Meetings are held on the first and third Tuesday in the month at the Liberal Hall, Clarence Road, Southend, and particulars may be obtained from the secretary: Mr. G. Hedger, 67, Smith Avenue, Southend-on-Sea.

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AMONG the activities reported from the **Mansfield and District A.S.** was a members' discussion night on "Diseases of Fishes", starting off with an introductory talk by Mr. A. Atkins on "White Spot Disease." There was also a table show for livebearers and a lecture on "Livebearers" by Mr. H. Morton. Winner of the show was Mr. R. V. Dyson and in the breeders' class Mr. R. V. Dyson took first place also.

The Mansfield Society were very successful at the open table show held by the Sheffield and District A.S. There were over 200 entries and Mansfield Society won the "Best Fish in Show" award, the winning fish being a Bleeding Heart Tetra owned by Mr. A. J. Blake, who also took first place in its own class. Characins: Mr. R. V. Dyson took second place with a male Blue Acara.

At the last meeting of the Society there was a table show for Angel Fish and a Lecture on Angels by Mr. A. J. Blake.

• • •

A VERY full and active programme is arranged for the year for the **Hendon and District A.S.** Recently the Society was host to the six clubs which form the North West London Group of Aquarists. It was the first leg of a Fish Competition which during the year will cover all varieties of fish. The fishes concerned on this occasion were Guppies, Egg-Laying Tooth Carps and any other variety tropical egglayer. The result of the competition was a win for Hendon. Mr. Rice, a Canadian Aquarist, founder member of the Windsor Society, Ontario, was a guest recently. Before leaving he joined the Society, which already has four American Members.

Trips to support shows at Slough and Manchester have been planned. And later in the year it is the club's intention to have another Film Congress.

Messrs. Carle and Waste from Belgium are being invited to show the coloured films which without any doubt are the best in Europe. This will be their third visit to this country and it is expected that from six to eight hundred people will attend on 21st October.

• • •

THE guest speaker at the May meeting of the **Cambridge and District A.S.** was Dr. Clifford of Saffron Walden. He gave members a very instructive and interesting talk on "Life in the Water" and illustrated it with a collection slides and pressed botanical specimens.

The following Saturday, the first Members' Show of the year was held in Tracy Hall, the trophy winners being as follow: Spencer Cup (Best fish in the show), Mr. Aldridge; Moyes Cup (Best coldwater fish), and Major Wright Cup (Best fancy goldfish), Mr. Barker; Fadgell Cup (Best livebearer in show), and Breeders Cup (Best fish bred by exhibitor), Mr. Tappove; Morley Cup (Best egglayer in show), Mr. Aldridge; Quarry Cup, Mr. Palmer; Pictory Cup (Best catfish or loach), Mr. Bayley; Pairs Cup (Best pair in show), Mr. Driver and Brodd Cup (Best brood of six fish), Mr. Bayley.

• • •

THE last table show of the **Slough Aquarium Society** for Catfish, resulted in a win for Mr. A. N. Pryor's Corydoras aeneus, with Mr. L. Povey's Loricaria ... and Talking Catfish second and third.

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RECENT activities of the **North Warwickshire A.S.** have included a lecture on Genetics, the speaker being Dr. Cole, from West Bromwich, and a Film Show by Mr. C. D. Roe, the subject being Plant Life. At the May meeting there was a discussion on Fish-house Construction, and, for the meeting in June, it is hoped to show films of fishes.

New members and visitors would be made welcome to the meetings which are on the last Wednesday evening of each month, commencing at 8 p.m. at the following address: The Sports Pavilion, Cooksey Lane Sports Field, Kingstanding, Birmingham, 22C.

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THE annual show of the **Hampstead A.S.** was held last month, the results being as follow: Common Goldfish: 1, K. Pye. Angels: 1, B. Mould. Characins: 1, 2 and 3, T. Glass; 4, D. Webb. Rasboras: 1, B. Mould; 2, K. Pye. Barbs: 1, B. Mould; 2 and 3, O. Kluger; 4, T. Glass. Corydoras: 1, K. Pye. A.O.V. Catfish: 1, O. Kluger; 2, T. Glass. Egglaying Tooth Carps: 1 and 2, T. Glass. Male Guppies: 1 and 2, T. Glass. Mollies: 1, T. Glass; 2, K. Pye; 3, B. Mould. Platies: 1, B. Mould; 2 and 3, D. Webb. Sword tails: 1, J. Whittal; 2, B. Mould. A.O.V. Livebearers: 1, D. Webb. Fighters: 1, J. Whittal. A.O.V. Labyrinths: 1 and 3, B. Mould; 2, D. Webb. Cichlids: 1, T. Glass. A.O.V. Egglayers: 1, B. Mould; 2 and 3, T. Glass. The best fish in the show was a Leporinus fasciatus entered by T. Glass.

• • •

AT the May meeting of the **Northampton and District A.S.** Mr. J. Wright conducted an "Anagrams" contest of an aquatic nature, and this was won by Mr. R. Flynn.

"Trouble Corner" was answered by a panel of experts, and the monthly table show results, for Livebearers and Guppies, were: 1, Mrs. Upton; 2, Mr. Webb; 3, Mr. J. Wright.

• • •

LAST month **Merseyside A.S.** were visited by Dr. F. N. Ghadially, well known in aquatic circles for his informative lectures. In a recent inter-club table show and quiz with Widnes the home team won the quiz easily by 32 pts. to 27 pts. but Merseyside won the table show comfortably. Mr. Ian Threlfall will be leaving Merseyside soon owing to business reasons but will be joining Widnes.

• • •

THERE was a full and enthusiastic monthly meeting of the **Bradford and District A.S.** and Mr. C. R. Wilson gave a very interesting talk. The yearly film show evening was held recently at the Bradford Cine Circle when three colour films were shown. The table show was for coldwater. An excellent response has been received for the Chester trip and a second coach has been ordered.

Crossword Solution

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

AQUARISTS' CALENDAR

10th-11th June: British Aquarists' Festival, Belle Vue Zoological Gardens, Manchester. Schedules are available from Mr. Geo. W. Cooke, Spring Grove, Fieldhill, Batley, Yorks.

17th June: Priory A.S. first open show at Brixton. Entry forms from Mr. F. Jakes, 6, Westwood Park, London, S.E.23.

19th-24th June: Independent A.S. displays in the Islington Civic Council for Arts & Crafts exhibition at the Town Hall, Upper Street, London, N.1.—7 p.m. till 9.45 p.m. Sat. 2.30 p.m.—9 p.m.

22nd-24th June: Southampton and District A.S. annual open show at the Avenue Hall, Southampton. Details can be obtained from Mr. D. E. King, 32, Clover Nook, Bitterne, Southampton.

24th June: Dewsbury and District A.S. furnished aquatic show at Batley Agricultural Show, Mount Pleasant, Batley, Yorks.

24th June: Show of Livebearers and Cats. Organised by Clapham A.S. and sponsored by ASLAC. Venue St. Peters Church Hall, Prestwick Place, Clapham, S.W.4.

25th June: Skipton and District A.S. One day open table show, Ambulance Hall, Skipton.

8th-9th July: Ossett A.S. Open Show. Ossett Hall, Refuge St., Shaw nr. Oldham.

8th-9th July: Dagenham Town Show. All enquiries re Schedules, etc., to the Show secretary, Mr. A. F. Smith, 125, Heaton Avenue, Romford, Essex.

13th-15th July: Merseyside A.S. Open Show at the Liverpool Show. Schedules and information from T. A. Mitchell, 47, Oakhill Road, Liverpool, 13.

14th-15th July: Bedford and District A.S. open show in connection with the Bedfordshire Agricultural Show. Details can be obtained from the show secretary Mr. D. Ward, 42, The Ridgeway, Putnoe, Bedford.

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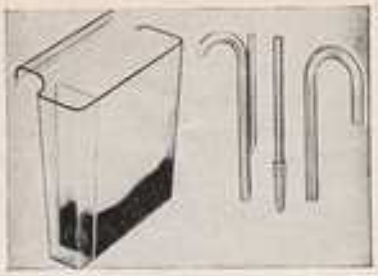

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The firms listed are wholesalers or retailers or both in fishes, tanks, plants, appliances and accessories, reptiles and amphibia. Abbreviations: **W.**—Wholesale only. **R.**—Retail only. **WR.**—Wholesale and Retail. **C.**—Coldwater. **T.**—Tropical. **P.**—Plants. **AA.**—Appliances and accessories. **R. & A.**—Reptiles and Amphibia. **E.C.D.**—Early closing day.

BERKSHIRE

The Reading Aquarist
64, King's Road, Reading
Telephone: Reading 53632
E.C.D. Wednesday. R. C.T.P.A.A.

BUCKINGHAMSHIRE

Brown, K. G.
100, Amersham Road,
High Wycombe
Tel. 1573 R. C.T.P.AA.

CHESHIRE

Grassby, Joe., F.R.H.S.
"The Glen" Fisheries, Mobberley, Nr. Knutsford
Tel.: Mobberley 3272 W. C.T.P.AA.R.& A.

Robert Jackson (Naturalists) Ltd.
Holly Bank Nurseries, Grove Lane, Hale
Telephone: Ringway 3301
WR. C.T.P.AA.R. & A.

DURHAM

Metcalf, G. R.
2, High Northgate (near A.B.C. Cinema)
(On main A.1 road) Darlington
Telephone: Darlington 5991
E.C.D. Wednesday. R. C.T.P.AA.R.& A.

ESSEX

Goodmayes Aquaria
Shaftesbury Parade, High Road, Chadwell Heath
Telephone: Goodmayes 2594
E.C.D. Thursday. R. C.T.P.AA.

The Hamlet Aquaria
14, St. Helen's Road (off Hamlet Court Road),
Westcliff-on-Sea
Telephone: Southend 44724
E.C.D. Wednesday. WR. C.T.P.AA.

HAMPSHIRE

Arundel Aviaries & Fisheries
211/213, Arundel Street, Portsmouth
E.C.D. Wednesday. WR. C.T.P.AA.R.& A.

Wingate Zoological Supplies
7, Market Street, Winchester
Telephone: Winchester 2406
E.C.D. Thursday. R. C.T.P.AA. R.& A.

HERTFORDSHIRE

Cura, L. & Sons
Water End, Hemel Hempstead
Telephone: Water End 44
E.C.D. Saturday. W. C.P. R.& A.

Wat-Pet Stores
66-68, London Road, St. Albans
Telephone: St. Albans 55439-55507
E.C.D. Thursday. WR. C.T.P.AA.

KENT

Kingfisheries Aquarium
138, Croydon Road, Beckenham
Telephone: Beckenham 3716
E.C.D. Wednesday (all day). W.(P). R. C.T.P.AA.

Sherwood Pet Stores
(Proprietors, Fairbairns Aquaria, Ltd.),
252, Sherwood Park Avenue, Sidcup
Telephone: Bexley Heath 7217
E.C.D. Thursday. R. C.T.P.AA.R.& A.

LANCASHIRE

Hornby's
Trafford Bar, Old Trafford,
Manchester, 16
Telephone: Trafford Park 2980
E.C.D. Wednesday. R. C.T.P.AA. R.& A.

Liverpool Aquaria Company
23, Sir Thomas Street, Whitechapel, Liverpool, 1
Telephone: Central 4891
E.C.D. Wednesday. R. C.T.P.AA. R. & A.

"Stanleys"
110-112, Shakespeare Street, Southport
Telephone: Southport 5369
E.C.D. Tuesday. R. C.T.P.AA.

LONDON (North)

Philip Castang Ltd.
91, Haverstock Hill,
Hampstead, N.W.3
Telephone: Primrose 1842 and 9452
E.C.D. Saturday. W. T.P.AA. R. & A.

Paramount Aquarium
95, Haverstock Hill,
Hampstead, N.W.3
Telephone: Primrose 1842 and 9452
E.C.D. Thursday. R. C.T.P.AA. R. & A.

LONDON (South)

Fairbairns Aquaria, Ltd.
15, Well Hall Parade, Eltham, S.E.9
Telephone: Eltham 5859
E.C.D. Thursday. WR. C.T.P.AA. R. & A.

The Jaynor Organisation
(James North (London) Ltd.)
316, Lee High Road, Lewisham, S.E.13
Telephone: Lee Green 3577
E.C.D. Thursday. WR. C.T.P.AA.

South Western Aquarists
2, Glenburnie Road, Trinity Road,
Upper Tooting, S.W.17
Telephone: Balham 7334
E.C.D. Wednesday. WR. C.T.P.AA. R. & A.

Tachbrook Tropicals
244, Vauxhall Bridge Road, Victoria, S.W.1
Telephone: Victoria 5179
(Open all week except Sundays).
WR. C.T.P.A.A. R. & A.

LONDON (West)

Owen Reid's, Aquarium Dept.
12, Spring Bridge Road, Ealing Broadway, W.5
Telephone: Ealing 3259
E.C.D. Wednesday. WR. C.T.P.AA. R. & A.

NORTHAMPTONSHIRE

The Aquarium
192, Wellingborough Road,
Northampton
Telephone: Northampton 34610
E.C.D. Thursday. R. C.T.P. A. & A. R. & A.

The Pet Shop
120, Kettering Road,
Northampton
Telephone: Northampton 841
E.C.D. Thursday. R.C.T.P.AA.

NORTHUMBERLAND

Watsons
6, 8 and 10, Half Moon Lane,
Durham
Telephone: Durham 72407
E.C.D. Wednesday (all day). R. C.T.P.AA. R. & A.

OXFORDSHIRE

The Goldfish Bowl
9, East Avenue, Cowley Road,
Oxford
Telephone: Oxford 41825
E.C.D. Thursday. R. C.T.P. A. & A. R. & A.

Headington Pets Supplies
150a, London Road,
Headington, Oxford
Telephone: Oxford 61706 and 58673
E.C.D. Thursday. R. C.T.P.AA. R. & A.

STAFFORDSHIRE

Walsall & Wolverhampton Aquatics
46, Stafford Street, Walsall and
147, Horsley Fields, Wolverhampton
Telephone: Walsall 21783 and Wolverhampton 24147
E.C.D. Thursday. R. C.T.P.AA. R. & A.

SURREY

Thameside Tropicals and The Pet Shop
Brassey House, New Zealand Avenue
Walton-on-Thames
Telephone: Walton 24076 R. C.T.P.AA. R. & A.

SUSSEX

Preston Aquarium
44, Beaconsfield Road, Brighton
Telephone: Brighton 29620
(Open all week). R. C.T.P.AA.

WARWICKSHIRE

The Coventry Aquarist (Prop. W. Dymond)
43, Melbourne Road, Earlsdon, Coventry
Telephone: Coventry 72772
E.C.D. Thursday. WR. C.T.P.AA.

Fanday Aquaria
Fanday House, 129, Stratford Road, Sparkbrook,
Birmingham
Telephone: Victoria 3537
E.C.D. Wednesday. WR. C.T.P.AA. R. & A.

WORCESTERSHIRE

The City Aquaria, Bird and Pet Supplies
(Proprietor: Mrs. M. Hemming)
34, Friar Street (opposite Union Street), Worcester
Telephone: Worcester 2005
E.C.D. Thursday. R. C.T.P.AA. R. & A.

YORKSHIRE

The Corner Shop (Prop. J. Wilde)
526, Abbeydale Road, Sheffield, 7
Telephone: Sheffield 54172
E.C.D. Thursday. R. C.T.P.AA. R. & A.

SCOTLAND

Aquarists' Rendezvous
164/168, Albert Drive, Pollokshields, Glasgow, S.1
Telephone: South 4258
E.C.D. Tuesday (1 p.m.) WR. C.T.P.AA.

Forbes, James L.
176, Blackness Road, Dundee, Co. Angus
Telephone: Dundee 66409
E.C.D. Wednesday. R. C.T.P.AA.

NORTHERN IRELAND

Ulster Aquatics
15, Montgomery Street, Belfast
Telephone: Belfast 27144
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TT Heaters—25, 40, 60, 75, 100, 150 watts	9 6

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Liquivex	1 9
Dissolvine	2 6
Brooklyn Fertilising Tablets	1 6
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Fungus Cure	2 0
Halamid	2 11

PUBLICATIONS

Handbook of Tropical Fishes	10/6
The Encyclopaedia of Tropical Fish	60 0
Tropical Fish	39 0
Exotic Aquarium Fishes	84 0
All about Tropical Fish (McInerny)	35 0
Diseases of Fishes	14 6
Tropical Fish	15 0
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Starting right with Tropical Fish	6 0
All About Aquariums	6 0
All About Guppies	6 0
All About Breeding Tropical Fish	6 0

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