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JANUARY, 1961



MONTHLY
Vol. XXV No. 10

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Editorial

ALTHOUGH the propriety of offering goldfish as prizes at fairgrounds or of using them as articles of exchange for old clothes has been often questioned, it must be admitted that occasionally the acquisition of a fish in one of these ways marks the beginning of a lasting interest in fish-keeping for a youngster or even for one not so young. What is obtained so casually in a jam jar (or more likely, to-day, in a polythene bag) is unlikely to be valued or much cared about, however, and the fate of most of the poor fish distributed in such a manner is a sad one.

In a short French film that is circulating at the present time the winning of a goldfish at a sideshow by a small boy provides the foundation for a charming story involving the goldfish, a canary and a cat, no dialogue or commentary being used or needed. "The Golden Fish" (we did wonder why this translation of "Le Poisson d'Or" was used as title instead of the colloquial name) contains much to fascinate aquarists, for so clever is this production that the impression is given that here is a truly wonderful and knowing fish if ever there was one. It is shown looking positively apprehensive (and yet how can a goldfish look apprehensive?) in a rocky shelter when it appears likely to be awarded to a formidable-looking successful patron of the Wheel of Fortune stall, and later is seen darting at high speed into a net in apparent willing surrender after it has been selected by the small boy when his number comes up.

By the time, in further sequences, the goldfish has been seen performing some remarkable gyrations in time to music, in its bowl at the small boy's home, one is almost willing to believe that the fish is unique. It seems likely, however, that to obtain the effects shown, these goldfish (for aquarists will notice that more than one fish has been used in the shots) were used by the film-makers in a harder way than is the lot of most fairground goldfish.

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Trout Hatcheries and Amateur

by JOHN S. BESWICK (Illustrations by the author)

IT is now trout-rearing time. Trout ova are hatched commercially in great numbers, and the trout reared are sold for the stocking of fishing waters and for food. Some experts state that more food can be farmed in this way in water than on the same acreage of land.

When the trout are ready the ova and milt are stripped from them by hand and mixed together in water. The fertilised ova are then put inside a hatching house in shallow trays made of wood and perforated zinc. The trays are supported in large sinks which are placed one above another so that the supply of fresh water which flows into the house, usually from a stream, can flow down from one sink to another and then out into the stream again.

Eyed Ova

At first the ovum looks like a round halibut-liver oil capsule, but after a time two dark spots appear. If you examine them very carefully you will see that the spots are actually two eyes, and at this stage the eggs are known as eyed ova. Soon the new-formed tail can be seen, looking like a fragment of cotton, and sometimes the little creature twitches violently, as when subjected to strong light.

From the time of fertilisation it takes several weeks for the

embryo to hatch, but the actual length of time depends on the temperature of the water. The colder the water the slower the development. In Nature, if the embryo hatched out while the water was still very cold it would find very little food available, so it is made to wait until the temperature is right for the rapid breeding of the microscopic creatures which supply its early needs.

Any ova that become white are extracted by the trout farmer and thrown away, for they are dead. The white is fungus and it would quickly spread to the live ova if not checked.

When the ova hatch the little creature which emerges is called an alevin. It is a funny thing without any colouring at all and is perched upon a large ungainly yellow balloon which is actually a yolk sac from which the baby trout will draw all the nourishment it requires during the first few weeks of life. Again this period is long or short dependent upon the temperature of the water.

Not until the yolk sac is used up does the alevin begin to look round for food, and then it takes up a feeding position facing the current, just like a mature trout. It is amusing to watch it at this stage dashing at anything which moves, but it is not yet good at catching things, and does not seem to know whether the object is edible till it has it in its mouth.

At the trout hatchery the alevin is fed on liver, minced up so fine that it looks to us like a pulp with no substance at all; the particles have to be very small indeed for the small fish. At first the alevins have to be fed about five times a day.

As soon as the alevins (correctly termed fry when the yolk sac has been absorbed) become strong enough they are moved out of the hatching house and put instead into concrete tanks, and then later into ponds. A constant supply of fresh water flows through the ponds and tanks, which is first aerated over a small waterfall.

The fish must be fed every day and a large part of the hatchery man's work consists of the endless preparation of minced food: offal, fish heads and specially prepared dried food which is bought commercially. At feeding times the food is wheeled round the ponds in barrows and is hurled by the shovel-ful in a wide arc across each pond.

Trout grow disparately and have to be sorted into size-groups to give undersize fish a chance of catching up. The rate of growth of a trout is dependent mainly upon the amount of food available; in a trout community the amount of food available to you will depend mainly upon whether you are bigger or smaller than your fellows.

Rearing Trout in Still Water

In January 1949 I visited Nailsworth Trout Hatchery in Gloucestershire and decided to buy some ova and try rearing them myself. A friend who had tried rearing trout in running water in an aquarium succeeded in keeping only a few till the feeding stage. As I intended rearing mine in



Nailsworth trout ponds. In the foreground are seen the fry ponds and "baskets"

Trout Rearing

static water as an experiment I purchased 100 ova. Later I found this number far too many for indoor rearing.

To see whether temperature had any effect on the rate of development of the embryo I divided my ova into three different groups, keeping them in three different rooms. One group by this means was kept at 42°F, another at 52°F and the third at 62°F. There was a very marked difference in the rate of development.

When a trout hatches out normally the chorion (rough outer covering of the egg) splits and the tail of the alevin breaks out first. One strange effect of keeping some of the ova at 62°F, and one which I have never seen mentioned anywhere, was that most of them hatched out head first instead of tail first, and so died.

When a trout hatches out tail first it moves about vigorously by flicking its tail, and so breaks free from the chorion. If it emerges head first it is usually doomed to die, for it gets halfway and then sticks with its copulent yolk sac wedged tightly in the split; unless an obliging human is there to help it out. There were very few abnormal hatchlings among the ova kept at the other temperatures.

To my amazement, about 80 out of the 100 ova reached the feeding stage, but as they reached that stage in batches instead of all at once they were not too difficult to cope with at first. I would recommend the expedient to anyone who wants to rear a large number on live food, for trout have large appetites.

I set up the ova first in a tank without any kind of perforated tray, but dead ova stuck to the bottom and when they were removed left patches of white fungus. When using perforated trays the bits of fungus fall through the holes into the bottom of the tank, so I made trays with two strips of wood to make the tray float and to form the sides, and a rectangle of perforated zinc bent up at the ends and nailed on to the strips of wood. The trays should be painted with non-toxic paint to cut down the risk of contamination. I used bakelite paint which I happened to have around. Aeration was supplied underneath the trays from a pump.

Food

This is the biggest problem. With pulped liver such as they use in a hatchery you immediately pollute the water and the decaying food means that soon the water will be so full of bacteria that they will be using up all the available oxygen and your fish will go short and die. Both trout and salmon require a very good supply of oxygen, much more than ordinary freshwater fishes.

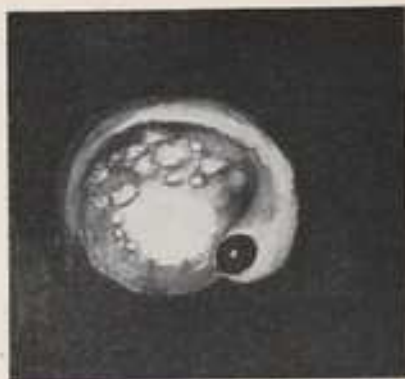
Obviously the way to feed your fish without consequent pollution is to give them live food, but with 80 baby trout to feed my cupboard was soon bare. I bred micro worms for the early stages and Grindal worms for later, but I could not keep up with the fishes' appetites and eventually I was giving pulped liver on some days and micro worms



Step-down arrangement of large sinks in the Nailsworth trout-hatching house. Fresh water passes through the sinks continuously. In the sink nearest to the camera hatching trays can be seen.



Tail of trout alevin seen under the microscope. Fin rays are beginning to form in the membranes, which can be seen to continue along both upper and lower surfaces of the young fish.



Before hatching, the trout embryo is revealed by removal of the egg membrane to be curled over the yolk sac.

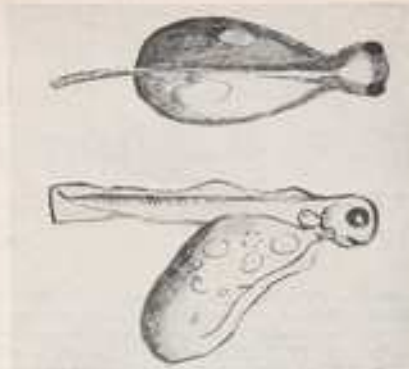


From above the pectoral fin of the alevin nearly at the feeding stage shows well-formed rays. Body pigmentation shows as distinct spots.

on others. But after feeding with liver I caught all the fry in a net and transferred them to another aquarium containing fresh water. All the water I used for the trout rearing was from the mains but I used to leave it standing at least a day till all the chlorine passed off and it came up to room temperature. That is I made a point of doing this after losing some fry by putting them into water which was straight from the tap, but brought up to the correct temperature with the addition of some hot water. The fry were poisoned with chlorine; about 12 died and the rest, though rescued, were off their food for a couple of days.

As trout died I pickled them in tiny bottles in formalin, and also did drawings of them. They make fascinating microscope studies, for as long as you keep them damp the alevins will live out of water for a time. You can easily see the blood circulation and follow it from the vigorous two-chambered heart, through the yolk sac, among the oil globules from which the alevin draws its food supply and back to the body. You can see the pigmentation forming on the body, at first as little dots, and then see the rays forming in the fins and tail (which are at first all one membrane) and see minute teeth form at last.

I read that trout fry could be fed on boiled-egg yolk; it might be all right as a last resort for one feed, but kept on it the fry become constipated and die. You cannot feed them on anything but protein; trout cannot digest carbohydrates. Later I bred enormous numbers of *Daphnia* in a spare tank in which I first encouraged *Volvox* to increase in such numbers (the tank was placed in a window space) that the water became a thick green colour. How-



Magnified views of trout alevins, from above and from the side, a few days after hatching. The yolk sac is large, a continuous fin membrane is present and there is little pigmentation.



Late alevin stage, with yolk sac almost absorbed, fin rays formed and pigmentation spreading. The eye is still large in proportion to the body (magnified $\times 2$).

ever, I would suggest the culture of Grindal worms as being a much more reliable supply of food. Cessation of supply means death for the trout.

I kept about 50 of the fry alive till they were about 2 inches long. They seemed fit and lively, but my air pump was always going wrong and a good air supply is of supreme importance. Keeping the water fairly shallow helped, but one day I thought I could cut down my pollution worries by installing a water filter. To make it work I had to fill the aquarium to the top; the result was that most of the trout died from lack of oxygen. Two of the trout were put into another aquarium, but later were separated because they fought. They have lived in static water ever since with no apparent ill effect. Others lived for about a year in an open-air concrete pond but were eventually eaten, I believe, by ducks.

Stages in Development

The unfertilised ovum consists of food materials, mainly oil globules. A sperm enters the ovum and unites with the nucleus. Development of the ovum starts; it splits into a lot of cells which form on one side of the egg; the cluster of cells is called a germinal disk, it is raised above the general level of yolk and spreads over to form the yolk sac. The tail at this stage is only a dark streak.

The tail tip splits off from the yolk sac, the heart forms and starts beating. The eyes become visible.

The notochord becomes visible and more backbone segments form. The oil globules run together into larger

Please turn to page 200

IF ICE SHOULD FORM by ASTILBES

If a covering of ice forms on the surface of a pond gases are trapped in the water and will not be able to escape as long as the ice is intact. This is when many fishes can be poisoned, and some pondkeepers immediately reason that it is the cold which has killed their fishes, whereas cold by itself is not likely to harm them at all. The covering of ice alone will not harm the fish; but the water underneath must be pure. What should the pondkeeper do when ice forms? The action taken will depend entirely on the state of the water. As long as it appears clear and sweet it does not matter much whether the ice is partially broken or not, but let there be anything decaying or pollution in the water then look out for trouble, and the safe thing to do is to remove much of the ice to let the foul gas escape and to change some of the water.

Opening the Ice Layer

In any case I think that it is good policy to keep a small hole open in the ice. This decreases the pressure caused by the formation of ice to avoid any harm to the fish and, of course, it is possible for the pressure to become so great that the pond sides may be cracked. There is little better than a water can filled with boiling water and allowed to stand on the ice to thaw out a clean hole. By this means the fishes will not be harmed, as might happen if the ice was struck to break it.

Even in the best-kept ponds when a covering of ice has been over the pond for a few days the water is likely to become in a rather bad state. The smaller the pond the more is it probable that the water will be fouled, and so it will benefit the inhabitants to run in some fresh water. When ice of 2-inch thickness has covered the pond for some time it will be wise to try and break this up once a thaw arrives and to remove most of the ice from the pond. Fresh water can then be run in and this may save the lives of many fishes. It does not need much imagination to realise what the state of the water will be like when the pond has been frozen over for days on end, especially if there has been a quantity of decaying water lily or other leaves at the bottom.

Use common sense then in your treatment of the pond

this month: be guided by the weather. Whilst the weather remains fairly open leave well alone, but once freezing conditions prevail keep a good watch on the condition of the water, and remember that it is not the cold which kills the fishes but the lack of oxygen or, to put it another way, the superabundance of foul gases.

Cracked Ponds

This month can be the testing time for newly made garden ponds. The force exerted by freezing water is considerable and unless the concrete was made strongly and with reinforcement it is probable that cracks will occur. Should a crack appear low down in the pond much or all of the water can drain away and the fishes be left high and dry. The problem is not lessened by the fact that if frost continues it is very difficult to deal with the cracked pond. If the ice persists it will be very difficult to make a good repair job and the fishes must be placed in safety whilst this task can be carried out.

An old cistern or bath can be used for them as a temporary measure but it will be a safe plan to use a sheet of polythene to line the receptacle in case there is any harmful matter which could come from it. Once the ice has left the concrete the crack can be tackled and all the loose matter removed. One of the best repairing compounds for such a task is Prompt cement, mixed with clean fine sharp sand (equal parts of each). Make only sufficient mix to be used in a short time as this cement dries out for a first set in half an hour. It then sets like rock and will give a lasting repair. The mixture should be forced well into the crack but do not allow it to overlap the edges of the crack; this appears to encourage lifting from the old concrete after a time.

As this cement sets so quickly it is possible, provided that there is not too much ice about, to make a quick repair, and if the amount of concrete required was small there is no need to worry over any ill-effects from free lime. If the crack was large then a light wash over the repair once it has partly set will make all safe. It may be found that the next day after filling the pond there is a slight film on the top of the water but this can be washed off



This pool, part of an exhibit at the British Aquarists' Festival last year, would be undamaged by freezing conditions as it is formed from a glass-fibre "shell" (marketed by Tomlinsons (Rochdale) Ltd. in association with Northmore Water Gardens). The shells are available as prefabricated ponds in several different shapes; the formal one shown in the photograph has been built up as a raised pond with Glyercast concrete building blocks

with the hose or even scooped up in a sauceman. Do not keep the fishes in the temporary receptacle for longer than is necessary as it may not be large enough for their comfort. Remember that they may have had plenty of space in their pond and unless their tank is of a good size they may soon be in trouble; a constant watch must be kept on them. Do not under any circumstances feed them in the tank. They will not die of hunger whilst there even if they have to stay

for a month. Most fishes eat very little if any during very cold weather; at least this can be said of the goldfish and its varieties and any food given can cause the water to become foul and the fish will soon be in trouble then. Even if goldfish manage to eat some food it is often found that they are not able to digest it properly. The voided undigested food is then in such a condition that it can cause trouble when it decays.

THE GUPPY—KING OF TROPICAL FISHES

Selection of Females by Treatment with Hormone

by PETER DENDY

IN the last article I dealt with general and colour feeding of guppies and I am now going to discuss the use of hormones for the "proving" of females. The hormone used is a male hormone known as methyl testosterone, which has absolutely no effect on male behaviour or coloration, but can be used to produce some interesting results in females. Basically the hormone starts to make the female resemble a male, with formation of typically male colour patterns, fin shapes and even a gonopodium, if the treatment is continued long enough and the solution is sufficiently strong. You will gather from this that it should be handled with care, particularly as too great a dose renders the female sterile.

Treat a group of females for a few weeks and observe which fish produces the strongest colour intensification or patterning and then use this female for breeding from. Do not continue the treatment beyond the point where the colour-carrying properties begin to make themselves obvious for fear of sterilising the female. A safer, though perhaps more troublesome method, is to breed from three females and "colour prove" them after they have given birth, then keep only the brood from the best female. This way it does not matter too much if you do overdo it.

Methyl testosterone can be obtained from your chemist, if you talk to him nicely, and comes in one-twentieth gram tablets, in which it is mixed up with a binder like arrow-root. The tablets should be crushed finely in a pestle and mortar and thoroughly dissolved in a third of a cup of 70 per cent. alcohol (ethanol). This solution is then made up to one pint with water and forms the stock solution. The dosage is two drops to each gallon of aquarium water and must be replenished every other day. It might be advisable when first trying this hormone treatment to use unimportant females, or else to reduce the dose by half to play safe.

The latent coloration should appear in 2 to 4 weeks for young females and 4 to 6 weeks for mature adults. When the treatment is stopped the coloration will slowly disappear and about 3 weeks should be allowed after cessation of treatment to elapse to permit the female to recover before mating.

Showing Jars

The showing of guppies is carried out in square glass jars of the type commonly used for a popular brand of pickles. Except in breeders' classes, all fish are shown singly, the males in 10 ounce jars and the females in 40 ounce jars, all with screw tops that should be painted red. These jars may not seem very big, but guppies can live happily in

them for a week or more and in any case the longest guppy show is only 2 days. The breeders' class calls for four males or females to be shown in the 40 ounce jar and the fish must all be from the same brood. There is usually also a stipulation that the date of birth must be on the jar and that the quarter must not be more than a year old. Since guppy males are mature at 6 to 8 months and females at 8 to 10 months, kept under normal conditions, this age limit is not very hard to comply with.

Trout Hatcheries

(continued from page 198)

drops. Muscles develop in the tail region. At this stage the eye is relatively large and the lens is formed. The eye becomes pigmented.

Blood vessels spread over yolk sac gathering food. The blood channels are extensive, and under the microscope blood capillaries are visible.

The embryo is fish-like in form before it hatches, the pectoral fins are formed and the mouth is open.

The embryo ruptures the egg skin (chorion) and breaks out. The yolk sac becomes elongated. The embryo carries the yolk sac about, feeding from it. The yolk sac gets smaller as food is drawn from it into the blood, until it disappears. It is then a fish.

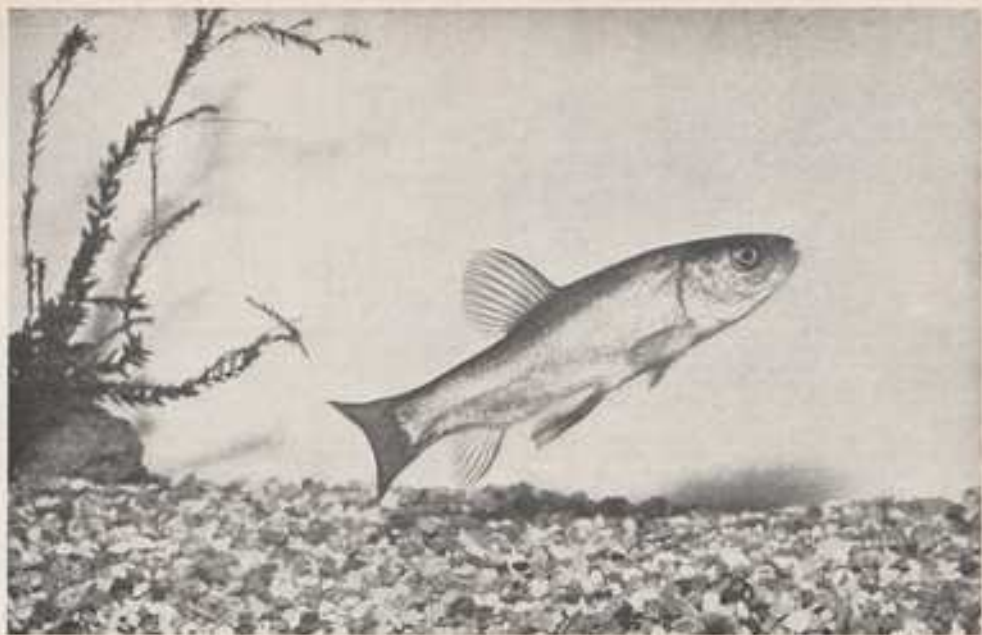
Fin rays form, but at first the fry moves chiefly by its tail.

Trout Hatching in Nature

With the approach of spawning time, maturing trout migrate into small streams or tributaries, where there are suitable clean gravels and oxygenated waters. There ova are released and fertilised and then covered with gravel to the depth of perhaps 12 inches.

The ova are laid where a flow of fresh water will pass through to them constantly. There they hatch and remain in the gravel till ready to feed. The gravel protects them from predators. Before they reach the feeding stage the alevins are repelled by light, but later are attracted by light and emerge and begin to feed.

Trout ova can be ordered from: The Midland Fishery, Nailsworth, Gloucestershire, and are available in December, January and February, price 5s. for 50 or 8s. for 100 post free.



Photo

W. J. Howes

Tench for the GARDEN POOL

by WILLIAM J. HOWES

TENCH show a marked preference for the still waters of lakes, mezes, disused gravel pits and weedy ponds, and they can live and thrive even in semi-stagnant waters, though they are found in some canals and slow-flowing rivers. Essentially bottom feeders, they are particularly fond of crushed water snails, crustaceans, earthworms and maggots; in fact, tench will eat most of the usual kinds of fish food, and often come to the surface to feed on any proprietary dry food which may be floating there.

The best time to see your tench is to sit quietly by the pool at dusk, when they will appear on the surface, which is often ruffled by their dorsal fins as they cruise slowly around, or perhaps lie motionless close by or under the leaves of water lilies. But if the tench are alarmed by your sudden approach they will immediately dive to the bottom.

The tench is an asset to a garden pool because by nature it is a scavenger, always rooting in the mud and decaying matter which would easily foul the pool. However, because of this constant rooting in the mud large specimens are not to be recommended, for they will stir up all the sediment at the bottom and the water will always look thick and coloured. Therefore, small fish are advised,

and they will thrive in ponds containing a good food supply and, when they are established, there is every possibility that the fish will breed.

A female tench will deposit her eggs, several thousand of them, in the summer. But the exact period of spawning is unpredictable because tench have been found to be full of spawn early in May and as late as September. Spawning is a communal affair, for a shoal will move into the weedy places where the females shed their eggs on the leaves of aquatic plants. One female may lay as many as 30,000 eggs, which are shed spasmodically. The eggs, fertilised by the males in attendance, soon hatch out.

Tench grow quickly, according to the food supply and area of water, but rarely reach 8 lb. in weight. The maximum so far recorded, on the Continent, is 17 lb., but here tench are specially bred and grown in fish ponds to make big weights. The largest in England was one 12½ lb. caught by an angler on the River Kennet in Berkshire, and this fish was returned to the water and not claimed as a record because it was thought to be a spawn-bound specimen. The British rod-caught record is held by a tench of 8½ lb. taken from a Leicester canal in 1950.

These, however, are exceptional fish, and could only be kept in aquaria at the London Zoological Society or similar large aquaria.

The average size of tench which your angler friends are liable to catch for you will be between 1 lb. and 2 lb. in weight, something like 12 inches to 14 inches in length. Suitable home-aquaria or garden-pool specimens are best purchased from a breeder, but if you are a "collector" by

nature than the best way of catching small tench is to visit a very weedy pond known to hold tench and, with the help of a fellow aquarist, drag large bunches of the weed out. I say weed because I'm thinking mainly of the thick blanket-like bunches of silkworm or thread algae. The tiny tench feeding amongst this stuff get trapped and so are raked up on to the bankside; you should get enough tench by this method for your requirements.

The general colouring of the tench is a dark olive green, its scales are small and the small eyes contrast attractively with the colour of its body. Its fins are round and scoop-

like and its tail is broad and strongly formed. The tench is often called the "doctor fish," for it is thought that its slimy skin exudes a fluid which will cure any sick fish that rubs against its sides. There is no truth in this. Yet, surprisingly, many people still believe that tench are possessed of such curative powers, even though there is no scientific evidence to support this idea. Some even believe that pike will not attempt to attack the "doctor" tench, a mere fallacy. My aquaria have contained pike which would devour small tench just as voraciously as they would minnows!

Of Fishes, Cats and Bears

"PRITSY pos cat ate all your fish." I will not need to elaborate, for the benefit of fellow aquarists, on the impact with which this piece of news struck me, after an absence of several days from my precious charges. Reason, however, came to my aid before I collapsed from shock.

There was something fishy, in more senses than one, about this statement of my wife's, which greeted me on my return. In the short space of time allowed, no cat could possibly have eaten several hundred fishes of various ages and sizes. On pressing for further details, I learned to my relief that "all my fish" were only nine valueless small trout, which I had intended shortly to return to their native haunts anyway. Such regret as I might have felt was much tempered by the realisation that I might turn the event to good account. I had long wondered just how much truth there might be in tales of fish being taken by cats. Now it seemed that my wife at least, if not myself, had actually caught one "red-handed." It turned out, however, that she knew very little about what had actually happened.

The trout in question I had rescued from certain death, when a neighbour exterminated a family of beavers, and broke down their dam. The fish were trapped in some isolated small puddles, and, at their last gasp from shortage of oxygen, were easily scooped out with a small dip net. A small pond, or cistern might be a better term, which I used as a goldfish hatchery and nursery for lilies, was at that time unoccupied, and I decided that I might derive some pleasure from watching the habits of the trout for a few weeks, before finally releasing them.

A brief description of the pond is necessary at this point. It is no more than a big concrete box, 8 ft. by 4 ft. and 10 in. deep. This depth is increased a further 5 in. by the addition of wooden planks embedded in the concrete, and extending above it. On this again, a coaming of boards 6 in. wide provides a sort of fence, across which a net can be stretched, to provide protection for the fish, when such is considered necessary. When the trout were first put in they showed a tendency to cruise around in the angle provided by the top of the concrete wall and the planks behind it. However, after a few hours I thought they had stopped that game and had settled behind the rails and boxes in which lilies were planted.

My wife's story was briefly as follows. She had come upon one of our gang of cats, a ginger female we called Pritsy pos, eating a trout by the pond. Another fish, much dried by the sun, lay near by. No more fish were to be seen in the water. I decided to do a little detective work. Having secured another live trout, I put it into the pond, and thereafter stuck around and kept an eye on the cat. One fact soon transpired; only one of the six fishes even realised that there was a prospective meal in the pond, and that one was not Pritsy pos, but her daughter Vicky.

As long as the trout remained near the bottom, Vicky watched it with mild interest. But after a while the trout started this silly perimeter-following game, near the surface. Vicky was all attention at once; with forepaw raised, she waited for the fish to pass. I tried to get a photograph as she struck at her quarry, but I was a moment late, and caught her just withdrawing her paw, the fish having vanished in a flash. But the picture does show how she hoped to get the fish, by pinning it, not by scooping it up. The water is so clear, that the only way to ascertain the surface level in the photograph is to note the water lily leaves at the right.

To my mind, the mystery of what happened to those nine trout remains unsolved. Two facts are not accounted for; the cat that was seen eating the fish never made the slightest attempt to catch my "guinea pig," and another fish lying on the shore at the time had evidently been out of water for some hours. It seems impossible to suppose that Vicky had found it so easy to catch the trout that she had pitched them all out for the fun of it, but that is the theory that my wife clings to. Vicky never did catch the "guinea pig" either, but that may have been because this fish very shortly gave up swimming along the edge and took to lurking behind the lily tubs, where it was absolutely safe. After 2 weeks I netted it and gave it its freedom.

The certain fact is, that if the cats did get those fish, they were able to do so only because of the wide ledge of concrete just below the water surface. Vicky knew perfectly well that her only chance was to pin the fish against this ledge; she never attempted any scooping or lifting motions of her paw. This greatly interested me, because I have long scoffed at the accounts of bears catching fish by the latter method. To make it work the bear's paw would have to be exactly at the centre of balance of the fish during the whole sweep. If the fish moved ahead a few inches, as it most certainly would, the hopeful carnivore would get no better satisfaction than seeing its quarry flip over, at the most a foot or so out of water.

There is no difficulty in understanding how the theory gained acceptance that bears can perform a first-rate juggling trick with a live and wary fish. People have seen them catching fish, and the tale passes from mouth to mouth. Somewhere along the line the exact account of how it is done drops out. Some sceptic then asks the narrator "How can a bear catch fish?" Well, of course, the teller of the tale won't admit his ignorance, but thinks it perfectly safe to make a guess. Evidently a bear can't dive and swim under water, and it is not gifted with a long neck like a heron, which would enable it to grab a fish in its mouth. So there seems to be just one obvious answer, though actually it is still the wrong one. The true explanation I will venture to state, is that a bear can't catch fish, unless it gets its quarry at a hopeless disadvantage.

All these bear and fish stories originated in the lands on

the shores of the North Pacific Ocean, where the Pacific salmon (genus *Oncorhynchus*) run into the rivers and streams. Now I have personally had half a lifetime experience with these fish, and I can assure the reader that anyone who claims that Pacific salmon will get out and walk on shore is guilty of only a mild exaggeration. Many times I have seen them run up a long riffle, with half their backs out of water. That is when the bear gets them; he simply waits for them to come past, pins them down with a paw and then picks them up in his teeth.

I seem to be drifting a long way from the cats, but I

by RICHARD GUPPY



Photo

R. GUPPY

"Vicky" not quite caught in the act

think that all these observations are of interest to pond-keepers, because I am convinced that cats are under just the same limitations as are bears. In order to get hold of a fish they must encounter it in water shallow enough to allow them to pin it down with a paw. After that the cat must pick up the fish in its teeth, and I doubt that many felines would try that in water over 2 or 3 inches deep. Another question is, in ponds with wide shallow margins, to what extent will a cat wade out in order to reach its quarry? A very little way, in my guess, though as my observations of my own pets have shown, individuals differ

markedly in their reactions in the sight of a possible funny meal.

Many pond-owners automatically blame cats if their fish are disappearing. It is possible that some of these people are located in areas so built up that there could be no wild life around. It is difficult to imagine such a place, which would still provide space to accommodate a pond. Now that herons are almost universally protected by law, they have become bold enough to alight almost anywhere. Near the coast gulls are even worse, but they are so noisy and arrogant that there is no chance of their ever being able to put the blame on something else. Undoubtedly the raiders that most frequently go unsuspected are owls. These birds, being mainly rodent-eaters, like to hang around human habitations. Stomach dissections by ornithologists have shown that almost every member of the clan will add fish to its menu, if opportunity offers. They work in the dark of night, absolutely silently. With all these things considered, for the title of worst curse of the pondkeeper, I nominate the garter snake (genus *Thamnophis*, comprising many species widespread in North America, related to the ring snakes (*Natrix*) of Europe and with similar habits). Even nets won't keep them out!

Book Review

The World of Amphibians and Reptiles by Robert Mertens. 207 pages, 140 photographs. Harrap. 63s.

THIS is a delightful book which everyone who is interested in reptiles or amphibians should possess. As a photographer I have been enthralled by the superb illustrations, 31 pages of which are in full colour. I would hasten to add, however, that the quality of the text equals that of the illustrations. Professor Mertens writes as an authority on his subject and has a refreshing and stimulating approach. A large number of books on reptiles have appeared in recent years which have tended to provide a rather superficial review of the class. These have mostly originated from the United States. The present volume must not be confused with these and I have no hesitation in recommending it highly.

I do wish, however, that some publisher would produce a sequel on reptile-keeping. These books make more people interested in herpetology but they find no really good books on the practical aspects of maintaining a collection.

Living Invertebrates of the World by Ralph Buchsbaum and Loren J. Milne. 303 pages, 292 photographs. Hamish Hamilton. 63s.

THIS book lives up to the high standards set by previous volumes in the series. The excellent illustrations, of which 144 are in full colour, will appeal to anyone who is photographically minded. The text, by two American Professors of Zoology, is excellent. It is written to be intelligible to the layman and the flowing style makes it easy to read. The book would be most useful to the zoology undergraduate in any University or even to the more biologically minded grammar-school pupil. To any aquarist this book will prove a mine of information, especially to one interested in marine life, as the sea is a great home of the invertebrates.

Each phylum is treated in turn and the extent of the invertebrate animals makes this a most comprehensive book which should be on every naturalist's bookshelf.

H.R.B.

The Black-banded Sunfish

by JAS. STOTT



IT would seem that during the last few years the black-banded sunfish has lost some of its former popularity and is, to a certain extent, neglected by enthusiasts entering the hobby, which is a pity. The "chactodon" is an interesting fish and undoubtedly attractive in a way that reminds one of the angel fish superficially. It was, in fact, at one time referred to as the "poor man's angel fish."

It is principally the dark-banded markings which provide this resemblance; otherwise it possesses the typical ovate body shape and dorsal fin of the American sunfish family. It differs, however, from the other members of the family in that it is quite peaceful and devoid of the pugnacious temperament which makes most sunfishes unsuitable for the community tank.

The basic body colouring is a lemon yellow with silvery high lights, an olive-green back and six to eight black bands vertically crossing the body, but some of these may, at times, be broken into blotches, which seems to be influenced by the varying moods of the fish. The first, second and sometimes the third rays of the dorsal fin are black and the fin has an orange flush in the centre. Anal and front rays of pelvic fins also have this slight orange tint. There are fine dark specks on the base of the anal and caudal fins, and the pectorals are so transparent that they are almost invisible. The large, bold eye has a rich brown iris which is extremely bright, and one of the dark bars passes through the eye down the side of the head. It is about 3 to 3½ inches in length and fairly deep in body. The black-banded sunfish is found in slow-moving streams and in pools from Pennsylvania to South Carolina, and is particularly prevalent in the cedar swamps of New Jersey. It prefers soft, acid water.

Although this fish is often sold as a tropical this is not

strictly correct; it should be considered as a temperate subject. It will go into the tropical tank and do quite well but it will also do quite well in an outside pool during a normal British summer. The reason for this is, of course, that it experiences a wide temperature range in its natural geographical locations. The ideal temperature range is 62-70 F, the higher figure being the conditioning and breeding temperature. There is little or no difference in the sexes except when in breeding condition. Then the male becomes much paler and loses a considerable amount of the black colour in his vertical bands across the body. The female, on the other hand, becomes much richer in colour with the dark markings intensified and, of course, more round in the body.

A 24 in. by 12 in. by 12 in. tank is suitable for a breeding pair and should be planted fairly thickly along the back and across the two ends, leaving a small area clear in the centre where a little extra depth of aquarium sand or fine gravel will be an advantage and tends to encourage the nest-building in this area, where it is more convenient for observation. Rain water adjusted to provide a pH around 5.8 to 6.0 will be found satisfactory and the tank should be filled with this to a depth of 8 inches. Place the pair in the tank and feed on small red earthworms to bring them into top breeding condition. The best time of the year for this is May to July, when they seem to condition very readily.

The nest, which usually consists of a shallow pit scraped in the sand, is generally made in close proximity to thickets of plant life, giving the fish, no doubt, a sense of security and a feeling of concealment. It is the male which usually does the nest-building, with the female hovering about near by among the plants. Eggs and young are cared for by the parents.

At the suggested breeding temperature the fry should be free-swimming in 5 or 6 days, when Infusoria feeding may be commenced. After 4 days micro worm may be introduced, to be followed, as development permits, by brine shrimps. Once the fry are fully free-swimming the parents can be removed. With the fry as well as with the parents live food is essential, because it must be remembered that the sunfishes are carnivorous and it is seldom they can be induced to take any form of dry feeding or food that is not alive.

Cacti in the Fish House

IT is not generally known that many cacti can be raised from seed and some can be flowered the year after the seed has been sown. Seeds can be sown in John Innes seed compost in pots or half-pots. Some of the compost can be sifted so that an inch on the top is fine. Do not bury the seeds but any large ones can be pressed into the soil. Moisten well and place on top of the tropical tank. A temperature of 70° to 75°F will soon start germination. A small piece of glass can be placed on the top of the pan to conserve moisture, with paper as a shade. The covering must be removed as soon as any seeds are up. Do not allow the pan to dry out during the early stages and give light once the seedlings are up, but no direct sun. Prick out when the seedlings are large enough to handle.

AQUARIST'S Notebook

by
RAYMOND YATES



COLDWATER fanciers are so lost among the vast masses of tropical enthusiasts that it is easy to forget that the hobby only exists to-day because of the pioneering work done long ago by coldwater aquarists. Most hobbyists of standing came to tropicals via coldwater fishes and many, like myself, still have both. However, the coldwater hobby has been with us for so long that it is no longer news and goldfish of the old Italian variety are so commonplace that the public at large is not interested in goldfish. Anglers do try to keep other coldwater specimens with varying degrees of success but as most of these lack colour they seem to have little appeal to the man in the street.

A few keen coldwater aquarists have banded together in some of our larger towns and cities, London, Bristol, Manchester and Birmingham, but coldwater enthusiasts as a whole find themselves isolated from others and plough a lone furrow. There is little opportunity to show or see other fishes and little competition. Some fanciers have ponds and a certain amount of breeding goes on but what happens to the many thousands of young fishes which hatch out is anybody's guess. In most parts of the country you couldn't give them away. I have never seen young fancy goldfish for sale which were not enthusiastically described in some such terms as "remarkable finnage," "exceptional colour," "amazing growth" etc., whereas all too often they are absolute rubbish. The price asked depends entirely upon local conditions and the anxiety to purchase or sales resistance of the prospective customer.

The goldfish is, of course, far too good natured and easy going and has suffered from permitting man to monkey about with its inheritance. There was a time when goldfish varieties were delightful, but of late years any ugly freak, however hideous, is perpetuated and hailed as a great success. Show standards of a sort are available for those who want them but these merely represent the ideas of individuals and are far from being universally accepted. Of the various clubs and societies catering for the coldwater hobbyist probably the best known is The Goldfish Society of Great Britain. Although this sounds all-embracing the membership of this society, according to a recent list which they sent to me, is around 75, of which 60 or thereabouts live in the greater London area and its hinterland, six overseas and individual members in Glasgow, Sunderland, Bath, Stoke, Oxford, Renfrew, Ipswich and the coast to a total of ten. According to this list none lived in Bristol, Birmingham or Manchester, the other centres where there is some interest in goldfish as a hobby. In spite of it having a rather localised membership the society probably does more for its branch of the hobby than any other coldwater club. The club's fourth annual convention was held at Chessington Zoo in October, with talks and a film and even an auction of fish from well-known breeders. A regular bulletin is issued and this contains much of interest. For any reader interested the address of the secretary is Mr. W. L. Wilson, 57, Constable Gardens, Edgware, Middlesex. A year or two ago one saw quite a few advertisements offering young goldfish hatchlings for sale but these seem to have ceased. Several years ago a dealer in the north asked me to give him the addresses of several breeders in the midlands, which I duly supplied. He told me later that although he wrote to them all, enclosing stamped addressed envelopes, he did not get one reply.

Writers for the hobby, in common with film stars and sporting celebrities, have their share of fan mail, but now and again a letter turns up from some disgruntled reader

who is not impressed and says so in no uncertain terms. I always remember one such letter from a reader in Yorkshire who accused me of dreaming up most of what I write. Many years ago the great Beaverbrook was lampooned in another paper as "The Peddler of Dreams," and he was so amused at this that he immediately took the writer on his own staff at double his previous salary. For myself I am afraid I have always kept to fact and never chanced my arm at fiction, but can forgive my correspondent, who must have heard that truth is sometimes stranger than fiction. Be that as it may I ventured into dreamland the other night. I have recently been involved in several large-scale auctions, and with the near approach of the British Aquarists' Festival these events somehow became jumbled up when I retired to bed, perchance to dream.

In my dream I became aware that, somehow or other, at an auction I had acquired the whole of Belle Vue Aquarium, against my will. The question of cost did not enter into things fortunately, but other aspects did. I went to view the unwanted set-up. Needless to say it was not at the real Belle Vue nor anywhere like it. The tanks were all set out on Ionic columns (about 5 feet high) in a sort of Arcadian glade. This in itself worried me as I noticed no heating, and although the weather was ideal I knew it would not last. What really worried me was the fact that the curators turned out to be two friends of mine who keep a cottage deep in the heart of the country and who know nothing whatever about tropical fish. Each tank was full of the most delightful specimens, likely and unlikely, and I realised I would have a job on catching and isolating the unsuitable. Suddenly I thought of how I was to feed these battalions with a mere sixpennyworth of *Tubifex* in the house!

I was still pondering this when I found myself at home, where, to my horror, I discovered dozens of tanks, filled with water and fishes, littering the place, one even on the bed. The dream faded soon after I found a queue of people outside the house all claiming to be members of the local club who had loaned their fishes to Belle Vue and had now come to reclaim them from me! Never again will I go to an auction—it just isn't worth it.

The news that the vicious piranha is now prohibited from entering the United States is interesting. Tropical fishes have been introduced into new waters with excellent results, mostly in mosquito control. Alligators are reported in the sewers of New York, these being escaped or unwanted pets. The piranha does not ship well nor does it transfer to new waters easily but the rise in numbers is obvious and there must have been a danger of this fish becoming acclimatised to the warmer waters of the southern states.

An M.P. has recently suggested that certain pets are now prestige symbols, depending on their cost and upkeep, like cars, kept to impress the neighbours. Fishes certainly fall within this category. It isn't so many years ago that the aquarist was looked upon as not quite sane—I know, I was one of them. Nowadays aquarists are accepted as normal but nothing more. A few rare fishes may be a

prestige symbol to other hobbyists but to the public at large all fishes are much the same; a visit to any public aquarium will soon convince you of that. The finest and the commonest, the fresh water and tropical marine, all are lumped together as "just fish" to the uninitiated in much the same way that orientals all appear to have identical faces to western eyes. I think in the period about 1951 to 1953, when the hobby was "the latest thing," the possession of several large, well-stocked tanks had just this compensation. It was because of this that so many delightful tank set-ups, bookcase aquaria etc. appeared. No one goes to the trouble of marketing de-luxe rabbit hutches because nobody but the owner will ever view them. Ornate aquaria were brought out for the benefit of visitors and the effect they would create.

I know nothing about electric lamps except that they never last as long as they should in aquarium conditions and that nobody ever seems to have any real data about them from the standpoint of use in the hobby. A new lamp called the Crompton Life light is now on the market, which the makers claim to have advanced features compared with the old coiled-coil types, but no details of actual average life are given. Lamps all fail at last and on occasion gas-filled lamps can burst. I have often had to remove broken glass from this source from the bottom gravel. A new flashproof fuse filled with minute glass-balls called ballonini avoids any possibility of bursting. Other features are up to ten times more resistant to mechanical shock, up to one hundred times more resistance to vibration, double the filament supports usually employed and higher pressure of the argon-nitrogen gas mixture which reduces filament evaporation. Compared with the older coiled-coil type there is a slight loss in light output but this becomes infinitesimal in the larger sizes from 100 watt upwards. I have not tried these myself as yet.

Condensation is a great nuisance but there is very little you can do about it. In your early days of fishkeeping you worry about it but as time goes on you bother less and less until at last you learn to live with it. Every tank needs a cover, mainly to put a stop to the suicidal tendencies of the fishes, but also to keep out dust and dirt and to permit a cover light. Where there is no cover condensation is not obvious except that the level falls rather fast and the tank needs to be topped up at frequent intervals. With a cover condensation is immediately obvious every time you lift it, because some of the cover water runs out, either on to the floor or into the tank. This water which collects in any channels in the cover tends to encourage the growth of algae on the inside of the cover and some of this finds its way into the tank. Often the electric-light sockets are damp and the raising of the cover makes the condensation run down into the socket with a consequent short life for the lamp.

A recent newspaper report on an assault case referred to the weapon which had been used as a bowl of goldfish. What will they think of next?

The hobby is now quite international and has spread to most countries in the world. It is probably a good thing that fish species are spread over large, often continental, areas and few belong to one country alone. Come to think of it there are precious few fishes with national names; few occur to me beyond American flag fish, Siamese fighters, Argentine pearl fish and the Chinese paradise fish. These last, with angels, seem to belong to another world. There is a great deal in a name, in spite of what the bard of Avon says, and it is just as well for the popularity that fishes have steered clear of any national handles. Way back in

history religious intolerance caused untold suffering to the ruffe, known also as the pope. There are so many splendid names that can be given to fishes without darkening their horizons by the use of geographical names of political significance.

One would not think that the recent troubles in Cuba would have had any effect on the hobby. However, for some poor goldfish in a pool in U.S.A. it was a major disaster. It is reported that some U.S. students wishing to demonstrate against Cuban political trends dumped a very large quantity of sugar from this particular country into a large goldfish pond. What happened to the fish is not mentioned, but we can guess. Students are notorious for being involved in fatuous stunts but this is the first I have heard of in which an aspect of the hobby suffered as a result of their foolishness.

I like duckweed on the surface of a tank. It tells you that conditions are good by growing fast and you can always remove with a net any surplus. The fish enjoy it, as food and a source of shade. It is a fine shelter for tiny fish. Best of all it helps in no small measure to keep down the growth of algae. A tank where there is a top growth of duckweed has invariably crystal-clear water. One caution: don't introduce your duckweed from natural waters or you are likely to get many unwelcome guests with it.

How did you, dear reader, first become interested in fish? David Niven, the actor, has told of his first acquaintance. When about 4 years old, he rushed into the boarding house at which his family were staying, shouting "The waves are full of fish." He returned to the beach when nobody took the slightest notice of him and watched the spectacle. It seems that a large school of mackerel had chased a similarly large school of whitebait right to the sandline. Filling his hat and pockets with the little wriggling fishes he returned, only to be sent to bed for being smelly. From that moment Mr. Niven has been very interested in fish. Frankly, I cannot remember just how and when I became so passionately keen on the little blighters but it probably dates back to childhood angling days round about 1915 or so. Most hobbyists began either as anglers or through being introduced to tropicals through seeing a set-up tank in a show or at the house of a friend. There must be some interesting stories as yet untold of how now experienced aquarists came to join the ranks of the hobby. Has anybody any interesting data to give us on this? I have read some jolly good yarns about introductions in U.S. club magazines. What about Britain?

I just have no idea how many times I have lugged a heavy 1-gallon Thermos jar about and been asked by all and sundry "Is it soup?" . . . "Have you a cup to spare?" etc. One just dare not admit that the jar contained what it did. However, on bus or train one never feels that one is carrying or smuggling animals which should be fare-paying. It is now reported that a boy, travelling on a bus with a tortoise, was charged 3d. for himself and 3d. for the tortoise, a ticket for each. If this idea spreads hobbyists are going to be in trouble. What next?

Tortoises must be more endearing creatures than one would expect. At a certain school the class tortoise was looked after all winter by one of the boys. However, when summer came there was a marked reluctance to return the tortoise to the school, and it was not until after six applications, verbal, written and personal, that at long last the school got back its pet, but only a replacement one. After the antics of "An Alligator named Daisy," one can understand that even such a solemn creature as a tortoise can become something of a heart-throb.

Hyphessobrycon greimi by B. ROBERTSHAW

I OBTAINED my stock of this small fish some years ago as a gift from a friend who had imported them from Aquarium Hamburg. Although it is very similar in appearance to the better-known flame fish, I find that the highlights of the shoulder spot, in conjunction with the overall pink coloration and bright-red tail, make them very much more pleasing to the eye. Sexing was comparatively easy as the fish grew to maturity; females became unmistakably full and rounded.

The spawning attempt was made in a set-up which had been successful on previous occasions when breeding tetras, and this attempt proved to be no exception. The tank used was 16 in. by 8 in. by 8 in. with bottom heating to keep the water at 78 F. The base was well-washed peat. The water was soft (in fact, rain water which had been filtered and then allowed to stand and settle for some time before being carefully drawn off to fill the tank). A thick clump of willow moss was placed in one back corner of the tank and gentle aeration started. The female fish was put

into this tank and the following evening the selected male was introduced. After half an hour or so, when the fish had found each other and shown interest, the lights were put out. The following morning spawning started, the two fish dashing into the plants to scatter small transparent eggs. Spawning continued for 2 hours or so and then the parent fish were removed.

By the following day the eggs had hatched and in another 3 days feeding was commenced. A proprietary liquid food was used for the first 2 or 3 days until it was obvious that newly hatched brine shrimp (which was also being given in small quantities at each feed) was being taken, and the prepared food was then discontinued. On this diet the youngsters grew quickly and at 1 month were miniature editions of their parents and had reached the stage where Grindal worm could be given.

A shoal of 60 or more were eventually raised and proved themselves to have an ideal temperament in a community tank.



Hyphessobrycon greimi

Photo: Norman A. E.

AQUARIUM BARBS by HARRY LODER

(Photographs by B. PENGILLEY)

WHEN I was asked to write something about barbs in general, the other day, it took my mind back quite a long time, to some years before the war; so long before I was considered an "expert" and long before theory had ousted practice, to the happy days when spawning was a real thrill.

Barbs were one of the first families I seriously got down to breed and, looking back, I really had a great deal of success. One reason for this success is that barbs are the beginner's fish. In many ways the commonly kept aquarium barbs can teach a beginner many things about fish-keeping that holds good for many other species of

fishes. He, the budding pisciculturist, learns that barbs need sparkling clean water, plenty of "swim room," plenty of oxygen, appreciate moving water (aeration) and, because barbs are boisterous, happy fishes, he will also learn that they are not good companions for weak or slow-moving species such as angels or very fancy-finned effete chaps like Siamese fighters.

Barb Aquarium

A tank of mixed species of barbs, in top condition, is one of the finest sights in aquaria. I like to see a trio of each (a trio always looks better than a pair as you have the extra

beauty of repetition and the dealers like to sell three at one time) of the following barb species in a 3 foot tank: tiger, nigger, rosy, ticto, cherry, chequer and stobickama. Only 21 fish in this large tank, but this is quite enough as all, except the cherry and chequer barbs, grow quite large, averaging about 2 in. of fish each, especially under good conditions. There is no need for *Corydonas* or catfish in this tank as barbs do their own scavenging.

It should be planted with strong plants that take a firm hold, with strong root action such as *Cryptocoryne* planted in deep gravel. Not too many plants, plenty of swim room at all times, but what plants are used must be healthy; any bad leaf should be removed and not allowed to turn into mulm on the tank bottom. Healthy mulm is quite good, in a spawning tank or where Infusoria is wanted for the fry, but for living quarters, for quality fishes, fit for show, have clean tanks for barbs. Keep it clean; get the siphon cracking, the old rubber tube and bucket. The new water you add to replace the old is a tonic to your barbs (and, I am beginning to think, for lots of other fishes as well!).

Barbs like to be warm, but not uncomfortably so; 75 F is enough. They will stand much more, but I do not recommend continuous high temperatures; it shortens the life of any fish and especially the barbs. A good guide is your trio of tiger barbs: when they are too warm they have a tendency to stand head down under a leaf. This is natural as, in nature in the wilds of Sumatra, the surface water gets very hot. The lower water is cooler and the fishes cool their gills by peering head down into this cooler stream; so, if they do this in your tank, lower the temperature.

After quite a while at fish-keeping I find that any fish can get used to any water reaction (pH) within reason. I have also found that to state flatly that any species needs a certain pH is wrong, especially in these days of direct wild imports. Fish of the same species can be caught hundreds of miles apart and can be from waters of very different pH values. The pH you need you will have to find yourself, for your

own individual fishes. I will say that Malayan fishes, of late, like some salt in the tank, as most of them are being caught in the open estuaries which receive quite a lot of tidal water. I suppose that the fish catchers in Malaya find it safer to fish in the open estuaries where they are not having to rub shoulders with the bandits of the inland jungle. Estuary fishing will be less hazardous in other ways as well; you can develop these themes in your own mind while I carry on now and spawn some barbs—the least hazardous way to get some.

Spawning

Barbs can be very obliging spawners, but they can, at times, be very stubborn, though there are many stimuli that can be used to start the pair, or trio, off on a spawning spree. A gradual rise of water temperature from 75 to 78 F will usually be all that is necessary. If not, the addition to the spawning tank of 3 or 4 pints of fresh cold water through a rose, to get a rain effect, may work the trick. I have found that they also seem to prefer very early morning as a time to spawn, but I have also watched them spawning in strong moonlight in my fish house.

Barbs, the usual aquarium species such as tiger, rosy, nigger and ticto, most of the small species, require about the same treatment to breed. All should have plenty of plants to act as cover for the eggs; by plenty I mean really thick masses at each end of the 24 in. by 12 in. by 12 in. tank. They are all excellent egg-eaters and find eggs like a good lurcher can find rabbits. You can lose a good spawning of fertile eggs if there is not enough plants for cover. The big drawback of this heavy bunching of temporary plants in the tank, is that plenty of aeration is called for whilst the fish are in the spawning tank. Also, for the fry, a good system is to remove all the plants as soon as the fry are free-swimming—all the fry. Make sure of this because the fry of barbs are very much like the fry of goldfish, in that often very many are still clinging to the plants whilst their brothers and sisters are already free-



Clown barb (*Barbus everetti*)



Tiger barb (*Barbus tetrazoni*)

swimming. There can be 2 to 5 hours difference in their development.

As with all fishes, the numbers to rear depend on the individual aquarist and the room he has available. I should say never above 60 to a 24 in. by 12 in. by 12 in. tank. So as soon as your fry can be handled count and

distribute to tank capacity. It is better to rear 60 good specimens than hundreds of colourless weaklings that no one wants. You will soon be redistributing your young fish and will require your 60 fish in at least three 24 in. by 12 in. by 12 in. tanks before they reach selling size, and, if you are wanting a six-fish team for the breeder's class,



Chequer barb (*Barbus atigolepis*)



Red barb (*Barbus ranchinus*)

well, that's another 2 ft. tank for specials. It is simple enough: plenty of room to produce good fish. Let this be a rule, especially for barbs.

Barbs are easy to feed and come on well if they are fed often and plenty. Use chopped earthworm for your breeders every day when getting them ready and twice a week under normal conditions. A good dry food and some wheat germ should be given; they also like a little boiled spinach or brussels sprouts, fresh peeled shrimps, scraped raw liver and a little banana now and then. Well, you think of something—it will probably be eaten greedily!

The fry have large mouths and a good starting food for them is *Paramecium*; this is easily cultured by the usual recommended methods. Do not take them off *Infusoria*, especially large *paramecia*, too early and they must still have some even when large enough to take brine shrimp; they should be getting *Infusoria* and brine shrimp at the same time, also *Grindal* worm. Try to mix their diet, a mixed diet is good for any creature (as I write my Lakeland terrier pup is trying to eat my shoe laces; that's not diet, I hope, I think she is just cutting her teeth). With a good mixed diet your barbs should be ready for disposal at 12 weeks, not big, but well-coloured youngsters that have had a good start and can be grown on easily by their new owner (who, if he is a decent bloke, will tell everyone you bred them and help your reputation some).

Showing

Now, to further your reputation as a master aquarist and to increase your interest, and other people's, in the barbs, you must show. Competitive or otherwise, public shows help to keep our fishes at the top of the tree (funny place for any fish except a climbing perch). Fishes, like any other livestock, need preparation for showing. A few little things you can do are these:

Condition. You have already got this, by the methods of

keeping already described. To keep this condition, during the show season, is difficult. Remember one important thing—do not "over show" any individual fish; have a team if you want to visit all the shows with a few entries. Have plenty of show fish on hand.

Selection. The way to pick the future show fish from your spawnings is to pick the ones that grow fastest—the odd giants that you get in almost every spawning, these and the active well-coloured ones. Also, usually in barbs the aggressive individuals make good specimens; often this aggressiveness is just good health and condition. Many times I have been presented with so-called "killer fish" whose only crime has been they have been the only healthy fish in the tank, and when these individuals are put in a tank composed of healthy fit specimens, they then never commit another crime.

You do not make show fish, they are born, but they can be helped: they can also be spoilt and many more are spoilt than helped. Despite the importance of showing in the fish world to-day, I feel that many show fish are neglected specimens and kept good in spite of their owners. Good intensive feeding for a fortnight before the date of show, and arrange for plenty of fresh water and water changes beforehand, so that when the change of water at the show comes along, the fish feels less effect. Putting fish in small show-size aquaria for a week before the show possibly helps to settle them in the show tank. Whilst the judges are tapping the glass to make the scared fish get off the gravel, your "show-tank trained" specimen is tapping the glass himself to make the judges admire him! I knew a firemouth, one season, who did everything except break the glass when he was at a show; he was not the world's best specimen of a firemouth, but his spirited display usually had him in the cards.

Spirit and activity help colour. This is all condition,

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Breeding the FIGHTING FISH

by L. C. DAWSON



IN the wild the Siamese fighting fish (*Betta splendens*) is an inconspicuous retiring creature without the beautiful colours that we are used to seeing in our aquaria. The colours we see to-day are the results of careful breeding by fish fanciers throughout the world.

To breed the *Betta* I recommend an aquarium not less than 14 in. by 10 in. by 12 in., the larger the better, as this allows a greater quantity of Infusoria to be placed in without polluting the water.

Having made the choice of an aquarium, fill it two-thirds with clean aged water; do not fill right to the top or there will be no room for the addition of the Infusoria. Next divide the aquarium into two compartments by using a piece of glass; in the side where you are going to put the female place a small flower pot with a hole clipped out so as to make a door for the female to enter should the male become too ardent in his love-making. In the side for the male plant a few strands of plants, long enough that the tops will reach the surface of the water; this gives the male some place to anchor his nest to. The aquarium should have a canopy or cover fitted with a 60 watt bulb. This should maintain the temperature of the water at some point between 75° and 85° F.

Having prepared the aquarium, and making sure you have a good supply of Infusoria on the way, pick out a suitable male and female and place each in their respective compartment and watch to see how they accept each other. The male, if in good condition, will spread his fins and show off in all his beauty; the female will do likewise in her small way. In a very short time, possibly the same day, the male will begin blowing his nest of bubbles on the surface of the water. When the nest is completed, which should be in 1 or 2 days, carefully withdraw the glass partition and watch to see how they behave. Do not be alarmed if the male violently pursues the female; usually they come to terms. There are some cases of incompatibility but these are few.

After a considerable display of fin-spreading and chasing, the male will coax the female under the nest and both will spread their fins. The male will wrap himself around the female, both will sink slowly to the bottom and here the male will release his hold and commence picking up the eggs, that have been expelled during this process, and blow them into the nest. This will be repeated several times until the female has been spawned out.

It is now time to remove the female. From now on until the young are free-swimming the male takes over the household duties. He will spend nearly all his time under the nest picking up any eggs or young that fall out, which will keep him quite busy. Care should be taken not to jar the aquarium as it may cause a great number of eggs or young to fall from the nest at one time and overtax the male's ability to pick them up and blow them back before damage is done.

The young fish find shelter under the nest until the yolk sacs are absorbed and the fins are developing, which takes 3 or 4 days; after this the young fish will be free-swimming and will be seen all over the aquarium. Now is the time to feed Infusoria, which should be done with care; small quantities two or three times a day is better than a lot once a day. After a week or 10 days the male will tire of house-keeping and should be removed.

In about 10 days feed newly hatched brine shrimp.

The shrimp should be siphoned off from the mid-section centre depths of the brine tank through fine cloth net. Do not dip the net into the brine tank and swish it around to collect the shrimp as in this way husks of the shrimp eggs are collected, which have a disastrous effect on the delicate stomachs and mouths of the young fish.

At the age of about 6 weeks the young start to become air-breathers; this is a critical time in their lives and when a great number of casualties occur, unless precautions are taken to see that the surface of the water is free from scum or film. It is necessary at this time for the young to come to the surface to breathe and if there is a film or scum they cannot break through and gulp the air. To remove the scum and film from the surface of the water, lay a sheet of newspaper on the surface and then lift it off. Once the young are past this stage, the battle is won and with good feeding they will develop quite rapidly. The young may be left together until they start to show their sex.

The mature fish will eat any kind of fish food, but, being carnivorous, should have foods included in their diet such as live *Daphnia*, scraped raw fish, beef or liver, *Tubifex* worms and white worms. Care should be taken not to feed with too many white worms, as there is a suspicion that these cause dropsy (one or two worms once a week is enough).

Possible reasons for failure in breeding fighting fish are:

- (1) Too small an aquarium (young starve, insufficient room for maintenance of ample microscopic life).
- (2) Water too deep (too much effort for young to reach surface).
- (3) Foul water (aged water is not foul water).
- (4) Infusoria not A.1 (cloudy water does not necessarily mean good Infusoria—test it by examination under a microscope. Life should be about 100 organisms to a drop of water).
- (5) Temperature (80°-82° F is ideal).
- (6) Parent fish not in good condition.
- (7) Film or scum on water surface (young cannot break through to breathe).

Aquarium Barbs

(continued from page 210)

all wrapped together in good feeding and good fish-keeping, which, after all, is just common sense.

There are some tricks; a sudden pH change can sometimes tie colour for a short time. An acquaintance of mine used to put a few drops of hydrochloric acid in the show tank with his male nigger barb; this deepened the colour for a while, and he did very well until he met up with some nigger barbs in safer natural conditions and his barb died from envy and an overdose of malt vinegar. Give some live *Daphnia* to be eaten in time before the judges get round. Pick your position, if you can, where your show tank will catch a little side light from a near window; this side light often brings up the wonderful scale shine on the big-scaled barbs and does help to stop the judge for another look. These are just little aids and will not make a poor fish win; your cards are won at home, with barbs or any other fishes.

ON TARGET WITH THE ARCHER

by R. E. MACDONALD (Illustrated by the author)

ONE of the most remarkable and fascinating species of fish ever to occupy one of my tanks was the archer fish (*Toxotes jaculator*).

Many sacrifices had to be made before I eventually accumulated enough cash to enable me to purchase four of these irresistible creatures, for, unfortunately, at the time the long period of transportation to this country resulted in a high death-rate, which consequently kept the import of this species down and the purchase price high. With modern methods of transportation a fine pair of archer fish can now be bought for between £1 and £2 per pair, when available.

The archer fish grow to about 9 in. and provided that they are not too large, they make a suitable addition to the community tank, for they are by nature a peace-loving species. If carefully looked after, archer fish prove to be quite hardy, but it should be remembered that as new imports they require careful handling until they become accustomed to their new surroundings.

These fish need a fairly large tank and for the first few weeks in their new home they should not be excessively disturbed. The tank should be well stocked with such plants as water fern (*Ceratopteris thalictroides*) and fanwort

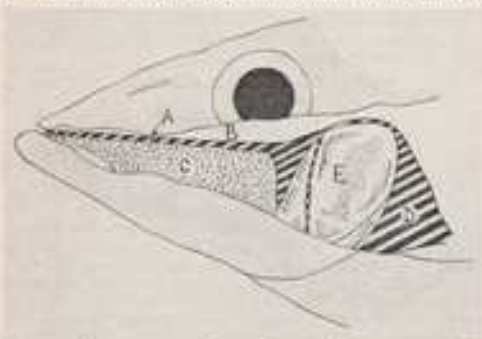


Diagram of arrangement of parts of archer fish responsible for its "water archery." (A) is the groove forming the palatine canal or tube above the tongue (C); the canal is continuous with the pharyngeal cavity (D) within which pressure can be raised by movement of the opercular membrane bone (E). Note that the forward end of the tongue (C) is thin and unattached to the floor of the mouth so that it can act as a regulating valve for flow of water through the palatine canal.

(*Cabomba caroliniana*) or perhaps with the various species of *Cryptocoryna*, such as *C. cordata*, *C. vitiensis*, *C. cilata* or *C. hartwegiana*, which will provide adequate hiding places if the fish become frightened. A mud bottom in the tank can be used if preferred, for *Toxotes jaculator* originates from the mangrove swamps of India, Burma and Malaya.

The outstanding features of this species are the six dark bands or bars, running vertically across the head and top half of the body, and the size of the head, which is quite large in relation to other parts. But the most amazing feature is the fish's ability to procure tasty morsels of food after shooting down insects in the vicinity by spitting drops or streams of water at them with exceptional accuracy and velocity. When searching for prey, the fish will swim with its mouth breaking the surface of the water. This leaves a tell-tale wake that indicates the presence of the fish before it is actually seen by the observer.

At the present, very little is known about the breeding habits of this fish, and to my knowledge its scarcity is the reason why no serious attempts have been made as yet to breed the archer fish in the aquarium. There is also the difficulty of sexing them, as the male and female of this species look alike. From my own observation, I think the only way to determine the sex of an individual is by watching for the fullness that characteristically indicates when a female is ripe with eggs. It should be remembered, however, that it could be possible for a female to carry eggs without actually showing any external signs of this condition.

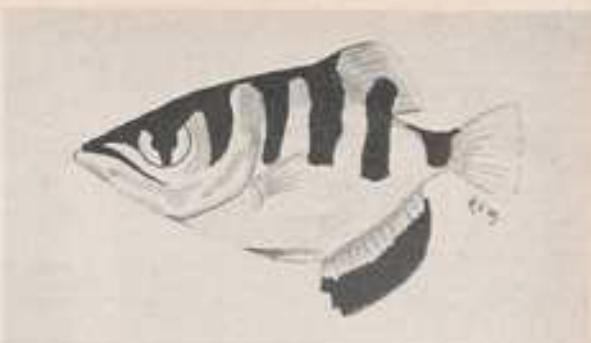
The first and only problem I experienced in keeping the archer fish was that of containing insects within shooting range so that the fish could demonstrate their capabilities as marksmen without waiting for the casual insect accidentally to pass within range.

As necessity is the mother of invention it was not long before I had the idea of constructing a perspex box to fit over the 36 in. by 12 in. by 12 in. tank that housed the fish. The box consisted of an aluminium frame 36 in. long by 12 in. wide and 30 in. high, covered on all sides except the bottom with 1/2 in. perspex. The hood containing the artificial source of light was fitted to the top of this and the lamp wattage was increased to counteract the loss of illumination occasioned by the increase in distance of the lamp from the tank. A trap-door was cut in one end of the perspex box and it was through this that I eventually released flies for the waiting fish. This method proved to work exceptionally well.

A small fly released into the box via the trap quickly aroused the attention of the lurking executioners below. With expert strategy they manoeuvred into position, took aim and shot globules of water at the victim with amazing

Archer fish (*Toxotes jaculator*)

FISH



velocity and deadly precision. It was noticed that if a particular shot went wide, there followed a quick succession of shots until the insect was hit, but from my observation misses were very rare, particularly when the shooting was made at a sitting target. A moving target obviously presents difficulties with the aim and calls for a quick repetition of shots. It was fascinating to watch my four marksmen letting loose shots in rapid fire as they endeavored to hit the moving delicacy.

From experiment I found that large insects could not be taken by the fish, for although the head appears to be quite large, the capacity of the mouth is relatively small. The best insect to present when the fish is young is the mosquito, particularly when newly hatched. To provide my fish with this type of food I fixed a small water container within the perspex box, into which I placed some freshly caught mosquito larvae. When the larvae hatched, the fish were presented with a succulent dish of the right proportions.

This type of food was restricted owing to the season, so a substantial diet of *Daphnia*, *Tubifex* and white worms constituted the main menu, with the occasional addition of a good-quality dried food. Small spiders were also fed and readily consumed by the fish.

Care must be taken not to over-feed the archer fish as they very rarely inhabit and never feed from the lower regions of the tank. This means that if any excess of food is allowed to remain in the tank, serious biological problems can be expected. A feeding ring should be used when giving worms. It can be assumed that the muddy nature of the mangrove swamps in their natural habitat is the reason for the archer fish feeding and living at the surface and middle regions of the water, for under natural conditions bottom vision would be considerably restricted.

After a time, my archer fish became very tame and would jostle in an excited manner for a good strategic firing position whenever I opened the feeding trap. They proved to be always hungry for food of this nature and would often fight among themselves for a fallen insect. There appears to be no rules for the archer fish—it is a case of every fish for himself!

Archer fish freely exhibit their shooting powers in the home aquarium, to the utter delight of any onlookers, but it was not until the death of one of my archer fish, due to a bacterial infection, that I was provided with the opportunity of investigating the means by which archer fish practise their sharp-shooting habits.

Water is taken into the pharynx via the opercular opening (opening to the gills). The pharyngeal cavity then acts not only as a compression chamber but also as a reservoir. The compression necessary to expel the water at a high

velocity from this chamber is attained by a sudden muscular exertion on the pharyngeal cavity with the posterodorsal membrane bone of the operculum (gill cover). This exertion forces the water under pressure into the oral cavity, where it passes between the tongue and palate. The roof of the mouth contains a long deep groove which runs the entire length of the palate to the pharynx, so that when the tongue is pressed against the palate, a palatal canal or tube is formed, through which the water passes. The length of this palatal canal or tube determines, and is essential to, the accuracy of the shooting. The anterior section of the tongue, which is exceptionally thin and unconnected to the floor of the mouth, is used by the fish as a valve to control the flow of water. By operating this valve, water can be ejected in a continuous stream or as single globules. It also prevents water from prematurely escaping from the pharyngeal cavity whilst under pressure.

There are many strange and interesting creatures to be found in the aquatic world and the archer fish is one of these.



"Yes, they really adore him—it would break their little hearts if he didn't come every day"

LONG-TERM AQUARIUM

by B. POPLAND

RECENTLY, through a chance meeting, my interest was aroused in a type of aquarium which I had not seen before. It happened in a local aquarist's shop, where I got into conversation with another hobbyist who invited me to see his tanks; and since he lived in the neighbourhood we set off at once. Amongst his aquaria was one which immediately took my eye, for it housed a mixed collection of cichlids. Two very large angel fish, some dwarf cichlids, a marbled cichlid and a firemouth, presenting a picture rather different from the miniature tropicals normally seen in community tanks.

Another feature was the plants; all were slow-growers of the type which require no pruning or attention. In fact everything in the tank had been included with a long-term outlook and with a view to the minimum of attention. The fishes were long-lived, the plants slow-growing and the lighting fairly low so as not to encourage too much algae or run up a high electricity bill. The tank appealed to me so much that I began to make the necessary preparation for starting such a collection.

A large tank is necessary, 36 in. by 12 in. by 15 in. being the minimum. This is the size I used and since all the plants were to be slow-growing species, I decided on a tank of *Cryptocoryne*. Now, these plants have a habit of suddenly dying off if their conditions are not right, and many authors suggest that the plant needs a rooting medium of loam. I have found this to be true. It is also generally agreed that this plant cannot stand limey or salty water, so do not add salt to the aquarium and make sure that the water is about neutral (pH 7). Loam can be bought from any gardening shop in a clean condition but it must be sterilised before laying it in the aquarium. Do this by placing the loam in small batches in a colander and heating this over a pan of boiling water. Put a plate over the colander and the steam will gradually penetrate the loam, provided that the process is done gradually. After cooling spread the loam over the base of the aquarium after it has been washed and disinfected by the usual method.

However, cichlids are liable to scoop up the gravel, making depressions in the aquarium base, and should there be loam beneath this it will rise, clouding the water. It is important therefore to place the loam only in areas where pockets of plants will be growing to minimise the risk of this happening and to keep it to the back of the tank, where the gravel will be deeper. Next the washed and sterilised gravel can be placed on top, sloping this to the front. The next stage is planting.

There are enough *Cryptocoryne* to fill every need in fish-tank lay-out. Species vary in height and colour enough to avoid the monotony of one type of plant, and since the plants root firmly there is some resistance to the uprooting habits of some cichlids. With the rockwork forming pockets and holding back gravel at higher levels the *Cryptocoryne* were placed in position, taller species at the back and the smaller types at the front. The taller species were arranged in clumps to provide cover for any fish in need of refuge, and to give a little more variety I planted a few *Sagittaria natans*, another slow-growing plant which required no pruning. When the tank was all laid out and the water added to the full level, a period of 3 weeks was given to allow the plants to root before any fishes were introduced. None of the plants required strong light and

since a little natural light falls into the tank only three 25 watt bulbs are installed.

These are on three separate switches to avoid shocking the fishes with a sudden brightness, though the wattage is so low that this is probably not strictly necessary. Snails were included to help clear uneaten food, but only Malayan snails, which scavenge beneath and at the surface of the gravel. Because most cichlids grow large, not many fishes can be housed in such a collection; the prices of cichlids are usually low, therefore the cost of stocking the tank is not likely to be high. I would therefore suggest to anyone interested in this type of aquarium that he does not fill the tank at once with any fish he can obtain but rather take pleasure in hunting down rarer types of fish like orange chromides, not so commonly seen as the usual dealer's stock, guppies, platys etc.; care must be taken in choosing only fishes of a peaceful disposition. Jewel fish and Jack Dempseys are, of course, out. One mistake I made was to buy, on the advice of a slightly more experienced friend, a zebra cichlid. Having little experience in cichlids I placed the fish in the tank with a pair of fairly large angel fish. The following week-end I was away for 2 or 3 days and on my return one of the angels had a blood-red patch on both sides of its body, which soon developed fungus, and the fish had to be destroyed, followed by the zebra cichlid! I then began to read about cichlids in old aquarist magazines, library books etc., and have since bought a blue acara, a keyhole cichlid and a pair of lace angels to add to my surviving angel fish. Recently a firemouth has been added and I have had no further trouble. Fishes occasionally chase or nip at one another but nothing serious.

Most cichlids are hardy and are less liable to die suddenly than are the smaller tropicals. Also most cichlids are long-lived and once a suitable community is set up the cost of fish replacement is negligible; live food is, of course, essential. *Tubifex*, *Daphnia* and white worm are all excellent but the cheapest and best in my opinion is chopped earthworm, so anyone with a garden has no problem. I have found little sediment collecting and little algae forming. A half hour siphoning and cleaning the glass once a month seems to suffice and I have not touched the plants since their introduction. I have had no further trouble with fighting and no uprooting of plants; as the fishes grow bigger they seem more interesting, and I'm still looking for my orange chromide and other less-usual, colourful cichlids.

The Pet Trade Association Ltd.

AT the last meeting of the Committee of Management of the Pet Trade Association Ltd. Mr. R. Taylor was elected president for the year 1961, and will preside at the Annual Dinner Dance on 9th February, at the Windsor Castle Hotel, Victoria, London, S.W. Mr. S. C. Jacobs has been appointed delegate to the British Standards Institute Committee which is considering a standard for the transportation of fishes, reptiles and amphibians. Mr. Jacobs replaces Mr. E. Smyhala, who is at present in West Africa, where he expects to remain for approximately a year.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

I should like to know something about the habits, preferred food and temperature requirements of the freshwater flounder (*Tricostus maculatus*), a small specimen of which I have just added to my community tank.

The inoffensive freshwater flounder is not particularly active, and spends long periods with its body half-buried in the sand, or pressed tight against a side of the aquarium. It takes most of its food from the bottom, and appears to thrive best on a diet of live food, or suitable alternatives such as scraped red meat. A temperature range of 70° to 80° F. and slightly saline water, suits it very well.

I feed my guppies and platys every day on several different proprietary dried foods, but they do not live for any length of time. Before they die, they always waste away and develop bent spines. What is the cause of this trouble?

Lack of strong light, unhygienic surroundings and deficiencies in their diet are among the causes of wasting in fishes. See that your aquarium is placed close to a window, or is lighted by bright electric light for roughly 7 or 8 hours every day. Keep the compost clear of uneaten food and decaying plant life, and supplement their dried food diet with frequent feeds of live food, scraped red meat or tiny blobs of tinned cat or dog food.

Clay burnt on my garden bonfire forms rock-like masses. Would it be possible to make rocks for the aquarium by moulding large lumps of soft clay to the desired shapes and then baking them hard?

Lumps of burnt clay would soon disintegrate under water, and would not prove at all suitable for aquarium decoration. A far better idea would be to place coloured-glass bottles in the red-hot centre of a large bonfire and leave them overnight. A really hot fire would soften the glass and form it into quaint shapes. After a good washing, these glass rocks make excellent ornaments for the aquarium.

My tank set close to a window grows too much mossy green algae on the sides. Please can you give me the names of some fishes that will definitely clear this vegetation from the glass?

Catfish such as species of *Otocinclus* and *Plecostomus* will eat all the algae they can find. Other good algae-eaters are mollies and the so-called freshwater sharks (*Labeo*).

One of my angel fish has developed a large blister over one eye. I have treated the eye with ammonia, but without success. The blister is almost transparent and looks as though the slightest pressure would make it burst. What do you advise?

Net the fish and place it on a piece of nylon rinsed in tepid water. Lay another piece of nylon over its body to keep it from jerking about. Then take a fine-pointed needle and prick the blister. Press it gently to squeeze out pus or fluid and dab the spot with penicillin ointment, or a weak solution of iodine and water, before returning the fish to the water. If the blister forms again, repeat the operation.

In my community tank I have Australian rainbow fish, guppies, tiger barbs, zebra fish, blue gouramis and platys. I have just noticed that the caudal fins of the Australian rainbow fish have pieces nipped out of them. A few weeks ago, I found two male guppies with ripped fins dead on the bottom. Which species is likely to have inflicted the damage and killed the guppies?

Tiger barbs often develop the annoying habit of nipping the bodies and fins of other fishes. They are probably to blame for the damaged fins of your Australian rainbow fish. The guppies, however, may have died of old age, and most fishes will nibble at a dying or dead fish's fins, though it is not unlikely that the tiger barbs caused their deaths by treating them too roughly.

Please will you tell me how to sterilise plastic aquarium equipment?

You can sterilise plastic equipment by immersing it in a deep-red solution of potassium permanganate, but do not

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

leave it in soak too long or else it will become discoloured. Dettol can be used, but all equipment dipped in Dettol must be well washed afterwards under running water.

If I used a coloured nylon pot-scourer to scrape the algae from the sides of my aquarium, would it have any poisonous effects on the fishes?

A nylon pot-scourer is quite safe to use in the aquarium, but to be on the safe side give it a good soaking in warm water before putting it into use.

An angel fish I bought a few days ago has got the "ropes," and will not stir from its refuge in a thicket of plant life. Up till now it has also refused all offers of food. What should I do to cure the fish of this condition?

So long as the fish is not suffering from a chill or some other illness, your best plan would be to leave well alone. If you drive it from its hiding place you will only succeed in adding to its fears. Generally speaking, a scared angel fish should grow accustomed to its new surroundings within the space of a week. It will then swim about in open water. Try and get your fish to eat by dropping live food or tiny pieces of meat just above its hiding place.

The water in my new aquarium is covered by a greasy film. What has caused this film, and will it harm the fishes?

It is not unlikely that the greasy film you have noticed is caused by traces of oil working out of the aquarium cement. You can remove the film by drawing a sheet of newspaper across the surface of the water. After a few days the trouble will clear up of its own accord. The fishes will not suffer any discomfort. An aquarium kept in a room where cooking is done or where an oil-heater is used often develops a greasy-looking surface scum. The remedy here is to see that the room is adequately ventilated, and the aquarium is kept tightly covered.

Recently I bought a pair of blue acaras. Please could you tell me something about their habits, and can they be kept in a community tank containing barbs, gouramis, zebra fish and guppies?

In its smaller sizes the blue acara is as good as gold, but when it reaches full size it may attack and eat guppies and zebra fish up to 1 in. in length. A large blue acara will also bully sluggish or timid companions. It will accept any coarse dried food, but thrives best on a diet of chopped earthworms, pieces of meat and the regular bulky live foods. The blue acara breeds in the typical cichlid manner, depositing its eggs on rockwork, a glass side of the aquarium or even on the floor of the aquarium.

I have just taken up the hobby of tropical fish-keeping, and would like to know whether snails are necessary as scavengers in the aquarium?

Although snails are useful for breaking down uneaten fish food and decaying vegetable matter into a dark brown manure or mulm, they usually prove more of a nuisance than an asset. The majority of snails breed quickly, and a few score of them in a small aquarium will soon do considerable damage to tender plant life. Moreover, if snails are introduced into a breeding tank they will soon gobble up most of a fish's eggs. Regular dip-tubing, or the installation of a good filter will relieve the aquarium-keeper of the necessity of keeping snails as scavengers.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have heard a lot about ways of distinguishing between male and female goldfish but can you tell me what to look for and how it is done?

When in breeding condition the male usually shows a number of raised white tubercles on the gill plates and sometimes on the fronts of the pectoral fins. The females are generally fatter, as the eggs (hard roe) take up more space in the belly than does the milt of the male (soft roe).

I have a garden pond about 2 years old. I had a nice lot of goldfish until I introduced some unclean river fishes. Most of the goldfish and sterilised everything in the pond and made a fresh start. Now I have seen two of the new fishes darting at the food given but appearing unable to take it. On examination it appears that the mouths are quite closed up and yet the fishes seem otherwise healthy. What is the trouble?

The fishes may have had an attack of fungus, which often affects the mouth. Catch the fishes and by gentle pressure at the sides see if their mouths will open. They may have been stuck temporarily and a salt bath should put them right. It is a great mistake to introduce river or pond fishes from the wild to garden ponds containing goldfish. So many fishes in the wild are in a bad condition, often caused by anglers, who, of course, would be the last to admit this fact! However, by catching many fishes and returning them to the water much harm can be done to them. In the first place the damage by hook can perhaps be ignored, but the fish is held in the hand, when much of its protecting mucous covering is removed. The fish is then put in the keep net, often for hours on end, struggling to get out with several others; consequently more mucus is lost. At the end of the day the fishes are returned to the water in a sorry state, a prey to fungus disease and any pests which might be around. Any diseased fishes put into a pond seem to get much worse immediately and so can spread the trouble to other fishes which were previously quite healthy.

I have an aquarium 30 in. by 15 in. by 15 in. in a dark corner of the room. It is well planted and I would like to know how much artificial light to give the tank. I have about 9 inches of fish and would like to know if I could add any more?

You will have to experiment with the time you keep your lamps on to see which gives the best results. In our uncertain climate it is quite impossible to say whether the tank should be illuminated for 6 or 10 hours a day as each day may vary in light intensity. You will soon get used to the look of things in the room, and on sunny days the lamps may not need to be on hardly at all whereas on a very dull day they may need to be on for most of the day, at least 8 hours. Only by experimenting with the times and by watching the growth and health of the plants will you be able to get the best from your lamps. Strangely enough, I do not think the fishes mind at all whether the tank is illuminated or not. Your tank will hold 18 inches of fish.

Recently whilst catching *Daphnia* I caught some kind of newt in my net. I don't think I have ever seen anything like it before. I have enclosed a rough sketch and would be glad if you can identify it.

Yours was an excellent sketch of the larval state of a great water newt or triton. These tadpoles have quite large fringed gills protruding from the head, as you sketched. When the tadpole is fully developed the fringed gills disappear inside and are no longer visible. The young newt must then leave the water, to return only for breeding purposes when mature.

I have a small lake about three-quarters of an acre in extent, which has chemically-like qualities which both puzzle and annoy me. I had the lake almost emptied and its edges cleaned out about 10 feet out. It filled naturally in the winter and the water was quite clear. The water was tested and appeared pure.

Some trout were put in and they seem all right. Now the colour of the water went to orange, bottle green and back to brown and orange. What is the cause?

The colour of the water was caused by certain Infusoria and tiny plant life. At one time conditions favour a definite kind and then after a time they either become so numerous that their excrement destroys them or they eat up all the necessary food. Then another type may take over, hence the change of colour. Once a proper balance is obtained the water will clear again. There is no need to worry unduly on the account of the fish as some of the Infusoria may be used as food by them. Remember that they cannot breathe without taking into their mouths at every "breath" thousands of Infusoria and it seems perfectly logical that much must be sifted out for food. After all, if this is the type of food which rears most whales surely it is good enough for trout! I think you will find that if you leave well alone the water will clear in time.

A friend of mine who has a large fish pond has told me that he puts a block of cooking salt into his pond about every 2 months to keep the fish free from fungus. Is this the correct thing to do? I cannot find anything about it in books.

If a block of salt is put in a pond every 2 months it will soon become a marine pond fit for marine fishes only. No matter how much water evaporates from the pond the salt will be left behind. Although I admit that salt is a fine medium for curing some fish troubles the amount of salt suggested seems far too heavy, unless, of course, the pond is a very large one. In a pond about 10 feet by 8 feet a couple of tablespoonful of salt once a year would do no harm.

I have a sink partly buried in the ground and have fishes and plants in it. The sides of the sink have become green. Should I scrape this off?

The green is caused by algae and will do no harm; in fact it should improve the look of the sink. Do not try to keep too many fish in such a container and if you put in the large rocks you describe remember that they can do no good but will take up valuable swimming space.

I am a very keen angler and recently, having caught some small roach etc. I put these fishes in my garden pond with my goldfish. I now find that these river fishes have infested my pond with fish lice. These are attacking my goldfish. What can I do to get rid of them?

It is practically impossible to kill the fish lice by putting anything into the pond, as they are very tough and anything likely to kill them would almost certainly kill the fishes. The only safe and certain way of ridding the fishes of the pests is to give all the fishes a bath in Dettol solution. A half teaspoonful to a half gallon of water will do the trick. Each fish must be immersed in the solution for a very short time only and never left unobserved. As soon as a fish is immersed the lice will leave it, but if the fish is left in the solution too long it will turn over and can die. However, once the fish has turned over and been removed to fresh water it soon recovers. You may have to repeat the treatment later as some more fish lice may have hatched out. The lice are free-swimming until they find a host and lay their eggs on rocks etc. in the pond.

I recently found some ant hills in my garden and would like to know how to separate the ant eggs from the soil so that I can use them for feeding my fish.

You could put some of the hill into a sieve and shake out the fine soil. Alternatively you could shake up a quantity until the eggs came to the top, when they could be picked up with a spoon. These fresh eggs, or rather pupae, will be better food for fishes than the dried pupae cases sold for fish feeding as "ants' eggs."

our readers



write

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

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

Home Aquaria Competitions

I REFER to Raymond Yates' "Aquarist's Notebook" in the November issue of *The Aquarist* on the "Home Aquaria Competition" run by the Merseyside Club. I would like to point out to Mr. Yates, and others interested, that such a competition is quite common in Scotland, the Dundee A.S. having run such a scheme for a number of years and my own Society, Inverness, have such a competition currently in operation, but with a number of variations.

In our competition there are two judges, working in unison, and they make two unspecified visits to members' homes between 1st December and 31st March. This obviates members setting up a "show tank" specially for the judges, which completely, in our opinion, ruins the object of such a competition. Points are given for plants and planting, water clarity, fish selection and a variety of other subjects.

Finally, as a matter of interest, owing to the scattered nature of our membership, this competition involves our judges travelling some 80 miles in order to judge a tank.

JOHN A. F. BAIN,

Secretary, Inverness and District Aquarist Society

Coldwater or Tropical?

I WOULD like to challenge Mr. Boarder's statement (*The Aquarist*, September) that "There can be no justification for allowing heaters in coldwater tanks for exhibition purposes."

Has he forgotten the first fish lesson we were taught? Equalise the temperatures of the water. It is more than possible that the taking of fancy coldwater fish, oranges, veils, and moors from fish houses at about 60°F and putting them into tap water at shows at about 40°F for a day or two and then taking them home to go down with fungus and digestive troubles is the main reason why there is such a limited and expensive amount of English stock available.

It may be possible that single-tailed and long-bodied fish can survive such treatment, but even we novices to the fancy know how easily the really well-shaped fancy fish can be put out of sorts even with careful handling.

W. T. COOPER,

London, E.17.

Guppies Being Over-indulged?

I WAS delighted to read Mr. Walters' letter in *The Aquarist* (November), although I have not noticed a high proportion of guppy classes in the open shows I have attended. It is a first-rate idea, as guppies cannot be over

indulged because they are the finest little fish in the world! No other single variety of fish can come in so many different shapes and sizes, is so pleasing with constant activity, variegated colour, or has such a devoted, I will go so far as to say dedicated, following.

Many aquarists who have tried all manner of fishes return in the end to the guppy and are content to be a slave to the guppy cult, finding in the breeding of this great little fish a very worthwhile challenge.

The F.G.B.S., a specialist international society exclusively devoted to the guppy, is well known, and a new society has just been formed, also exclusively for the guppy, known as the Fancy Guppy Society (F.G.S.).

In conclusion may I leave Mr. Walters with the thought that if show secretaries have been providing so many guppy classes there can only be one reason for it—popular demand! Up the Gups!

P. DIXON,

Evesham, Worcs.

I HEARTILY agree with Mr. W. F. Walters in his letter to *The Aquarist* (November) on the subject of guppies being over-indulged. I know that they are cheap, colourful and active, but I think that many aquarists would agree with me when I say that they are rather small fish, and that they are really too multicoloured with no solid tint on them. Give me a good hefty cichlid, with solid colouring, any day!

R. H. T. ASHROD,
Dinas Powys, Glam.

Films and Speakers

I WONDER if any of your readers could advise me about the possibility of obtaining films of interest to aquarists for showing at club meetings and also if there are any speakers available within a reasonable radius of Brighton. We have a steadily growing membership which we are anxious to maintain by providing a well-balanced programme, and I should be most grateful for any information which other clubs could provide on the above subjects.

(Miss) B. STEPHENSON,

Secretary, Brighton Southern Amateur Aquarists,
14, Lincoln Street, Brighton 7.

Breeding of Siamese Fighters

I WAS greatly interested to read an account in your December issue of the spawning of a pair of *Betta splendens*.

I, too, recently had the pleasure of observing the spawning of a pair of these beautiful fish in a 4 gallons tank and

in my case the behaviour was very similar to that recorded by Mr. W. A. Clews.

After the embrace, the female sank gently in an inverted position almost to the bottom of the tank and the male appeared to be quite uninterested in the eggs, which the female ate almost as quickly as she produced them.

The behaviour of my fish deviated even more from the text-books in that after the spawning was complete, the male then took no further interest in the nest or the few eggs which had found their way into it, no doubt by accident, and the nest rapidly disintegrated. Not a single youngster hatched out and I therefore conclude that my fighters at least have not read the right text-books.

S. HURBELL,
Basildon, Essex.

Saline cure for Dropsy?

I SEEM to have found a cure for dropsy, a so-called incurable disease. I have had a number of fish die from dropsy and I was determined to find a cure, so when a friend of mine discovered that one of her fish had contracted the disease I saw my chance.

The fish, a black mollie, was placed in a jar with a solution of about 75 per cent. of local sea water and 25 per cent. of the original tank water; this solution was changed several times during the week it took to cure the fish. The fish was then replaced in the community tank and is still in perfect health.

B. PLANT,
Margate, Kent.

Oak and Beech Ferns

THOUGH they bear no resemblance to the trees of the same names, these two native species are amongst the most beautiful ferns available for either the water garden or aquaterrarium. Both are lime-hating and both frequent damp woods mainly in the northern counties. They do not require much light and as they rarely grow to more than 10 inches tall are eminently suitable for the moist soil of the aquaterrarium as well as the shaded crannies of the water garden. Both species have slender rhizomes which like to creep over shaded rocks and moist bark and therefore need only a shallow root run. What little soil is provided should be almost entirely leaf mould.

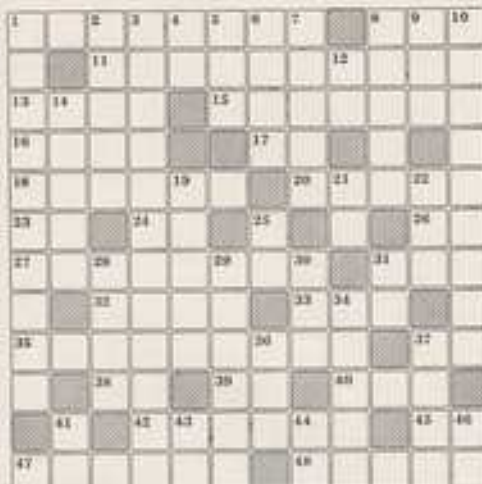
The beech fern, *Thelypteris phaeoptera*, has triangular to oval fronds each of which is bent at almost a right angle from the delicate, almost scaleless petiole. The lowest pair of pinnae are deflected backwards and upwards from the others. All the pinnae are a pale green and hairy, so that they have a dull, or matt appearance.

The petioles of *T. dryopteris*, the oak fern, are more wiry but bear the fronds at similar angles to those of the beech fern. The two lowest pinnae are each as large as the remainder of the frond so that the complete young frond at first appears as three small balls borne on the erect petiole. The brilliant rich-green fronds then uncoil and spread themselves as a canopy a few inches above the ground. The pinnae are larger and more densely set in the beautiful variety *T. dryopteris* var. *plumosa* than in the wild form.

C. D. SCULTHORPE

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1. Fish of a very large family which includes tetras (9)
11. Aquarium may be this or do so for art (10)
13. *Stenodus erythrophthalmus* (4)
15. Dace it? No such bird. Try a command! (7)
16. These may hold fishes but are not tanks (4)
17. One of the old railways (1, 1)
18. I grew a fierce-looking insect (3, 3)
20. These salts relieve amiparion in fishes (9)
23. No answer (2)
24. Old Testament (1, 1)
26. I'll have the first part of the could fit, thanks (2)
27. Aquatic varietal (8)
31. Fishes get this disease in their tin sometimes (3)
32. There's gold in the life, isn't? (4)
33. Name for the long leg of the water boatman (3)
35. Corroded fish hook on the fish? (5, 4)
37. Inlet of a sort (1, 1)
38. E.A. (1, 1)
39. Simpler than ABC (1, 1)
40. Girl with the hammer (3)
42. Eyes (6)
45. First class (1, 1)
47. Three-year-old salmon (6)
48. Anglers' device hold sets (3)

CLUES DOWN

1. Fish crosses in among the silvers (10)
2. Viper (3)
3. Popular tropical fish (3, 9)
4. Form of electrical supply (1, 1)
5. May be fish or may be kid (3)
6. Flag (4)
7. Module of pest (3)
8. Ficus (3)
9. Snak (3)
10. Inflated (9)
12. Moss hair (not of cats) (1, 1)
14. The vowels in a mixture (5)
19. It lay in the Mediterranean (3)
21. Fisher (2)
22. This scope is for viewing inside the ear. O, to give you the answer! (3)
25. Mixed type (2)
28. We welcome this on pay day; the angler does so every time (4)
29. Many of these on the beach (8)
30. Run gets up (3)
31. Best cat in the world (1, 1)
34. Upgrade, or a seat for the tank, perhaps (5 or 1, 4)
36. One-spot (3)
37. Type of tin (4)
41. Gold of the self and of heraldry (2)
43. Kind of ship (1, 1)
44. Little trumpets (2)
46. Is as in life (2)

(Solution on page 220)

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 following officers were elected at the annual general meeting of the **Bristol Tropical Fish Club**. Chairman, Mr. L. Nightingale, Vice-Chairman, Miss O. M. Lee, Hon. Secretary, Mr. L. Liddleton, Hon. Treasurer, Mr. E. Jones, Reporting Secretary, Mr. W. Holland, Librarian, Mr. R. Tovey, Auditors, Messrs. P. Cope & F. Meuld. In their Reports for 1959-60 the secretary reported an increase in membership during the year, and the treasurer reported a profit on the year's working.

At the December meeting Mr. M. J. Hardy (South Wales) spoke on "Diseases in the Aquarium and their Chemical Treatment" and presented the Cup to the winning Club and the plaque to Mr. P. Brown who gained the highest individual points in the Inter-Club Table Show held during 1960. A comprehensive programme of Talks, Slide Shows, Quiz Panels and Table Shows has been arranged for 1961, and a cordial invitation is extended to any Tropical Aquarists who would like to visit the Club. Meetings are held on the third Thursday of each month at the Old Duke Hotel, King Street, Bristol, commencing at 7.45 p.m.

OWING to lack of interest the **Doncaster A.S.** has had to be disbanded. Six former members of that Society, who had been travelling the 10 miles to Doncaster from Thorne for each meeting have, however, decided to form a Society in Thorne.

The first meeting has been held and further meetings will be held on the second Thursday of each month in the lounge at the Grammar School commencing at 7.30 p.m.

The Officers elected at the first meeting were as follows: Chairman, Mr. G. Lowe; treasurer, Mr. M. Hobson; secretary, Mr. D. Wells, 55, King Edward Crescent, Thorne, nr. Doncaster, Yorks. The result of the first table show, which was for the Best Fish was: 1, Mr. N. Sanders, kribiaensis; 2, Mr. D. Machin, salmon dario; 3, Miss G. Lowe, clown barb. The secretary would be grateful of any information on fish for loan.

THE **Reading A.S.** held a "Fish Forum" at which some amusing questions were asked. The table show for the Labyrinth Cup was won by Mr. J. Frost (blue gnanaxi) with Mr. D. Anagnost (blue gnanaxi) second and Mr. I. Godden (sac gnanaxi) third.

Recently the club saw two coloured films taken by Mr. C. Lenke. One on the Bird Life at the Peter Scott sanctuary at Slingsby, and a film taken at Lillsworth Cove. The films included marine life taught in the sea. The Club starts on the first and third Monday in the month at the Blagrove Arms Hotel at 7.30 p.m.

At the December meeting of the **Cambridge and District A.S.** Mrs. Meadows was the guest speaker. For the benefit of new members, Mrs. Meadows gave a lot of "Do's and Don'ts" and continued with tips and wrinkles useful to the aquarist of long standing as well as the beginner. After answering members' questions, the speaker was warmly thanked by the sitting chairman on behalf of all members.

At the annual general meeting of the **Thurrock A.C.** an interesting and varied programme was arranged for the year.

The following officers were elected: Chairman,

Mr. R. Nicholls; secretary, Mr. H. Purvis, Fairland, Kent View, Pitsea, Basildon, Essex; Treasurer, Mrs. B. Nicholls; show secretary, Mr. P. Swells. The society meets every Monday at the White Hart Hotel, Old High Street, Grays, Essex. And new members young, old, expert or novice will be made welcome.

A RECENT talk given to the **Sheffield and District A.S.** by Dr. F. N. Ghadially, covered a wide range of interest from, the breeding of Angels and Fishers to the construction of the Ideal Fish House. A very interesting film was presented by the well known Author and broadcaster—Mr. A. Faulkner Taylor, F.L.B.P., F.R.P.S. The film "A Derbyshire Dale" in colour, gives a general survey of the natural history of the limestone district of Derbyshire; introducing birds, fish, insects and flowers through the seasons of the year.

The results of recent Table Shows are as follows—Chalcids: 1, W. Weeks; 2, S. A. Abdy; 3, R. P. Middleton. Fishers: 1, Mrs. P. Brooks; 2, S. A. Abdy; 3, W. Weeks. Birds: 1, J. Beaman; 2, N. Wright; 3, W. Weeks. The first annual table show will be held on the 30th April, and details will be issued to all Societies in due course.

THE **Maryside A.S.** has just ended their showing year and report excellent results. At the Lancashire Aquarists Breeders Society eight fishes were obtained. In addition they

won seven seconds and five thirds. At the last meeting there was a talk by the chairman, Mr. Dave Jones, on "Hints and tips on setting up Aquaria."

THE table show at the **Dunbar A.S.** meeting was for breeders egg-layers and breeders live-bearers. The first two places in the egg-layer competition were filled by P. N. Greening and A. Robertson was first and third with P. N. Greening second in the live-bearers. At the last meeting talks were given by W. Cockburn on "Shore Stranda-Chalcids" and W. S. Russell on "Cuddler Pond Construction and Maintenance." The secretary of the society is Mr. G. B. Kirkland, 2, Kerington Crescent, Bardsill.

ONE of the most enthusiastic Societies in the country, at their last News Sheet shows, is the **East of Fife A.S.** and there is plenty of activity going on in the Society at all times. Recently they travelled to the Kirkcaldy Society for an Inter-Club Show, the other contestants being the home society Glenrothes A.S. and Alloa A.S. The cup was won by Kirkcaldy. In the table show for Chalcids the Males section was won by Mr. W. Murray, Mr. P. Ransfield taking the second and third places. Mr. R. Gold was first in the females competition, Mr. J. Newlands being second and Mrs. A. Nimmo third. This month's competition is for Swatches and Dams.

RECENT activities of the **Hford and District Aquarists' and Pondkeepers' Society** have included an auction of fish and equipment and also a table show for male and female guppies. The results were as follows: Males: 1, Mr. J. Banger; 2, Mr. Sorbbing; 3, Mr. Farr. Females: 1 and 3, Mr. Sorbbing; 2, Mr. Moore. The result of the Home Aquarium Competition was a tie for first place between Mr. Parsons and Mr. Harvey with Tropical Aquarists, Mr. Banger being third with Goldfish.

The subject at the December meeting was group discussions, and the table show was for any variety of egg-layer and live-bearers.

AT the annual meeting of the **Erith and District A.S.** it was announced that Mr. D. Cronin, the secretary would be leaving in the New Year to Bath. The new secretary is Mr. L. Randall, 118, Brook Street, Erith, Kent.

A TABLE show, film show, and a talk by Mr. Cyril Hill on the "Art of creating an oasis" have featured in the **Nottingham and District A.S.** programme recently. The next film show will be held on the 1st January and the two films will be on "Goldfish" and "Poisonous Snakes." The temporary secretary is Mr. H. Wilson, 8, Kelvin Road, Thorneswood, Nottingham.

THE main programme for 1960 of the **Bradford and District A.S.** concluded with two social events, the Ladies' Night and the Annual Dinner. At the last meeting there was an interesting talk by Mr. G. Taylor on "Breeding of Fishes." The table show cup competition for the year resulted in the cup being held jointly by Mr. R. Marshall and Mr. B. Neems with Mr. S. Winterburn a close third.

THE following officers were elected at the annual meeting of the **Yeovil A.S.** President, Mrs. Bryant; chairman, M. Emcoott; vice-chairman, C. Dushell; secretary, H. Anton, 100, Larkhall Road, Yeovil. Assistant secretary, E. J. Stokes; treasurer, T. Perry; Committee, S. Langdon, H. Godds, D. Stubbs, D. Silver and J. Mizlum. In December a coldwater table show was held the results being as follows: 1, S. Langdon (Shubunkin); 2, V. Collins (Cotton Fantail); 3, A. Downey (Goldfish).

THE General Secretary of the **Federation of British Aquatic Societies** is now Mr. Ken Derham, 21, Vicars Road, London, N.W.5. The General Assemblies dates this year are 4th March, 3rd June, 2nd September and 2nd December.

TWO meetings of the **Romford A.S.** were held recently. At the first, with Mr. N. Campbell



The Aquarist's Badge

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

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in the club; it was announced that the late Mr. Morgan's aquatic effects had been given to the Club to be distributed without charge to members of the Society—also that a fish-accipiter (it would be opened to purchase a Trophy to be known as "Bob Morgan's Memorial Trophy") to be used initially as a Table Show Trophy. The remainder of the evening was devoted to disposing of the fish and equipment of Mr. Morgan. Every remaining present received some fish and articles which would be of use to them.

At the second meeting a table show of two classes was held with Mr. P. Sagron officiating, the results being as follows: Plants and Swedish—1, 2 and 3, Mr. N. Campbell; Barts—1, Mr. J. Hayes (Taco Barb); 2, Mr. N. Campbell (Digger Barb); 3, Mr. A. Smith (Cherry Barb).

At the December meeting of the Northampton and District A.S., the president, Mr. A. V. Ashford, explained the use and care of the aquarium which he recently presented for the use of members. Mr. J. Wright then conducted a Cross Cross Quiz.

Winners in the monthly table show (tropical plants) were: 1 and 2, R. Mernery; 3, B. Webb.

The judge for this year is Mr. L. Roy.

THE President's Cup of the Stamford and District A.S. has been won by Mr. F. V. Tock, with Mr. G. Purton second, Mr. A. Cobden was third and Mr. B. Walker fourth.

The Brough Trophy was won by Mrs. J. Tuck with Mr. E. Whitaker second and Mr. B. Harris third. Fourth was Mrs. B. Cobden, Mr. E. Taylor, of the Salt Vap (Manchester) Society was the judge at the "Furnished aquaria competition" evening recently.

THE monthly meeting of the Plymouth A.A. was held and as a result of the delay in the opening of The Athenaeum they were nowhere nearer solving the question of their future meeting place.

A talk was given by Mr. Cecil Teare on "The Flame Fish" and specimens were on show.

SECRETARY CHANGES

CHANGES of secretaries and addresses have been reported from the following societies: Erith and District A.S. (H. Randall, 118, Brook Street, Erith, Kent); Federation of British Aquatic Societies (K. Dombart, 21,

Viers Road, London, N.W.3); Hamstead A.S. (J. Wilson, 42/31, Nassington Road, Hamstead, London, N.W.3); Kingston and District A.S. (M. J. Lambert, 82, Knollwood, Tolworth, Surrey); Giffham and District A.S. (C. Walker, 6, Jersey Street, Holford, Giffham); Yeovil and District A.S. (H. Amos, 100, Larkhall Road, Yeovil).

NEW SOCIETIES

EFFORTS are being made by Rochester aquarists to form a Society in that town; Mr. G. Richards, 77, Bradbottle Green, Boreham, Rochester, would welcome any enquiries from those interested.

AN aquatic society has been formed at the Southton County Grammar School for boys, Surrey. Active support and encouragement have been received from the parents, but the project was started and is being run by the senior boys. There are only a few members at present, but it is confidently expected that the society will grow quickly. The secretary is C. E. Joyce, 24, Ellingham Road, Long Ditton, Sutton, Surrey, and news from similar societies at other schools would be appreciated.

The Lemon Tetra

by JAS. STOTT

WHILE on a visit to an aquarists' show 2 or 3 years ago I was attracted to a particular tank in the class for tropical furnished aquaria. It was a nicely designed set-up but it was the fish that won my interest, a shoal consisting of about eight or nine lemon tetras. Since then *Hyphessobrycon pulchripinnis* has been one of my favourite characins. The very delicacy of its colouring gives this tetra a quiet distinction, a feature which becomes even more obvious with shoaling.

The body colour is a pale golden-lemmon and the dorsal fin is faintly yellow with the front edge black. A distinct yellow line marks the leading edge of the anal fin and this is backed by a line of intense black, which runs along the free edge of the fin and gradually fading out to the rear of the fin. The upper part of the iris carries a flash of red and the gill plates are golden-yellow, looking almost as if they had been touched with gilt. Both sexes are alike in colour but the female becomes more round and deeper in the body when in breeding condition. They are about 1½ inches long when fully grown and possess a peaceful disposition.

Prevention of Egg-eating

These fish do not appear to appreciate too high a temperature and 72°F seems to be suitable, with an increase of 4 or 5 degrees when conditioning for breeding. There is no difficulty in getting the lemon tetra to breed; the trouble is to prevent egg-eating, a very bad habit with this tetra. Several methods may be used to overcome this in the breeding tank, of course, with varying degrees of success. The most successful way seems to be to use shallow water, say around 5 or 6 inches deep, to pack the rear half of the 24 in. by 12 in. by 12 in. tank densely with thickets of *Myriophyllum* or an artificial spawning recipient over a layer of fairly coarse gravel and to use one male to one female. When conditioned sufficiently the breeding pair should be placed into the prepared breeding tank in the evening and spawning will probably take place the following

morning. The pair should be removed immediately they have completed spawning.

They are brought into condition on *Daphnia* and white worms, and with general feeding variety is essential for tip-top results with this fish.

Diet for rearing

The fry should be ready for *Infusoria* feeding 36 hours after hatching, by which time the yolk sac will have been more or less absorbed, and from then on the rate of growth should be carefully observed and the youngsters given larger foods such as brine shrimps and micro worm as soon as possible; keep the *Infusoria* going for a few days after introducing these larger foods, so as to ensure that all the fry are properly weaned. White worms, dwarf at first, can quickly follow if a quick rate of growth is maintained through the pre-*Infusoria* stage and variety in foods is gradually introduced.

With a hatching successfully reared eight or nine good specimens selected from the brood and placed in a nicely set-up decorative tank as a small shoal will produce a sight which will gladden the heart of any discerning aquarist.

Crossword Solution

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

GRO-WEL

SUPERIOR

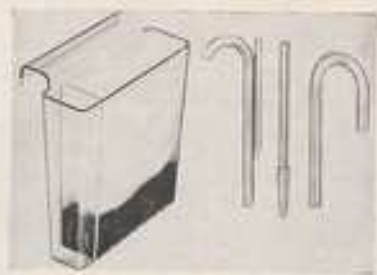
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- AT 2/6 Australian rainbows, Zebras, Spotted danio, Pearl danio, Widow, Platies, Angels, White clouds, Tiger barb, Blue gourami, Dwarf gourami, Flame Pristella, Nigger barb, Scissortail, Fasciata, Fishies, Bloodfin, Silver tip, Cherry barb, Bantustan, Kribi, Golden barb, Black nobby, Hyph. Goniist, Glowlight, Neon, Black line tetra, Leri.
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- AT 10/- Gyrinocheilus, Black angel, A. cyprinoides (adults), Phantom tern, (each) Looped catfish, Large cardinal tetra.

BLACK SWORDTAILS 10/- pair
(12 & Trio—extra female)

LEON PISTON PUMPS
Single Cylinder 14/19/6 Twin Cylinder 15/17/6
Duplex Compressor (Fish house model) 18/10/6

**PLEASE NOTE OUR NEW
HOURS OF BUSINESS**

PLEASE NOTE—All enquiries requiring a reply MUST be accompanied by S.A.E. Our premises are situated on the main Stratford-Birmingham road, 3 miles from Birmingham, Midland "Red" Bus No. 150 from Bull Ring, Birmingham, passes the door, night at "The Crown," Monkspath, BORDERS OF BUSINESS—Weekdays 10 a.m.—5 p.m. Sundays 10 a.m.—12.30 p.m. May—July Sunday afternoons also from 2 p.m.—5.30 p.m. CLOSED ALL DAY EVERY MONDAY

TERMS OF BUSINESS—Cash with order please. Fish sent by rail. Tropical minimum order £7, insulated container and carriage 10/- Cold water minimum order £2 plus 10/- van and carriage. Plants by post (minimum order 10/-) please add 1/6 post and packing.

Aquarium Plants

OVER 100 PLANTS ILLUSTRATED AND 220 PLANTS DESCRIBED IN OUR BOOK A MANUAL OF AQUARIUM PLANTS 7/6 POST PAID

Tropical (T) — Coldwater (C)	
Acorus intermedius (giant Japanese Rush)	18/-
Acorus gramineus (Japanese Rush) (T & C)	1/6 & 1/4
Acorus pusillus (dwarf Japanese Rush)	3/6
Apogonon undulatum (T)	2/6
Bacopa (dwarf Bacopa)	3d. each, 1/6 doz
Cabomba (T)	2/-
Cryptocoryna (For 20 species see plant list)	
Echinodorus (For 15 species see our list)	
Elochea Densa (T & C)	6d. each, 4/- doz.
Eleocharis acicularis (dwarf grass) (T & C)	2/-
Lagarosiphon Major (Elochea Crispus)	6d. each, 4/- doz.
Lagarosiphon ovata (Spear plant)	7/6 & 5/6
Limnophila sessiliflora (cassula) (T)	1/- each, 10/- doz.
Ludwigia arcuata (T & C) (mosaic)	9d. each, 6/- doz.
Ludwigia nodata (T & C)	9d. each, 6/- doz.
Myriophyllum elatiodes (T & C)	1/- each, 10/- doz.
Najas pumilus (Spatterdock) (T & C)	1/-
Najas sagittifolius (Cape Fan Spatterdock) (T)	10/-
Sagittaria natans (T & C)	9d. each, 6/- doz.
Sagittaria elatior (Giant Sag.) (T & C)	1/6
Sambucus parviflora (Water Rose) (T)	2/6
Sisyrinchium (Water Wiscaria) (T)	2/6
Vallisneria spiralis (T & C)	9d. each, 6/- doz.
Vallisneria spiralis (T & C)	9d. each, 9/- doz.

SHIRLEY SPECIAL PLANT PARCELS

TROPICAL OR COLDWATER
30 Plants in 14/10/6 ... 10/-
50 Plants including annual species ... 30/-
POST & PACKING 1/6

SPECIAL OFFER FOR JAN. & FEB. ONLY
ANUBIAS LANCEOLATA 25/- each

JANUARY ONLY
10 BEAUTIFUL STRONG CABOMBA 10/-

SPECIAL COLLECTION OF 4 DIFFERENT
ACORUS (JAPANESE RUSH)
GIANT, MEDIUM, DWARF, VARIEGATED. 15/-

CLEAN SPAWNING PLANTS
ELODEA DENSA ... 15/- 30, 25/- 100