

The AQUARIST AND PONDKEEPER

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Editorial

NEXT month's issue commences our twenty-fifth volume, and with it some important changes are to be made, so that we hope readers will excuse us for talking about ourselves in this column this month. *The Aquarist* was the first journal of its kind to be published in the English language, over 35 years ago, and is to-day the only journal for the fish-keeper in this country. We have been continuously heartened by the encouraging comments of our readers and advertisers through the years, and it is, we believe, because our policy has always been to keep as closely as possible to readers' requirements, as made known to us directly and through correspondence, that our circulation has shown a steady increase since the set-back which a few years ago affected all kinds of periodicals.

The sad thing is that the publishing and distribution of printed matter has become increasingly a more costly business in recent years. Few people will be unaware that increases in wages have taken place in the printing industry, since the most recent increase was preceded by an unfortunate dispute that resulted in the cessation of printing of periodicals for many weeks last year. However, increased wages do not represent the only heightened costs that have had to be met in the past eight years, during which period our selling price has remained fixed at one shilling and sixpence.

The situation is now such that for publication to continue on an economic basis and, what is more important from the readers' viewpoint, for us to be able to maintain our standards and to introduce new features, an increase in price of *The Aquarist* is unavoidable. This decision has been reached with regret, but there is a brighter side to this proposal. From next month *The Aquarist* will be priced two shillings a copy, and in next month's issue and at regular intervals from then on we shall be including features with photographs in full colour. This new venture, together with other features that we are planning, we hope will appeal to our present readers and will also attract new ones to your journal.

Chilling can be the Cause of Many Troubles

by R. E. MACDONALD

IT is essential for the budding aquarist to be in possession of some basic knowledge of the more common diseases that afflict fishes. There is no need to remind the experienced aquarist of the pitfalls and despairs of a disease-ridden community. Here are some of the more common complaints and diseases which nearly every aquarist meets with some time or other.

The ailments of fishes can be grouped generally in two classes: (a) temporary malaise; (b) disease.

A "temporary malaise" is an illness generally brought on by abnormal changes and irregularities in the fish's environment.

One such illness is a chill, which can be produced by a sudden fall in the temperature of the water. The symptoms of a chill generally show as "shimmies," which is a condition easily recognised. The fish will stay at one spot in the water and agitate its fins as though it is trying to swim against a strong current.

The condition of a fish with a chill need not give cause for anxiety. With extra warmth and a good diet there is every reason to expect the symptoms to disappear after a few days.

It should be remembered, however, that the term "shimmies" is a word describing the visible effect that some complaints produce. It does not describe any particular disease but is more a state of shock. Shimmies, for example, can be brought on by moving a pregnant female livebearer to another tank at a time when she is about to deliver her young. This is particularly the case if the livebearer happens to be a gravid female mollie (genus *Mollienista*). The shock of being caught in a net and transferred to another body of water will show first as shimmies. In most cases a premature birth will follow. Sometimes the pregnant female will die before giving birth to her young. Another "temporary malaise" is indigestion and its allied trouble, constipation. Apart from possibly showing shimmies the fish will show a complete lack of interest in food and will have, in most cases, a swollen abdomen. Although the cause of indigestion and constipation could be a chill, the more common fault lies in the nature of the food the fish consumes, or perhaps quite simply, it could be due to over-eating.

Mollies are particularly prone to this complaint owing to the elongated nature of the gut, which is designed for the digestion of soft vegetable food. If animal food is presented it should always be chopped small, mashed or be given in the form of finely sifted live *Daphnia*.

It should also be remembered that starchy foods swell up after contact with water and can cause distension and air-bladder troubles, in which case the illness may become progressively worse and the fish eventually die if the diet is not corrected.

With indigestion and constipation, as well as correcting the nature of the food the best remedy is to add a teaspoonful of Epsom salts to each gallon of water in the tank and raise the temperature of the water by about 5 to 10 degrees and then keep it steady until the sufferer is in good health again.

"Disease" in a fish is by far a more serious worry for the aquarist. The organisms that cause disease are only too prevalent and ready to invade damaged tissues, etc.

The foremost ailment to come under this heading is white spot (ichthyophthiriasis). White spot is nearly always

caused by the effects of a chill, which, as it also does with humans, lowers the fish's resistance to white spot parasites that may be present. It can also be introduced into the tank by infested new stock.

There are various ways of destroying the protozoan parasites which attack the weakened fish and cause tiny white spots to appear on its sides and fins, but there is no doubt that an increase in temperature is most essential for the victim. The temperature should be raised to about 85° F., at the rate of 4 degrees an hour. When the white spots on the body and fins have vanished the temperature should be lowered to 75° F. at the rate of 5 degrees a day.

Adding chemicals to the water helps a great deal in promoting the clearance of white spot. Five drops of a 2½ per cent. solution of mercurochrome to every gallon of water can be used effectively or the use of a 5 per cent. solution of methylene blue, which is added drop by drop until the water shows a slight discoloration and a bluish tinge begins to show up on the sand. Remove the fish when it has regained good health, and thoroughly disinfect the tank with potassium permanganate.

Bruising or mauling by another fish can bring the terrors of fungus (*Saprolegnia*) into reality, when the mucous covering of the fish is broken and is unable to protect its body from the fungus in the surrounding water. The symptoms appear as a grey-white "cotton wool" substance accumulating on the fish's sides or hanging from the body. The disease will spread rapidly, enveloping the body and fins.

Cleanliness is most important in fighting this disease. All waste food should be siphoned off and the temperature of the water raised as for the treatment of white spot.

The most effective treatment for the fish is to dab the affected spot with a mild solution of iodine and water, taking great care not to injure the delicate membranes of the gill by careless swabbing with the chemicals.

Fin and tail rot is also a form of this disease and can be treated in the same way as fungus, although fin and tail rot is chiefly attributable to chill or under-nourishment.

By far the most appalling disease is dropsy and so little is known about this affliction that there is little to suggest as a remedy. The body tissues of the fish fill with water and as the disease progresses the scales lose all their colour and lustre and the bloated tissues swell, causing the scales to stand out at right angles to the body.

Drawing off the fluid from a dropsical fish with a hypodermic syringe will help to check the declining condition of the fish but it does not bring about a permanent cure; quite often the victim will linger for weeks before it dies. Dried food will undoubtedly accelerate the progress of the disease and while live food seems to rally the fish it only has the effect of keeping the fish alive for a longer period.

Once the fish is in an advanced state of dropsy the best thing to do is to kill the sufferer.

In a clean, well-illuminated tank disease is rare. Dirty living conditions create the spawning ground for millions of deadly parasites. Organic waste with little or no light produces a large population of bacteria and poisonous substances, i.e., a state of pollution.

Above all, ensure a steady temperature, as a chill brought on by a sudden drop in the temperature of the water lowers the fish's resistance to disease and opens the gateway for disaster.

Founding a Strain of Shubunkins

by JOHNSON H. HOOD

THE shubunkin is a great favourite with coldwater aquarists, and rightly so. It is a hardy variety of goldfish; alert, long-lived and at its best a very beautiful fish rivaling the most exotic of tropical fishes. Unfortunately it is not easy to produce really outstanding specimens with the regularity one desires, as any breeder will readily testify. Judging by my correspondence I would say there is a definite upsurge of interest in the shubunkin (after it has been almost decimated by the existence of no less than three show standards!), and it is my desire to assist and foster this interest with some practical advice on the breeding of the shubunkin drawn from my experiences.

It often happens that the enthusiast visits a show and sees an outstanding specimen. He is enthralled by the grace and beauty of the shubunkin and is fired with the ambition to breed fish like that specimen. The next step, of course, is to acquire some stock. He can either buy a breeding pair or buy young stock to grow on, and from which he would select his breeders. Very often our shubunkin enthusiast experiences the first of his disappointments—the fish are nothing like as good as the specimen which caught his imagination. Naturally not; that outstanding specimen is almost certain to be the result of years of patience, careful thought and hard work. However, there is no need for despair; if the fish obtained came from a breeder with good stock the newly purchased fish will have the same "blood" and same potential, and it is almost a certainty that these fish will produce a proportion of youngsters superior to their parents.

When mating shubunkins the breeder must take into consideration several factors, such as body shape, finnage, colour and pedigree, but as show standards differ on body shape and finnage, I will deal only with colour and pedigree. Often the beginner fondly imagines that if he mates two richly mottled fish together he will produce many fine fish at one stroke. It is possible he might produce a few good specimens but my experience has been that if this plan is continued the fry from such a mating policy will progressively become darker and darker through succeeding generations. Again some breeders use parents showing as much blue as possible. This also is a mistake as blue is a form of black lying deep in the tissue of the fish. The resultant fry are usually very dark or very pale in colour.

Results of Experiments

After experimenting for many years to increase the proportion of good youngsters per spawning, I have come to the conclusion that red is the most important factor. At one time I always followed the practice of insisting on blue being visible in both parents but the proportion of good fish per spawning never increased from year to year; indeed, the fry rarely had the brightness of the parents. Several years ago I mated a bright-red, black-spotted male, displaying no blue, but of known parentage with a heavily mottled blue female. To my surprise a high percentage of the fry were very good and, not only that, the proportion of blue youngsters increased. Later, I mated two red, black-spotted fish, without visible blue, but of known pedigree, and produced as good a proportion of youngsters displaying blue as from a blue × blue cross, but with a brilliance delightfully pleasing. Greatly interested in this result I followed up the experiments by crossing this red type with a metallic fish (uncoloured bronze) and also with



Photo 1

W. J. Howes

At its best the vivid colouring of the shubunkin can rival that of exotic fishes

a matt (a pink uncoloured fish) with excellent results.

However, I must stress one point. The fish I used in these spawnings had excellent pedigrees extending over many generations. Since then I have outcrossed to good-type females with the deliberate intention of producing red fish. After choosing about eight of the most brilliant-red fish the rest of the spawnings were destroyed. Later these "half-breed" fish were crossed with "full-blood" partners and again excellent results were achieved. It will be noticed that when "half-breed" fish were used I made sure that the resultant fry were of only 25 per cent. diluted "blood." I regard that as being very important. There is little doubt that the strain was revitalised by the introduction of new "blood," and this was proved by later spawnings between brothers and sisters producing large, quick-growing youngsters of amazing vitality with an excellent percentage of richly coloured fish.

Points to Observe

In conclusion I think the following points are worth stressing and will assist in the founding of a good strain of shubunkins.

1. Do not make haphazard spawnings between fish of different "blood".
2. Always work to a plan and keep careful records.
3. Do not, as a policy, mate fish together that are predominantly blue.
4. Make sure that one parent, preferably the male, is rich in red.
5. Mating red to blue is a good plan.
6. Mating a coloured fish with a metallic or a matt can produce excellent results, but it is wise to know the pedigree of such fish beforehand.
7. If your fry take a long time to colour you need an injection of new "blood"—preferably from a strain of red!
8. Do not expect to achieve your "ideal" in one season.
9. If your slim-bodied shubunkins produce even a few twin-tailed fish they are too closely inbred.

Ctenobrycon spilurus

by C. WRIGHT

THIS hardy and distinguished-looking fish is very rarely seen these days, why, I do not know, unless it is because they lack the brilliant colour of the more showy members of the aquarium world, but in 1938 they were a very popular fish, and in that year I was successful in breeding a pair of my own.

It was during a sort-out of old note books that had accumulated in my fish house that I came across details of the breeding of a number of tetras including the above, which is also known as the silver or knife tetra, or as plain spilurus.

Ctenobrycon spilurus is a South American characin found in the inland waters of Guiana and Venezuela. A general breeding size is about 2½ to 3 inches, although I have seen a pair that must have been at least 5 inches in length.

The body is flat from side to side, and very deep, so that if viewed head on it is nearly invisible; it is from this view I should think that the name knife tetra was given. At breeding size it is almost the shape of a diamond though not as deep as the *Metynnis* species.

The fine scales on the body of this fish give it a silvery mirror-like effect, with a lateral line that has a distinct greenish tint. In good bright light the whole body gives an indication of a reflection of light blue; this tends to emphasise the black spot at the base of the tail and the less-intense mark on the shoulder.

These hardy fish will thrive in almost any tropical aquarium and will feed on any of the normal foods, alive or dried, but even with plenty of food I found that they were persistent nibblers at the plants, especially *Vallisneria*. I found them good mixers in a community tank until they became of a size for breeding; even then they were all right with fishes of their own size, but were inclined to bully the smaller fishes.

Their temperature range is much more varied than is generally thought. I see from my notes that owing to heater failure whilst I was working away from home the aquarium temperature did not rise above 68°F during the day, which must have given them a temperature of between 54° and 58° during the night, and that must have lasted over a month, but they were none the worse for it because 3 weeks later they were spawning.

Although I have mentioned that they are happy in any tropical aquarium, to see them at their best a crystal-clear aquarium with plenty of strong plant life and a really good light coming from the top front is essential.

There are, to my knowledge, two certain ways of sexing these fish. The first and most reliable method is that when in condition for breeding the female has a reddish tinge on the anal fin; this is never seen in the male. The second method is the fuller outline of the female when viewed from head on. There is a third method, which I have found unreliable: the hard rays of the anal fin have small projecting hooks on the extremities and these tend to stick to the net when the male fish is netted. I have played for hours with several known males in an endeavour to prove this; it does happen sometimes. If selling them when young, I take the coward's way and say they are unsexable; in this way I never disappointed a customer, although I did try to catch what they wanted.

My first attempt at spawning them was not a success.

I used an 18 in. by 12 in. by 12 in. aquarium, my idea being that feeding would be easier and it would be better for removing the parents after the spawning was completed. It seemed ideal, but I prefer to draw a veil over that unhappy episode, which left me with three babies.

Having learnt a lot from my failure my next attempt was with a 36 in. by 15 in. by 12 in. aquarium. The centre 12 in. was very thickly planted with *Myriophyllum* and *Ambulia*, leaving the two ends clear. I arranged the lights in the reflector so that the maximum light was given to the two clear ends and reflected from the top front. With this arrangement I really did see the beauty of these fish.

Tap water was used to fill the tank to a depth of about 11 in.; this I thought would allow for a lot of Infusoria to be added, and as events proved, I needed it.

This set-up was left at a steady temperature of 80°F for 3 days, the reason being that I wanted the weekend to observe what happened. The parents were given their new quarters about 7 o'clock one Saturday morning, and, on arriving home at about 2 o'clock in the afternoon, I was amazed to see that they were spawning. Like other characins they are chasers, the male pursuing the female vigorously in and out of the plants, and my arrangements gave me a clear view of what was happening. Periodically they stopped in the plants and began a circling movement, which ended with their bodies touching and the female extruding her eggs. These were immediately fertilised by the male. The eggs were left sticking to the plants, where they remained until they hatched, or rather started hatching, about 9 o'clock on the Sunday evening, about 32 hours after spawning. They continued to hang to the plants for about 2 days, when they started looking around for food, their own yolk sac by this time having been absorbed.

They must have started spawning between 12 and 1 o'clock because I saw the actual egg-laying only three times, when they decided to call it a day and each retired to the further ends of the tank. This I was prepared for, having cut a piece of glass to slip in as a division. Now I found the benefit of central planting, because when the partition was in, there was no difficulty in catching one parent at a time without even touching the plants.

I started to drip-feed with a very rich Infusoria culture the day after the eggs started hatching, but I found that they were ravenous eaters and it took me all my time to keep the Infusoria going, and very soon I found my tank full of water which I could not siphon out because of the fry. I finally overcame this by putting a diffuser stone on the end of some ½ inch rubber tubing and siphoning through the stone, but it was a very slow process. Nevertheless, after the first day I was able to adjust outflow to coincide with the inflow of Infusoria.

Once a day after the first 3 days I added a small quantity of crushed yolk of egg squeezed through a very fine piece of linen. Although this is a very good food for young fry there always is a danger of over feeding, which can soon result in a bad tank, so I used this method only sparingly.

When they were about 3 weeks old I was very fortunate to find some very fine *Daphnia*; these were fed to the fry through a very fine mesh tea strainer, the larger of the *Daphnia* being fed to young livebearers.

How many eggs were laid or hatched I cannot say, but I was fortunate enough to rear 158 to varying sizes between ½ and 1 inch, when I was forced to dispose of them to a wholesaler through lack of sufficient tanks. They had by then been spread into five tanks and were growing rapidly.

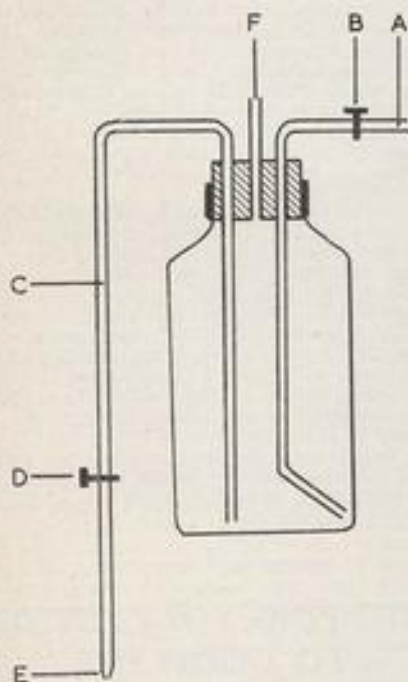
From my observations I do not think that the parents are avid egg eaters; they seemed to ignore them whilst they were in the breeding tank.

There is little more I can say except that I think they were the easiest of the egg-laying fishes that I have ever spawned. Whether I was lucky or if other breeders have found them as easy, I do not know.

A Method of Drip-Feeding Micro Worms to Fry in Aquaria

by Dr. M. PUGH THOMAS

IF young fish are to be reared successfully in aquaria it is essential that they be given an abundant supply of food at all stages in their development. Protozoa can be supplied by a conventional drip-feed in the early stages of development and small *Daphnia* or *Artemia* larvae can easily be given towards the end of the fry stage. Formerly, it was difficult to provide a continuous supply of food in the intermediate stage. The apparatus described below allows micro worms to be fed to the fry continuously on the drip-feed principle.



The diagram shows that the apparatus is basically a jar of about a half-pint capacity. This is connected to the compressed-air supply by tube A, and the flow of air is controlled by clamp B. The tube reaches to about a quarter of an inch from the bottom and side of the jar. Tube C is a siphon leading from near the bottom of the jar to a nozzle E, above the rearing tank. The flow of water through the siphon is controlled by clamp D.

In operation the jar is filled to the neck with water. The micro worms are removed from the culture in the normal way and washed off the brush into the water in the jar until it becomes slightly cloudy with worms. The cork is placed in position and the air is turned on. The flow of air is adjusted to allow a flow of bubbles through the water sufficient to keep the worms in suspension. The air escapes by way of tube F. To start the siphon, tube F is blocked with a finger and water is forced by air pressure

into the siphon. When the water is flowing the finger is removed from E and the tap on the siphon is adjusted to give a steady run of drops.

A half-pint jar normally lasts for from 6 to 8 hours and with experience the number of worms put into the water can be adjusted so as to provide adequate food for the fry without fouling the bottom of the tank.

This apparatus can be used to drip-feed some of the finer proprietary foods to small fry. However, the small particles of food tend to block the tap on the siphon and the flow of food is not reliable. It is, however, a useful standby should the Protozoa cultures, normally used at this stage, fail.

With the apparatus described above it is possible to provide fry with an adequate supply of food throughout their development. Measurements have shown that a marked increase in growth rate can be obtained by this method of feeding.

FEEDING RING

MANY aquarists consider that a feeding ring is unnecessary in a furnished tank, but it is a must when any artificial food is used. Dried food dropped into a tank immediately spreads all over the surface of the water and from then on, unless it is eaten at once, pieces of food may drop to the bottom of the tank in inaccessible places. This food then remains on the bottom to start decaying and mildew will soon form on it, when it becomes uneatable and tends to turn the water sour. On the other hand, if a feeding ring is used and kept close to the front centre of the tank, any food which falls will remain where it is always apparent to the aquarist, who can see at once if too much food has been given or if it is not cleared up in a given time. The ring can be of glass or plastic, round or square, but whatever the shape it will do a grand job in helping to avoid pollution of the water.

DO YOU KNOW THE NAMES?



In the squares above the vowels have been filled in. Fill in the consonants from the jumbled list to make the names of seven plant families. If this is done correctly, one of the vertical columns will give the name of a plant family that includes a number of well-known aquarium plants.

B C C C C C C C C C D D F G G H L L
L L N N N P P P R R R R R R R S T T T

(Solution on page 202)

G. F. H.

Frightful Fish Which Grunt



Scorpion fish

THE amateur marine aquarist depends very much upon the inshore fishes for stocking his tanks, and particularly upon those species, frequenting rock pools, which are easily obtained at the seaside. If, however, he can accompany somebody working a shrimp-trawl or a prawn net, even one dragged by hand along the gullies between the rocks, he may find many an interesting specimen.

But what frightful faces some of them have! The scorpion fish are most terrifying captures to handle for the first time. Both short-spined and long-spined kinds are easily obtained in a shrimp net, and the "father lasher," as the former is sometimes called, may emit a grunting sound when taken out. Most of the specimens in our rock pools are about 6 inches long, which is very much less than the specimens caught in waters further north. They are best obtained in spring or early summer, having come in winter into the pools to spawn amongst the brown seaweed or in holes amongst the rocks. You may be lucky enough to find their spongy little sticky lumps of pinky-yellow eggs in March; but there is so much else to find there that they might not easily be identified, especially as they look like herring spawn.

Feeding upon small shrimps, the scorpion fishes are shore hunters, and their mixtures of brown-and-yellow patterns help to hide them from view amongst the rocks and sandbanks. Like the ferocious little bullhead or miller's thumb of our freshwater streams, to which they are closely related, the scorpion fish are able to enhance their colours under certain conditions, and become more highly coloured in brighter surroundings. As with the river fish, the male scorpion fish guards the lump of eggs, ready to charge and drive off any intruding fish, or perhaps even the paddler's feet wading nearby. For this purpose its broadly depressed head and spiny forepart of the body is admirably suited, although it qualifies for the distinction of being about the ugliest of British fishes. The pectoral or breast fins are also large and powerful, enabling it to twist and turn rapidly amongst the rocks, and they act as very efficient brakes when the thrust of its tail has sent it too far forwards. Otherwise these are not very active swimmers; they do not cruise endlessly around the tank or pool. They would seem out of place in a tank without some rocks to lie amongst.

The home of the scorpion fish or marine bullheads is the

Scorpion Fish in the Marine Aquaria

by ERIC HARDY

Arctic Ocean, where they are large and numerous. Only two or three kinds inhabit the sea-weed beds around our British coasts, and these are much smaller. I suppose they are harmless, despite their large, spiny, horned heads more befitting some horned toads than fish. As might be expected, the males are rather smaller than the females, but they are much scarcer to come by, and like the male miller's thumbs, are the more highly coloured. But they do not make any attempts at nest building as does the river *Cottus*, and the ripe female will accept almost any sheltered spot to spawn, with the male in attendance. The eggs, which stick to the rock or weed, usually take about 6 weeks to hatch, and the newly hatched larval fish is already provided with the very large beginnings of its breast fins, and what are to become its rather large and sinister-looking eyes.

I have found the short-spined bullhead (*Cottus scorpius*) fairly common in the Dee estuary at the seaward end of Hilbre Island, and off the sandy Lancashire coast; but in the deeper channels a little out to sea it becomes much commoner, though I have not had many more than 4 to 6 inches in length. They have been caught 10 inches long here. The long-spined bullhead, with more lance-like spines on the sides of its neck, is less common here, certainly less numerous than off the Devon coast.

Unfortunately fishermen often confuse the scorpion fish with the venomous lesser weever, although the latter's black dorsal fin is a quick means of distinction. They call it "sting fish," though the sea scorpion is not poisonous. But it is a difficult customer to handle, and wounds inflicted by the sharp spines around its head and gill-plates can become septic in dirty water.

PUTTING POLYTHENE TO GOOD USE

WITH the current craze for polythene in full swing these two tips may be of use to some readers.

(1) When a tank starts leaking, drain it, dry it and put a double layer of polythene round the inside, with the use of an adhesive. When it is dry, refill. Unless this is done carefully the polythene will crease, and at a distance it will appear that the glass has become frosted and will look very untidy.

(2) If the aquarist is destitute but urgently requires an aquarium top, polythene may be stretched across a wooden frame and placed over the upper frame. This is better than glass or angle iron in that it is cheap, lets in light and is unbreakable. Should more light be required, there is no limit to the number of methods the ingenious aquarist may use to suspend a light bulb over the tank.

ANTHONY LYMAN DIXON

THE AQUARIST

AQUARIST'S Notebook



by

RAYMOND YATES

WITH the December, 1959 issue the admirable little magazine issued by the Portsmouth Aquarist Society for the last 6 years has closed down. The fault is the well-known one of lack of material. Aquarists as a whole seem incapable of writing up their experiences, experiments and discoveries for the benefit of other hobbyists. The people who write for aquarists are aquarists, but almost all magazines issued by clubs in Britain seem to have folded up because of this losing battle in obtaining "copy" from their members and friends. The Portsmouth magazine has been first class and in the forefront of those published by societies in Britain, and its demise is a loss to the hobby for it circulated not only in this country but in almost all the countries of the world where fish-keeping flourishes.

The editor, in a farewell review, mentions his efforts on a world-wide scale to interest hobbyists generally and to get letters or articles on aquarium matters from other clubs and enthusiasts scattered around the globe. He wrote some 40 letters or thereabouts to addresses which originally appeared in *The Aquarium Journal*, with very little success. He did succeed in contacting some clubs who published their own magazines, but, unfortunately, many of these have since faded out, as for example, "The Indian Aquarist", "The South African Aquarist", "Singapore Aquarist" and the Australasian "Aqualife". In addition he reports sending over a dozen letters to various parts of the Commonwealth on behalf of the British Aquarists Study Society, but the net result of all these efforts was precisely nil. The editor (Mr. Jack Errington) will now be able to take a well-earned rest after his hard efforts over such a considerable period. Portsmouth club are naturally anxious to keep in touch with their existing distant contacts, and any fresh ones who care to write, and correspondence in future should be sent to Mr. A. Hancock, hon. secretary, Portsmouth Aquarist Society, Twyford Avenue Community Centre, Portsmouth, Hants.

This last issue of the magazine contains something which is rarely met with in club literature, a balance sheet for the annual fish show. This particular society has put on some very large and lavish shows in the past and I think their details will make interesting reading for other club members interested in shows. Under the heading of expenses in approximate (round) figures are: insurance, £3; judges' fees and entertainment, £4 5s.; publicity, £8; draw prizes, £5 10s.; show prizes, £3 10s.; transport, £2 10s.; sundries, £3 10s.; draw tickets, £2; tank repairs, £11; show secretary's expenses, £2; tips, £2; stationery, £2 10s.; vivarium stand, £3; refreshments, £2. Total expenditure came to nearly £55. Income showed: admission, £18; raffle, £6 10s.; programmes, £2; entry fees, £10; sundries, 10s.; refreshments, £1; trade stand, £2 10s.; ice cream, £3. Total income approximated £44, showing an overall loss of almost £11. Some of these items make very interesting reading, particularly that for publicity, all too often overlooked by show secretaries.

Red-eyed red swordtails are grand fish but not easy breeders. I had great success with them years ago and have recently tried again. For the present I am unlucky. Two of my females were just ready and I gave them the necessary quiet quarters. Two days later I counted 80 young, but of these 60 were born dead. This is not unusual with such a touchy fish. The remainder came on like a house on fire for 10 days and then, without warning,

I found them all dead. Why? I don't know. No obvious reason. They were well fed, well cared for, conditions were excellent but all died. Females seem very long in the carrying stage and it is very hard to tell just when they are ready to throw unless you have had a lot of experience with them. Once over the initial stages I find red-eyed reds very tough fish which live long in the aquarium and retain their colour and condition longer than the more-common varieties of swordtail. There is nothing for it but to try again in due course; fortunately I still have three females and a male.

If we swim in a large river we can rarely see more than a few inches in front of our eyes, but fishes swim about, hunt food, locate their homes under the bank, shoal and keep formation and always manage to find their way about without ever bumping into anything. Some fishes hunt at night, in inky blackness and yet prove most successful. How do they do it? This is a point dealt with at some length by Hans Haas in his fascinating book *We come from the Sea* (Jarrolds). He suggests that the lateral line may have something to do with this ability to sense in a way we cannot sense. We depend mostly upon our eyes but a dog uses its nose to "see" with in a way we cannot really comprehend. The suggestion is put forward that fishes feel vibrations and can distinguish between different vibrations, the normal and the unusual, as we, in a concert hall listening to the music, would instantly hear the noise of a creaking door.

The author makes the point that fishes and sharks, when they notice a man under water, always place themselves sideways on to him. This is presumably to so place their bodies that sensitive areas would best receive the vibrations through the water from the unusual creature they had seen. This leads to the conclusion that the bigger the fish the better its range of perception. Certainly sharks appear like lightning on the scene where a fish is injured, too quickly for this to be due to the smell of blood. Dr. Haas mentions that many noises under water produce no effect whatever on fishes and that shouting at sharks is not a foolproof method of scaring them off, although frequently it has this effect. However, touching fishes really upsets them and this can be tried in your own aquarium. In the normal way fishes touch nothing accidentally and often show signs of distress when, without warning, another fish touches them, as for example the panic shown by angels when pestered by tiger barbs or mollies.

In 40-odd years of fish-keeping I have had many tanks in many places but I have never had a fish house. I cannot possibly count how many excellent fish houses I have been in but however impressed I have been with those visited (and most are really wonderful) I have never bothered to go to the trouble of making or having one made for myself. Certainly I am too old in the hobby to bother now. So it will be seen that I am a dyed-in-the-wool supporter of having tanks in any convenient (or sometimes inconvenient) spot in the house or outside. I have never had a cellar but otherwise I have had tanks in the hall, the

landing, the kitchen, the dining room, lounge, the greenhouse, the shed, all the bedrooms, the garden and even built up on brick supports in a back yard long ago. I have never managed a tank in a bathroom but fishes have been kept in the bath so often (in emergencies) that I feel this qualifies also. In addition I have had several ponds and also kept many aquaria in schools and colleges.

Keeping fishes in the house is a matter for thought. Often the electrical lay-out affects what can and what cannot be done in this line. I hate to visit a house where one sees tangles of wire and adaptors fitted without restraint, and I wonder how they avoid accidents. I got over this difficulty by having small wall switchboards fitted, which take about five or six points, and these permit all the aquarium requirements plus table or reading lamps, electric clocks, irons etc., without risk of overloading, as the switch-board is attached to the power supply.

Of course, if one has fishes one wants to see them, so the popular place must be the room in which one lives. This has the advantage of being usually warm and the aquarist can watch his fishes in comfort. As he is constantly in the room anything wrong is quickly observed. However, a room in frequent use is not much use for breeding purposes and such tanks are best relegated to rooms such as bedrooms or outside in sheds where there will be little disturbance and where the relative bareness of a tank will not clash with the surroundings. Tanks do need attention and water has to be carried in and out. For this reason large tanks are best in main living rooms as they need less attention in proportion and can be very attractive. Tanks upstairs are best small, because the weight of the water is a serious consideration. I have heard some distressing stories of accidents upstairs but never had any myself except once when a small bore pipeline ran-back and emptied about 10 gallons from a tank. The water ran down the walls of the rooms below in streams like the Amazon delta, but everything dried up without a mark showing, perhaps I was lucky. It is no accident that many dealers have their premises (for aquaria) in the basement. A tank in the hall is liable to wide changes of temperature, draughts from the door and usually gets very modified daylight. In addition it is rarely possible to view the fishes sitting down, and this is a must for real comfort. In cold rooms in winter there is considerable condensation from the tank and this can be a problem—I would not advise a tank being kept in a room with a piano unless the room is lived in every day throughout the winter and therefore is kept warm.

Aquaria in greenhouses tend to get too hot in summer, suffer from too much light and are generally unsatisfactory; in sheds the trouble is the inadequate daylight lighting and, in winter, the exterior cold. In kitchens tanks are unsatisfactory, being in the way and tending to get a light coating of grease from cooking, or unpleasant fumes. True, your fishes live and even thrive in any room, but you don't. Carrying water upstairs can be a back-breaking job, few bathrooms being designed to provide water easily for the type of container hobbyists use for filling purposes. Fishes in bedrooms have their points, and I have thoroughly enjoyed lying in bed watching a well set-up tank and often used to leave the tank lights on all night, which provides a delightful restful atmosphere. But there are disadvantages. However silent fishes may be normally, in complete darkness they really go to town for noise, and I was often awakened by the noise of splashing and jumping against the cover. And it must be remembered that aquarists like to show off their fishes, and it is not always convenient to take visitors into bedrooms.

According to "Science Service" Siamese fighters will not fight when under the influence of tranquillising drugs

such as reserpine and meprobamate. Not only will they not fight but they even retreat, usually backwards. With another tranquilliser, chlorpromazine, the fighters are quiet, refuse to fight and do not even swim about unless attacked by another fish, when they swim away. Antihistaminic drugs make the fish turn pale and, in attempting to escape from other fish, they almost jump out of the tank. Barbiturate sleeping drugs depress the fish but they will fight when goaded. Under the influence of morphine and aspirin they become very aggressive and fight. These studies with fighters were reported by Drs. E. J. Walaszek and L. G. Abood of Illinois College of Medicine, Chicago. A tranquilliser was probably needed some time ago by a dealer in Denver, Colorado. He had just installed a piranha in a new tank when the glass broke and out came the £25 fish and about 30 gallons of water. He grabbed the fish in his anxiety and was bitten on the finger. Unlike the story of the mad dog, the man recovered from the bite and so too did the piranha.

The hobby in the United States is on a very firm footing and is well established in the major centres of population. How aquarists go on in the more remote areas I cannot imagine; no doubt fishkeeping is impossible in some regions. In the south and California, of course, there are many fish farms which meet the needs of most of the market but there is a limited import of foreign fishes which amounts to around £80,000 annually. As this figure includes goldfish the amount spent on tropicals is not large. It would be interesting to know what Britain spends on fish imports; is there any readily obtainable information available on this subject, does any reader know? Tropical fishes are about the only jungle pets which can be kept with a fair degree of life expectancy as most give little trouble to the experienced aquarist. The four-footed jungle pets, however, are less easily acclimatised (for obvious reasons), and in U.S.A. less than 40 per cent. of those sold last year.

In Britain nowhere is more than 80 miles from the sea and yet the marine hobby is in its infancy here. I heard recently of a dealer in Nairobi, Kenya who had had the sea water for his marine stock brought up from Mombassa on the Indian Ocean, a distance of 300 miles. It only proves that where there's a will there's a way.

In the region of 40 million goldfish are marketed every year by the Koriyama Goldfish Co-operative Union in Japan. The crop is worth roughly three-quarters of a million pounds and is farmed in the worn-out rice paddies and back gardens of a small village. One-eighth of the crop (about five million goldfish) is marketed in the U.S.A., the remaining 35 million fishes in Japan. With a population of about 100 million people this single firm appears to cater for much of the aquatic needs of hobbyists. The Co-operative consists of some 120 men who themselves own and manage the breeding and rearing ponds aided by the additional help of some 400 farmers from the district. Talking of population reminds me that the United Nations state that there are 2,700 human births in the world an hour I wonder what the rate is for guppies?

Hail, oh hail, little electric eel,
Don't you think you're a bit of a heel?
We don't seem to care, for your electric stare.
Your appearance I'm not knocking,
Though your manner is a little shocking.
"FIN FUN"

Breeding the Golden Panchax

(*Panchax playfairii*)

by E. WALLWORK



Panchax playfairii

IN its smaller sizes this is a satisfactory member of a large tank, but to see it in its adult size is to see the full beauty of its colours. Fully grown it is about 3 in. long, and at that size it is liable to attack smaller fishes with one rapid strike, as this fish will stand still for long periods at one end of the tank and then swim rapidly to the opposite end to swallow whole some unsuspecting male guppy or small fish.

The male is easily distinguished from the female by the fact that his general overall colour is yellowish with orange-red fins, and there are five rows of regular red dots running the length of his body and similar ones on his dorsal and anal fins. By contrast the female is only pale yellow-orange, with almost colourless fins, and these fins are not so large as those of the male and are without the red dots. The base of the dorsal fin is much smaller and carries a small black spot, and in some, this dark pigmentation is diffused all over the body, so that its general colour resembles that of a female guppy. In the male in particular the scales all over the body stand out, giving the appearance of a rasp. This is present in the female also to a lesser degree.

As purchased, my fish were about 1 inch long and were kept at 75°F in a community tank until they were 1½ in. long. They were one male and two females, and they seemed to eat anything that was offered but preferred the food to be at or near the surface and never went to the bottom of the tank to feed.

Foods given consisted mainly of white worms, *Daphnia*, *Tubifex*, dried food and, as I soon found out, my best male guppies. It really surprised me to see just how wide the male could open his mouth. Growth was rapid and the sexes were separated when it became apparent that the females were full of spawn.

The breeding tank was 24 in. by 6 in. by 6 in. and water from the community tank was used and maintained at approximately 80°F. No rooted plants were present in this tank, but a 3 in.-deep layer of bladderwort and *Riccia* floated at the surface, and, of course, all snails were excluded.

On introducing the three fish, they assumed a position below the plants and remained still for quite a long period, the male at one end of the tank, two females at the other, and there they remained for that evening. The following day the male was seen to move rapidly from his position and drive one of the females deeply into the plant masses, assuming an oblique position for a few minutes, repeating the operation from time to time with each of the females.

The eggs were seen the next day to be in groups of two or three and scattered all over the tank, close to the surface and adhering to the plants. Each was about 1 millimetre in diameter, faintly yellow, opaque and with light mottlings. Most of them were removed with a spoon and placed in a shallow dish containing water from the tank, which was then floated in the main tank and other eggs were added to it daily.

Incubation was spread over the next 12 days, and those fry in the dish were seen to have bright-golden eyes and pale-yellow bodies, 3-4 millimetres long. Others had hatched out in the main tank and when they were fed with micro worms they attempted to follow its progress towards

the bottom of the tank with fatal results. The male parent struck very quickly, with his mouth wide open, only those that remained near the surface being left alone. At this point, the parents were returned to the community tank and the batch in the shallow dish was returned to the breeding tank, where they continued to grow on a diet of micro worms, brine shrimps, *Daphnia*, shredded earthworm and dried food. *Tubifex* and white worms had a tendency to fall down in the water to the bottom, and they were reluctant to go down for these, so these foods were not given in the early stages.

Most surprising of all was the different rates of growth of the various members of the batch; so much so, that at 1 month old some were twice as large as others and the numbers had dropped from about 100 to 70. Though I never actually saw the larger ones eating their smaller brothers, which is what they are reported to do, I can vouch for the fact that only the larger ones reached maturity, and a batch of 50 remained. These were, no doubt, from the first of the eggs laid.

Kept with large fishes this is a very colourful and attractive fish, and, because it stands still for such long periods, is usually on show for visitors and looks its best in a well-planted tank. If a pair of these fish is kept in a shallow tank with a deep layer of bladderwort or *Riccia*, young fry can usually be collected from the surface and raised in another tank after the first 2 weeks. As previously indicated, feeding is best carried out in the upper half of the tank, which means that over feeding can soon contaminate the tank. My preference is therefore to use *Daphnia*, good dried food and white worms and *Tubifex*, on condition that the worms are eaten as they fall through the water. Rooted plants can, of course, be used in the tank to absorb and utilise any organic sediment, which is inevitable in a stock breeding tank, but there is always the consequent risk of snail spawn in such a tank. As the incubation period of certain snail spawns is so short, and that of the fish so long, there is always the chance that some eggs may be lost in this way.

Cacti in the Fish House

DURING March many of the cactus plants will start to make new growth and so watering can be commenced. If the fish house is fairly warm then growth can be expected sooner than if the plants are in a cold place. Do not give too much water at first or you may cause some of the older roots to rot. It is only the small fibrous roots which are able to take in nourishment in a soluble form. These roots are very tender and usually die during the winter months. They are soon replaced by new ones once the plant starts into active growth. A slight watering will encourage these roots to form and then after a week or so a further watering can be given. Tap water can be used if it is left for a couple of days after having been drawn. If clean rain water is available this is to be preferred but not if it has been collected from a dirty, sooty roof.

Microscopy for the Aquarist—52 by C. E. C. COLE

THE average aquarist regards algae as the bane of his hobby. They foul his plants, spoil the appearance of his aquaria and grow faster than anything else in outdoor pools. And all thread-forming algae are called by the well-known name "blanket weed," although there are many different species of filamentous algae—some thick, some thin, some rough, some smooth, some tough, some tender.

In addition to the many filamentous kinds, there are a great number of unicellular species, frequently so small that they can be seen individually only when greatly magnified under special lighting, yet present in favourable environment in such astronomical numbers that they give the water an intense green colour.

Still other species colonise the surface of stones, or the glass sides of aquaria, coating them with a green, bluish green or brownish film, sometimes rough to touch and sometimes slippery.

So each time you visit your ponds, or go fishing or pond-hunting, gather a few samples of algae and bring them home for closer inspection—you will be surprised at the great variation between the species, and delighted with the great beauty of many of them. You can, of course, examine your specimens while they are alive, but they will not live long in the comparatively dark conditions of the average room or when unduly crowded in a small container. So if you cannot keep them in an environment comparable with their place of origin, preserve them by placing in a little Bouin's fluid, or in some formalin-acetic acid-alcohol solution. This latter can be purchased ready made up (a mixture of 40 per cent. formaldehyde solution, acetic acid and 70 per cent. alcohol).

The green colour of many species can be preserved if the specimens are kept in a solution of lactophenol to which a little copper acetate has been added—0.2 gram to 100 ml. of lactophenol solution (lactic acid, phenol, glycerine and distilled water). Used with algae it will kill, fix, dehydrate and clear at one and the same time. I am experimenting with it for other aquatic subjects at the moment and will report on it later. One disadvantage is its great clearing ability, which makes parts of the algae invisible unless recourse is had to staining.

A little Cotton Blue dye added to the lactophenol will make a tremendous difference to contrast. Sufficient for as many specimens as you are likely to attempt can be mixed in a flat-bottomed specimen tube and tightly corked. One drop of Cotton Blue to one teaspoonful of lactophenol is sufficient. Cork the tube tightly to prevent evaporation.

There is, of course, no need to make slides of algae, but if you wish to do so, try the following methods. To prevent loss of specimens during transfer from one receptacle to another, all operations can be carried out upon the slide itself.

Place a drop or two of lactophenol in which the stain has been mixed upon the glass slide. Push a strand or two of the algae into the solution and spread them out to display them separately. This can be done with the aid of a pair of fine needles mounted in wooden handles.

Then hold the slide near a small flame—that from a methylated spirit lamp is suitable. Do not keep the slide still, or the liquid will quickly boil. Keep it moving back and forth over the flame until it steams. Hold it steaming until 45 seconds have elapsed. The liquid thickens as moisture is driven off, and becomes more viscous and manageable. Use a thin glass slide in preference to a thick one.

Next take the thinnest cover glass available, clean it, place a drop of lactophenol upon it and turn it over so that



Photo :

W. J. Howes

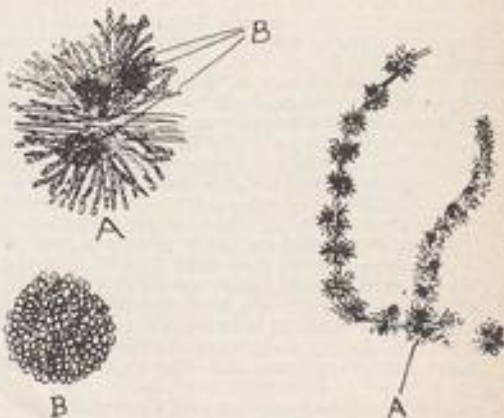
A small natural pond of the kind in which many forms of aquatic life will be found

the drop hangs from the cover slip. Lower the slip slowly until the drop touches the mountant already on the slide—then let it sink by its own weight. The phenol will spread evenly to the edge of the cover glass, excluding air bubbles.

For a temporary mount this is all that is necessary, permitting the closest examination without difficulty. For a permanent mount the cover glass will require sealing. Paraffin wax, melted, can be used and will prove satisfactory, especially if covered when hard by one of the sealing varnishes (Brown's cement, for instance).

You may prefer to try your hand at an alternative method. If so, attempt the following. It takes much longer than that above.

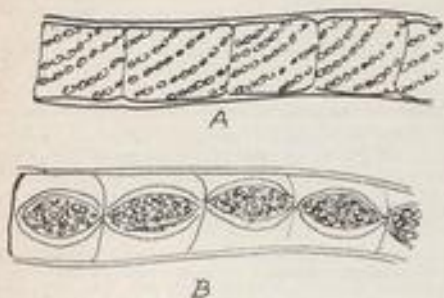
Fix the alga in a solution of 10 per cent. formalin. The fixing takes several hours. Wash it well in distilled water, several changes are desirable. Stain with a drop of Delafield's haematoxylin in 30 per cent. alcohol. Dehydrate progressively in 40, 50, 60 and 75 per cent. alcohol solutions.



Views of parts of the brown alga *Batrachospermum* at progressively greater magnification. This alga is sometimes called the frog-spawn alga and the small dark areas (B) in its threads are seen to be spore-forming organs

Again stain, this time in eosin (a drop in 75 per cent. alcohol). Continue dehydration in 80, 90 and 100 per cent. alcohol. Clear in xylol and mount in Canada balsam.

If dehydration has been incomplete a milky cloud will develop when the specimens are placed in xylol. If this does appear, replace the xylol with 100 per cent. alcohol and clear again afterwards. There are other methods, but I need not burden you with too many alternatives. Dehydrating fluid can be substituted for alcohol if this is not obtainable, and for most of us it just isn't.



Strands of *Spirogyra*: A, normal; B, with developing zygospores (magnified)

Now a word or two about the sketches illustrating this article. The first shows a tiny piece of *Spirogyra*. This algae is of a beautiful, vivid shade of green. It grows in clumps, thick and tightly packed at the base, but loosely spreading as the many strands lengthen. It is extremely slippery to handle, and anyone attempting to eliminate it by hand-picking will find it impossible. Each silky strand consists of innumerable cells, each containing a large number of small, elliptical, green bodies arranged in spirals. These bodies are called pyrenoids, and are enclosed in a larger body, the chromatophore. Enclosing the chromatophore is the sheath, the "skin" of the strand.

Not all chromatophores of algae are elliptical. Some have no particular or definable shape, others are star-shaped, plate-like or discoid. Likewise the number of pyrenoids within a chromatophore is not constant, but may



Magnified view of a short piece of the alga *Chara*, showing the organs of sexual function

vary between few and many. It is the chromatophores and pyrenoids which take up stain and so reveal details which would otherwise be largely un-noticed.

Algae reproduce themselves both sexually and asexually. In the sketch of *Chara* the two different kinds of specialised germ cells are shown quite plainly. The larger is the oogonium, the storehouse of the female oogonia. The circular projection below is the antheridium, containing the male antherozoids.

In asexual reproduction, the cell simply divides either transversely or longitudinally. Division begins in the pyrenoid, continues in the chromatophore and finally through the cell walls. Motile spores are also produced, equipped with cilia, a reddish pigment spot like an eye and one or two chromatophores.

Frequently, during the spring months, these zoospores break through the softened membranes of their mother cells and swim away, seeking a new environment in which to

establish themselves. They can easily be mistaken for infusorians, and a large number probably suffer the same fate, falling victims to fishes or *Daphnia*. There are always sufficient left to ensure that whatever else in the vicinity perishes, the algae will flourish as soon as suitable conditions obtain.

Any aquarist wishing to culture algae in order to study them can do so by using either Bristol's solution or Knop's solution. Most of them will find plenty of different species right at hand without recourse to special culture methods!

FRIENDS & FOES No. 80 Ramshorn Snails



Planorbis crista
(x 8)

Mollusca (continued)

GENUS: *Planorbis*, from Latin *planis*—flat, and Latin *orbis*—ring or circle.

SPECIES: *P. crista*, from *Planorbis* and Latin *crista*—crest.

TO appreciate its beauty, the shell of this snail should be placed under a hand lens, for it is hardly more than an eighth of an inch in breadth and a sixteenth in height. The sketch gives some idea of its appearance under magnification. Its smallness may lead to its being frequently overlooked during pond-hunting, yet it is considered quite a common snail, favouring hard-water localities and quite small ponds. For this reason it might well flourish if placed (on its own, without fishes) in an aquarium with soil or gravel compost and a number of plants. It will obtain most of its food from the plants, and, perhaps, a little meat from dead or dying insects in the compost. The addition of a tiny piece of meat, or a little fish (dead) will aid its preservation. Too much (and in a small aquarium, a little supplied too often rapidly becomes too much) will create very foul conditions and result in premature suffocation or poisoning of the creatures. The snails will do a certain amount of their own clearing up, but do not expect miracles. In fact, many aquarists, speaking of snails generally, and not of any particular species, say they make more mess and do more damage than they repair. A little siphoning out now and again will be necessary.

C. E. C. Cole

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

Please can you give me the scientific names of some dwarf plants not difficult to obtain and suitable for the tropical aquarium?

The following species of plants average about 6 in. in height and are usually available from dealers carrying large and varied stocks of warm-water aquatics: *Acorus pinnatus*, *Anubias nana*, *Cryptocoryne nevillii*, *Echinodorus intermedium*, *E. tenellus* and *Eleocharis acicularis*.

I should like to have the names of a few fishes that would live in brackish water.

Fishes belonging to the following genera flourish in brackish water: *Scatophagus*, *Monodactylus*, *Tetraodon* and *Mollisnia*. Platys, guppies and certain barbs such as *B. lineatus* will also tolerate saline conditions.

I live close to the sea and can get shrimps, crabs, cockles, mussels and other shellfish easily. Can I use these creatures as a substitute for live food for my "tropicals"?

Shellfish such as you mention make an excellent substitute for the common live foods. The flesh should be shredded or minced fine so that the fishes can swallow it without difficulty. Cockles, however, are too tough or leathery for all but the larger cichlids and barbs. Shrimps may be sun- or oven-dried, crushed fine, sieved and stored in screw-top bottles for use as a nutritious dried food during the winter.

Is there any book giving the life spans of tropical aquarium fishes?

No book has been published giving the life spans of tropical fishes kept in captivity. Generally speaking, the livebearers and egg-laying fishes that breed at an early age (and often) have a life span of about 3 to 4 years; but, at the same time, it must be said at once that there are certain small fishes that mature quite quickly and yet live almost



Photo: Laurence E. Perkins

The puffer fish (*Tetraodon fluviatilis*) is a tropical species that will live in waters of varying degrees of salinity from zero to full (sea) strength.

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.

as long as the average cat or dog. Among these long-lived smaller tropicals are neon tetras, harlequin fish, pristella, species of *Gorydoras* and paradise fish. Among the shortest-lived fishes are guppies and Siamese fighting fish.

Is fluorescent lighting suitable for a tropical aquarium?

The white or so-called daylight tubes are not at all suitable; but the tubes that give a warm white or pinkish light are quite satisfactory. One of the good points about fluorescent lighting is that it does not over-heat the surface of the water.

I am a newcomer to tropical fishkeeping, and I should like your advice on my plants. I bought several dozen healthy-looking *Vallisneria spiralis* a short while ago, but since planting them in my aquarium they have turned sickly yellow and started to die down. Can you tell me what is the matter with them?

Vallisneria often turns yellow when it is transferred from one aquarium to another; probably change of water upsets it but, in a short time it usually recovers and sends up fresh green leaves. It must be borne in mind, however, that *Vallisneria* needs plenty of bright light, and if the aquarium is not close to a window, or is not getting sufficient strong overhead electric light to make up for lack of natural light, it will soon turn yellow and die down.

Would it be all right to use rain water that drains from a roof and thence into a wood tub to fill my aquarium?

If the water drains from a roof covered with new or comparatively new bituminised felt do not use it. Nor water from a roof of recently painted iron. Water from a clean tiled or glass roof is safe enough, but make sure that it does not become contaminated in dirty gutters or spouting before it reaches the wood container.

A few days ago I bought a large pair of pearl gouramies. The female has settled down very well, but the male is so nervous that it will not emerge from its hiding place to eat, and stays in a corner most of the time. How can I cure this fish of its "nerves"?

Do not worry the fish by tapping on the glass sides of the aquarium, or by poking about the aquarium with a planting stick or dip tube to see if it is all right. In other words, leave the fish alone. You cannot force a fish to eat; but you can tempt it with live food dropped into its corner. If kept quiet and shaded from bright light, most fishes get over attacks of "nerves" within a few days.

I have added some salt to my aquarium containing catfish and mollies. Now I have been told that salt is harmful to catfish. Is this true?

A small amount of salt in the water will not harm catfish, but they do not prosper in the brackish conditions that suit mollies.

Can methylene blue be used to eradicate infestation with trematodes or flukes?

Yes, drops of methylene blue should be added to the water until it turns a rich blue. At such a strength, some of the plants will suffer, particularly those with feathery foliage, but the fishes will not be harmed. A few hours after adding the "blue" the floor of the aquarium should be siphoned or dip-tubed to remove the sediment.

Scavengers

by A. BOARDER

(conclusion of last month's article)

FRESHWATER mussels are often recommended as scavengers, especially for use in the pond. There are several species of these found in British waters and perhaps the best known are the swan mussel, *Anodonta cygnea*, and the pearl mussel, *Margaritifera margaritifera* or *Unio margaritifera*, and these are fairly large-growing types. The mussels live in mulm or mud at the bottom and are able to feed on very small particles of decaying floating vegetation as well as small live foods swimming in the water. They can assist in purifying the water but they cannot survive unless they have a good depth of mulm in which to move about. In a tank they can shove their way about in the soft compost and so uproot water plants. If they die, as will happen in unsuitable tanks, they soon go bad and pollute the water considerably.

Water fleas, *Daphnia*, are not often thought of as scavengers but as food for the fishes. However, they are very good as scavengers in any tank with cloudy water. Of course, it would be senseless to expect them to survive when there are fishes in the tank and so the first task would be to remove all fishes and then introduce the *Daphnia*. If the cloudiness of the water was caused by large quantities of Infusoria, as is usually the case, the *Daphnia* could have the water crystal clear in a few days. The fishes could then be returned to the tank when they would make short work of the water fleas. For any small garden pond where there are no fishes the water fleas would quickly assist in clearing green free-floating algae and Infusoria from the water.

Tubifex are also scavengers in their own habitat, but their use as such in tanks is limited. They would have to become established in the compost before they could function properly. They bury themselves in minute burrows head downwards and wave their tails in the water to create a current and obtain fresh oxygen. By assisting to keep some of the water at the bottom of the tank in movement they are doing a good job. However, as long as there are fishes present in the tank they would be in danger of being eaten as soon as they were well exposed from the mulm.



Photo:

W. J. Howes

Swan mussel, a scavenger suitable for large ponds with a soft base compost



Photo:

Laurence E. Perkins

Plants are aquarium scavengers in their activity of converting fish waste materials into harmless substances. This is the "giant" *Sagittaria*

Their use as scavengers is therefore hardly practicable in a tank.

What of goldfish as scavengers? It may be thought that these would be the last thing to consider as helps for this purpose, but provided that they are not fed artificially for a few days it is amazing how they can clean up a tank. Any well-established tank with plenty of water plants would be almost sure to have a quantity of fine filamentous algae growing on some of the leaves. This in time turns brownish-black and not only spoils the look of the tank but can be detrimental to the health of the water plants, as the algae can choke the pores of the leaves. In such a tank it will be found that if all food is withheld for a few days the goldfish will start sucking over all the leaves like small vacuum cleaners. After a couple of days one is surprised to see that the tank looks cleaner and brighter, the water is clearer and the plants have taken on a new lease of life. To test this theory further it is only necessary to leave a well set-up tank with the requisite number of goldfish in to themselves whilst one goes on holiday for a fortnight. On return, provided that no well-meaning neighbour has been stuffing the fish with too much food, you will find that the water is crystal clear, the water plants are once again green and flourishing and the fish look the picture of health.

If one needs further proof of the scavenging properties of the goldfish just feed them on dried food one day. The following day their droppings will be of a whitish colour. Then cease artificial feeding and the following day it will be seen that the droppings of the goldfish are dark brown and copious. This proves that the goldfish have been feeding extensively on the algae from the water plants and sides of the tank.

So do not ignore the goldfish as a scavenger, and the more sense and restraint you use when feeding the better will the goldfish do this job. When one is giving a tank the weekly servicing and is scraping the algae from the front glass the fish will wait for the falling particles and eat them avidly. In my own indoor tanks I have only to introduce a scraper into a tank for a tench to follow it about, snapping up the algae as it is scraped from the glass. The fantails in the tank will also do the same thing.

Few people would consider that water plants are in any way included in this class of tank inhabitants but they are

any of the others mentioned could perform. One of the disadvantages of most scavengers is that the harder they work the more copious are their droppings, which must pollute the water to a great extent. This is where the plants come into their own. They are able to break down and utilise large quantities of this waste matter. When they are growing healthily they are continuously feeding on soluble foods which are found largely in the droppings from the fishes etc. It will be noticed that those water plants such as *Sagittaria natans* and *Vallisneria spiralis* will grow with most of their root system out of the compost. The roots will be surrounded with mulm and droppings and it seems that these roots are actually able to attract these droppings to them; but it may be only that the movements of the fishes encourage the waste matter to move around until it comes in contact with the roots. Be that as it may,

will be noticed that such roots always have a good quantity of the mulm etc., surrounding them. The plants are then doing a very useful task in helping to clear up after the fishes. Not only do they do this but they also give off oxygen in daylight or bright artificial light and so assist in reoxygenating the water.

In conclusion it will be seen that among the scavengers the water plants hold a high place of importance, the tench is almost indispensable whereas some of the other well-known scavengers are better left out of the tank or pond. It must not be thought that there are no other scavengers than those described, as there are many others, such as the larvae of flies etc., which do a certain amount of scavenging, but those which have been dealt with are those most frequently found and are readily obtainable by the keen aquarist or pondkeeper.

The Garden Pond in March—by ASTILBES

NEW ponds may be constructed during this month so that they will have an opportunity of becoming safe for the water plants to be introduced and then the fishes later on. A certain degree of care must be taken when planning a pond as its position may make a lot of difference to the success or otherwise in years to come. Once it is made it is impossible to move it. Sometimes the shape of the garden will be the deciding factor for site but where one has a choice it is important to see that most of the conditions are right.

Some people are of the opinion that a pond should be in the lowest part of the garden so that rain water may run into it. This is not to be encouraged, as with the rain water there can be a great deal of matter which can pollute the water. It may be necessary to empty the pond some time and if it is in a low part of the garden it is no easy task to do so; in the highest part it may be possible to siphon out most of the water if necessary. The pond should not be made under trees as this will not only mean that many leaves will fall into the water, but some trees are slightly poisonous and so water dripping from them may injure the inhabitants of the pond.

Sun and Site

If some sunshine can reach the pond at times it will be an advantage, especially if the pondkeeper would like the fish to breed. However, too much sun reaching the pond is sure to cause a lot of green algae to form in the water, especially during the early days of the pond's life when there are few water plants to provide some shade.

Once the site for the pond has been decided on, its shape is the next consideration. This may be influenced by the type of garden. If it is formal in shape with regular flower beds it is imperative to make the pond formal to match. If the garden planning is irregular then the pond can be any shape to suit individual taste. Fish will not mind which shape it is as long as they have plenty of space in which to swim around. The larger the pond the better will it be, although it will be harder work to make it in the first place! Small ponds are generally a nuisance as they really take more looking after than larger ones. They warm up very quickly in the summer and can become foul, and they freeze over quickly in frosty weather.

Also remember that if one wishes to have several water lilies as well as other plants these must have plenty of space in which to develop. Most water plants make a very poor show when they are first introduced into the pond but after a year or so they will probably have grown

rampantly and once they become entangled with each other they will soon fail to look attractive or to give of their best as far as flowering is concerned.

Circular Pond

A circular pond is easily marked out with a length of string on a central peg. Square ponds or oblong ones are also easy as long as one measures correctly from top left corner to bottom right, and then the opposite corners must be exactly the same. If a formally shaped pond is not made correctly it will look very bad for ever after. If the pond is to be made on grass land it is easy to cut out an outline with a sharp spade, and the excavation can then follow this line. If the pond is to be made on softer earth then it will be necessary to put in a number of fairly long pegs to mark the position. A good way of marking out an informal pond is to lay a length of clothes line on the ground and push it about to form the design most attractive to the garden arrangements.

A useful shape for a pond is either T-shaped or in the form of a cross. This will allow the construction of slides so that portions of the pond can be shut off if required. The cross-shaped pond can be so made that four compartments can be utilised and any one used for certain kinds of fishes.

The excavated earth will often amount to a surprisingly large heap. The easiest way to dispose of this surplus earth is to pile it beside the pond to make a rockery there later on. The soil can be put to one side or round the pond according to the owner's fancy.

Pond Depth

Depth of the pond can be up to 2½ feet. The deeper it is the fouler can the water at the bottom become. A shallow pond allows more of the water to be in contact with the atmosphere at all times but the main disadvantage to a very shallow pond is that it can rapidly sustain changes of temperature. Also unless there is a fair depth of water some of the water lilies may not be too happy.

Hammer down the earth in the excavation as solid as possible to make a firm base on which to concrete. Failure to do this may mean a subsidence after the pond has been made. Most of the work can be carried out in frosty weather as long as the concreting is not started whilst actual frost is in the air. For the concrete it is essential to have some fresh cement; that which contains hard lumps is of no use as it has become hard through contact with moisture. Some coarse aggregate and fairly sharp sand is also required. The aggregate consists of stones of varying

sizes from small to up to half an inch in diameter. The sand should be the washed type and very clean. Soft sand is useless, especially if it has come from a dirty pit and contains lumps of soft clayey material.

Reinforcement

Some reinforcement can be used in the form of iron rods, especially at the corners, or some very stout wire can be used as an alternative. For a pond no larger than 12 ft. by 12 ft., 3 inches depth of concrete will be sufficient. For any pond larger than this an extra inch can be added. For each cubic yard of concrete you will require 6 cwt. of cement, $\frac{1}{2}$ yard of aggregate and $\frac{1}{4}$ yard of sand. The type of cement sold as Ciment Fondu is very good, although more expensive. The cement, sand and aggregate must be mixed thoroughly before any water is added. Mix until the sand etc. is all covered with cement. Then add water from a rose-can until the whole is damped. Do not make the mixture too wet or it cannot be worked and it will be weakened.

No shuttering of any kind need be used as there is no advantage in trying to make upright walls to the pond. A slope of about 45 degrees will be better and this means that the concrete can be worked into position without any supports at all, thus saving a lot of expense. Work as quickly as possible once the water has been added, as concrete starts to "go off" (the preliminary setting) as soon as the mixture is left static. If frost is expected cover the concrete with sacking; in dry weather an occasional spray will ensure that too quick a setting is prevented.

Another method is to lay one layer of very coarse mix first and then cover with a mixture of one part of cement to three parts of sharp sand. This last layer should be placed in position as quickly as possible and all at the same working time to ensure that no part of the covering starts to set before the next is added. Once concrete sets it is almost impossible to get fresh concrete to adhere to it.

AQUARIUM COLLECTING BOAT

A 30-foot live-cod boat was recently purchased by the Vancouver Aquarium and is now being altered as a collecting vessel. It is double ended and resembles a small coastal gill-netter but is somewhat deeper and narrower. The hull is perforated amidships and floods between two water-tight bulkheads, thus providing a live-tank for the transportation of specimens. A winch is to be fitted on the after deck and a boom rigged over the stern to enable a dredge or trawl to be dragged over the ocean bottom. This will not only enable the Aquarium's collectors to capture echinoderms, molluscs and small fishes with much greater efficiency but it will make it possible to sample new and different ocean environments and thus to obtain exhibits not previously shown.

The main method of collecting fishes from the boat will be by setlines. Each one consists of a heavy line several hundred feet long, from which 40-50 hooks are attached at regular intervals. The ground line is anchored at each end and connected to float lines reaching to the surface. These have been used for catching dogfish, skate, ling cod, ratfish and other species, but, up until now only a 10-foot boat has been used and bringing the catches to shore in tubs has been very difficult. The name of Vancouver's new boat is "Aquarius."

In 1959 the visitors to the Aquarium were 259,004. Of these, 8,431 were school children brought in groups by their teachers.

Rearing the Fry of Egg-Layers

by AQUARIUS

THE trickiest part in the rearing of egg-laying fishes is after hatching. The fry are born with yolk sacs, and these do not last very long, not more than 2 days at the most. The fry will be free-swimming by this time and it is then that they must have plenty of tiny food. There is little to beat Infusoria for the first few days. The fry are so very tiny that they can take only the smallest of foods. Some kinds of artificial fry foods can be used but the fact that Infusoria move in the water encourages the fry to eat. The artificial fry food can be kept gently moving by means of aeration, and the aeration can be used in the tank whilst the eggs are incubating. This keeps up a circulation of water and many types of fishes will fan their eggs to keep up a similar movement of water around them.

When a "drip-feed" of Infusoria culture is arranged into the fry tank a wick of clean linen can be used to siphon excess of fluid from the tank



Infusoria can be made by pouring hot water on to crushed leaves of lettuce, spinach or cabbage. Potato peelings and banana skins can also be used. The endeavour should be to get a good culture of Infusoria going without making a stinking mess of the water. A low-powered microscope is a must as it is impossible to see much of the Infusoria without this aid. One of about $\times 80$ magnification is ample.

The culture should be tested every day, as there may be thousands in the water one day and none the next. If too many Infusoria are in the water it can become fouled and thus they poison themselves.

When feeding the fry it is a good plan to take out a quantity of the water containing Infusoria and gently pour it into the fry tank. The Infusoria tank can then be filled up with fresh water. This will assist in keeping a healthy culture. The drip type of feed with Infusoria is not too good a method when one has to be away from home for some time each day, as the feed pipe can become blocked and the flow may cease. To remove some of the surplus water from the fry tank a strip of clean rag can be allowed to hang from the tank with one end in the water. See that the end outside the tank is lower and then the water will drip away to the level at the bottom of the inner end of rag.

As long as a good supply of Infusoria can be given the fry should grow well. Other foods can then be introduced, such as brine shrimps, micro worms or any fine mashed live foods. See that the water keeps pure as the addition to the water of too much mashed food can soon cause pollution.

The Lively Dace for Pond and Aquarium

by WILLIAM J. HOWES

THE dace is a slim silvery little fish which is extremely swift and lively in its movements. Its fast swimming and darting on the surface make this a particular favourite for the garden pool, for it will certainly thrive there if given plenty of space and aeration. A shoal of lively dace in the clear water of the pool is a most pleasing sight. Observe them in the summer, when they will be seen to dart swiftly here and there, at first leaping to the flies on the surface and then diving to the bottom to pick up some other tit-bit of food.

The outstanding colour of the dace is silver, and the back varies in different specimens from a dark olive-green to a brown. The ventral, pectoral and anal fins generally appear colourless, or have a slight tinge of very pale pink. The tail or caudal fin is rather forked.

Dace and chub are of the Cyprinidae, and both look very much alike, and fish of similar size may quite easily be mistaken one for the other. Nevertheless, to the practised eye there are recognisable differences.

A dace may easily be distinguished from a chub by its concave or indented dorsal and anal fins, the edges of these particular fins are unmistakably convex or outwardly rounded in the chub. The illustration shows the shape of the dorsal and anal fins of the dace. I once heard of a reminder which goes: "curved chub and dented dace"! This should help any aquarist to remember the main difference between the two species.

Dace are often referred to by such local names as dart, dare and graining. This last name is more often used in the Northern part of the country about Lancashire. In fact, graining were once regarded as a distinct species, although nowadays it is more generally realised that the dace of Lancashire do not differ in any way from those of other parts of England.

Dace are pretty widely distributed throughout England and Wales, but they are not found in Scotland. They are present in some of the rivers of Southern Ireland, especially the Blackwater River, County Cork, into which they were accidentally introduced.

Like most species of the great family Cyprinidae, dace are gregarious. Nowadays, dace (*Leuciscus leuciscus*) are more often found in the still waters of lakes and ponds, because they have been introduced there, yet dace are essentially stream fish, much preferring the swift aerated currents that flow over clean gravelly shallows. Therefore if dace are to do really well in a small garden pond, or in aquaria, good aeration is advisable.

Dace spawn in the early spring, April and May, when in their natural state they gather in large shoals in the weedy



Photo: W. J. Howes

Dace—"dented" (concave) dorsal and anal fins distinguish it from the chub

shallows. The males of the species generally show their breeding condition by having a number of the characteristic family tubercles around their heads, mostly on the sides of the gill covers. An adult female will deposit a very large number of eggs, which, because they are sticky, adhere to stones and plants. When the male has fertilised them they are left to hatch. The eggs develop quickly, and under favourable conditions they hatch in a few days.

During the first few days of the fry stage the tiny dace live on the small reserve of food in the yolk sac, and when this is depleted their food consists of minute water creatures. The young fry grow quickly and are soon swimming about in a closely packed shoal. They then take a more substantial diet of the smaller crustaceans, such as water fleas and small freshwater shrimps, and aquatic worms and the larvae of the numerous species of flies.

No special feeding is necessary, for dace may be fed on any of the usual fish foods, which include *Daphnia*, *Tubifex*, freshwater shrimps, small pieces of earthworm and maggots (the larvae of blowflies).

Under natural conditions dace grow quite large, but it is the small fish which are best suited to aquaria life and to the smaller garden pool. Once the fish have been introduced they soon become great favourites because of their liveliness. Although dace may be kept in a garden pool for several years, they are quite unlikely to reach the maximum size that some specimens attain in rivers, but they certainly develop into useful show fish.

The Black-Banded Sunfish—by JACK HEMS

MESOGONISTIUS chaetodon, popularly known as the black-banded sunfish, is native to North America—as, for that matter, are all freshwater sunfishes (Centrarchidae)—where it is found in cedar swamp waters of southern New Jersey to North Carolina and beyond.

The glassy body is ovate-shaped and laterally compressed. It is coloured brownish olive on the back, shading imperceptibly through pearly grey to silvery white on the underparts. The side is crossed by six to eight narrow black

bars, which come and go according to the mood and condition of the fish. The silvery spaces between the bars, and the fins, are streaked and flecked with shadowy grey to black markings. The anterior portions of the dorsal and ventral fins are splashed, as it seems, with bright orange-red. The large eye is black, encircled with gold. The species attains a length of about 3 inches.

As the black-banded sunfish is delicate in its movements and mild-mannered in its habits, it may be placed with

other similar-sized or smaller fishes in a community tank. It flourishes best, however, when it is given an aquarium to itself.

The aquarium should be filled with soft, acid water. Water that has had scalded peat or fallen oak leaves steeped in it until it turns brown is ideal for this species. A temperature of 65°F, with a range of 10° in either direction, suits it very well. Grassy-leaved plants such as *Vallisneria* or *Sagittaria* should be massed along the back and ends, for the fish is more at home among plenty of vegetation than when it has to live in an almost bare container.

Like other sunfishes, the species is carnivorous and prefers a diet of live food. If live food is not available, give it scraps of red meat, washed liver or shredded shellfish (tinned or fresh). A few individuals will take dried food; others prefer to die a lingering death of starvation rather than accept it. In fact, it is always a good idea to ask the dealer from whom the fish are obtained what food they have been taking; for they can be troublesome, and a source of worry where food is concerned.

M. chaetodon breed (but not readily) in the typical sunfish manner; that is to say, after some courtship in the plant life, the male fans a shallow depression in the sand and prevails upon the now fuller-sided and brighter-hued female to accompany him into it. Here, on this spotless bed, the female deposits her hundred or more eggs, and the male fertilises them. Now and again, a couple may deviate from normal breeding procedure and spawn in some place other than the original hollow in the sand; but, even then, it is customary for the eggs to be carried back by the parents to the original depression, and there watched over and fanned until they hatch out.

At a temperature of 70° to 73°F the eggs hatch in about

2 days, but the fry do not become free-swimming until several days later. The male takes upon himself full responsibility for looking after the babies, and though the female sometimes tries to busy herself around or in the depression, or among the free-swimming offspring, her fussy attentions are neither desired nor appreciated by her spouse, and, if the aquarium is smaller than the popular 24 in. by 12 in. by 12 in. size, it is best to transfer her to another tank before trouble breaks out.

Just before the babies start to swim about the aquarium, and look for food, the male often carries them, several at a time, in his mouth to a newly excavated hollow.

As soon as the babies are seen to be spreading like animated slivers of glass over the floor of the aquarium, introduce Infusoria and follow this, a few days later, with newly hatched brine shrimps and other small live food. If the babies get sufficient of the food they like they will soon grow and develop their colours. At a year old, they should average about 1 inch in length. From then onward, growth is steady but never fast, for the species is not one to reach full size quickly.

At one period of aquarium history, the black-banded sunfish was known as the poor man's angel fish. That was away back in the nineteen-twenties. Since then, the ban imposed by the State of New Jersey on the taking of black-banded sunfish in a net, and the reluctance of present-day aquarists (except those in Germany) to appreciate the fish at its true worth, has prevented the species from becoming either cheap (through large-scale breeding, as with the angel fish *Pterophyllum*) or popular, which is a pity; for apart from its faddy feeding habits, *M. chaetodon* is one of the easiest and loveliest little fishes to care for in the home aquarium.

Indonesian Water Fern by C. D. SCULTHORPE

THERE arrived in England early in 1957 a new aquatic fern, *Gymnopteris* species, from Indonesian waters.

This plant thrives in sand, gravel or a sand/soil mixture in almost any situation in the tropical aquarium, regardless of the light intensity. Its creeping, branching rhizome is covered with rust-red scales and is kept above the surface of the compost by the limited growth of the brown roots. The shining, dark-green fronds grow to a length of 9 to 12 inches and are seen in a bright light to have a beautiful network of veins. Young plants develop at points on the veins on the back of each mature frond; when these have good enough roots they may be detached and grown on in fine sand or soil.

Presenting a great contrast to *Gymnopteris* in having dissected, brilliant light-green fronds produced from a stout crown is the popular Indian fern, *Ceratopteris thalictroides*. The degree of frond division depends on the age of the plant, the depth and movement of the water and the light intensity. *Ceratopteris* resembles *Gymnopteris* in its suitability for tropical aquaria, its adaptability to almost

any rooting medium, its production of young plants on mature fronds and its ability to grow in very wet soil in the aquaterrarium. When so exposed, *Ceratopteris* produces erect, very finely cut, fertile fronds bearing linear groups of spore capsules on the underside.



Indian fern (*Ceratopteris thalictroides*)



Gymnopteris species with tapering ox-tongue-shaped fronds

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

Calling all Tape-Recorders

I WISH to exchange tape-recordings with fishkeepers in any part of the world, fish and plant-growing being the main interests. My tape recorders are: mains-operated Wynsor Viscount (3 speeds, 3½, 7½, 15 inches per sec., maximum 7 inch reels). Battery-operated Clarion (1 speed, 3½ inches per sec., 3 inch reels). I think that many fishkeepers own tape recorders and can increase the joy and interest in the hobby through the use of tape.

JOSEPH W. NEAL,
28, Ashurst Road, Friern Barnet,
London, N.12.

Breeding Orfe

I LISTENED on the wireless some while ago to a queries and answers panel when it was stated that the reason why golden orfe did not breed in an enquirer's pond was probably because (to use one broadcaster's words) they were "either all boys or all girls." On other occasions I have read in the *National Press* and in a gardening journal that the breeding of the common goldfish is a normal event in most garden ponds, and then the writers lightly add the golden orfe will also breed.

As a breeder of fancy goldfish for over a quarter of a century, I know the "oh so simple" contributions referred to are plain nonsense. However, I will admit I have never had luck with this fish and I would like to suggest a really comprehensive article by an experienced breeder.

A. J. FURUS,
Hatch End, Middlesex.

We have arranged for an article on the orfe to appear in a forthcoming issue.—EDITOR.

Publishers' Reply

WE are the publishers of *All About Tropical Fish* by Derek McNerny and Geoffrey Gerard. We would like to say that after one year this book is reprinting but we would like to point out that it is impossible for us to place the index at the rear of the book because the printing has been so arranged as to include a colour plate on the very last page of the book, namely p. 480, which is the economic printing multiple. If we were to place the index after this, we would have to charge the public for a further 16 pages of matter.

I. G. W. HARRAP,
Director, George G. Harrap & Co. Ltd.,
London, W.C.1.

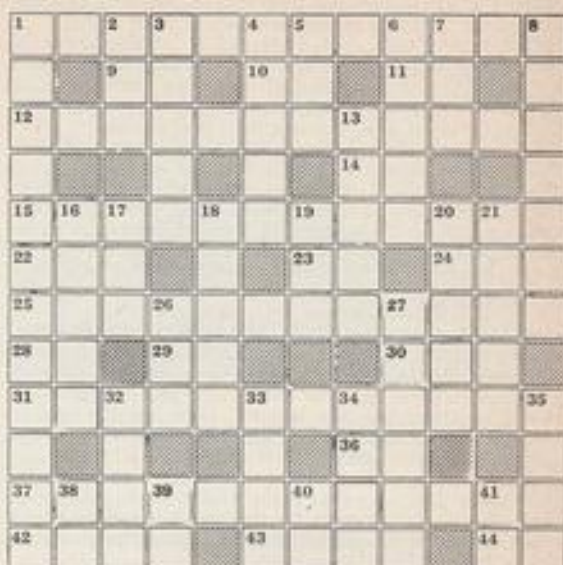
In our review (*The Aquarist*, December) of the book mentioned in this letter we appealed to author and publishers to place the subject index at the end instead of at the front of the book as it is in the present edition.—EDITOR.

OUR APRIL ISSUE

The April issue of *The Aquarist* will contain an article by the well-known experimental breeder of goldfish Mr. N. E. Perkins, illustrated with fish photographs in full natural colours. The attention of readers is drawn to the announcement on page 183 about the future price of this journal.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Usual occupants of the heated tank (8, 4)
- "Ruffian's game played by gentlemen" (1, 1)
- Moat (1, 1)
- Short way (2)
- I select creel (anagram) (8, 4)
- Asp without end (2)
- To change from one form of life to another (12)
- Scrambled eggs of goldfish? (3)
- 9 back for the Chaldees (2)
- Main body of solar system (3)
- Mollie(s) (12)
- His decision is final (2)
- Weight (2)
- Angler's allotted site in a contest (3)
- Thermal measurements (12)
- Otherwise the Free State (1, 1)
- Cheap, spectacular and hardy fish for tropical tank (3, 9)
- An old-fashioned sort of show (4)
- River of 44, but Lines, sounds likely place (4)
- Part of England that is almost new (1, 1)

CLUES DOWN

- Heat-measuring instruments (12)
- See 22 Across (3)
- Genuine, especially to a sahib (5)
- Load for go-car round (5)
- Friend in France (3)
- Not salt, to us (5)
- Orfe (3)
- Rushes in a way (7)
- Carp and I on the island (5)
- Exit away with a rod inside (5)
- Let up. Number follows (3)
- I am in a tangle of Indian coen (5)
- Usual seasonal move of some fishes (3)
- Roe is for creels (5)
- As needed to make calm (5)
- Chop off (3)
- Comes out in a set (6)
- Fashion (4)
- Source (4)
- Mixed diet involves a lot of liquid (4)
- Only fish (4)
- Common sort of query (2)
- Geographical direction, slightly misplaced here (1, 1)
- Sapper (1, 1)
- Not out (2)

(Solution on page 232)

An Old Favourite

Aquarists of long standing will remember Bartmann's Fish Foods, manufactured by Geo. Bartmann, a leading German aquarist, a food which was acknowledged before the last war to be one of the finest on the market. This food is now obtainable once again in this country through Philip Castang Ltd., 95, Haverstock Hill, London, N.W.3., who have secured the sole agency.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have a telescopic-eyed black moor which I bought about 6 months ago and which has started to behave in a strange manner. It appears in some distress and when it goes to the top for air it sinks again to the bottom like a stone and remains there. It seems very healthy and eats live and dried foods greedily. What is the matter with the fish?

Your moor has swim-bladder trouble. This affects the fish in such a manner that it cannot remain in a normal position in the water without effort. Many of the short-bodied fishes are prone to this trouble. The body of such fancy goldfish is very much shortened and in consequence the intestines are cramped, which in turn means that the swim bladder is also cramped. If the fish eats a lot of food the compression on the bladder is increased. Therefore part of your trouble can be caused by overfeeding the fish, especially with dried food. Put the fish in shallow water, warm it up a few degrees if possible and do not feed at all for at least a week. Then you can give a little live food. Remember that fishes need much less food in the colder months. You refer to your fish as a telescopic-eyed black moor. All moors are black and have telescopic eyes, so the single word moor is sufficient.

I have an aquarium, 36 in. by 15 in. by 15 in., with a heater to keep the temperature at 65 F. I stock it with about 30 fancy goldfish each summer but within 6 months I have lost nearly all of them. I think the trouble is constipation, and I treat them with an advertised remedy. I also give them Epsom salts once a week. Where do I go wrong?

In the first place you should not need any artificial heat in your tank for such fish as you keep. The warmer the water the less oxygen will it hold and you may already have

more than a safe quota of fish. Your tank will hold about 23 inches of fish, not counting the tail, and even less in warm water. You should not keep adding salt. This remains in the water and so in a few weeks the concentration would become dangerous and could kill the fish. I doubt very much if your fish are suffering from constipation; my own personal belief is that goldfishes do not get this complaint. Cut down the use of so much salt, reduce the temperature of the water, do not overstock or overfeed and you should have no further trouble.

I live on an island (population 2) and have to generate my own electricity, which is 110 D.C. It seems that it will be difficult and expensive to get equipment for tanks. I would like to keep and breed some coldwater fish and hope that you can give me some help on the matter?

There is no need to use aerators if you wish to keep and breed coldwater fishes. As long as you do not try to keep too many fishes in a tank you will find no difficulty. The heaters will also be unnecessary; there should be enough warmth to hatch the fry as long as you do not try to breed them too early in the year.

I am having difficulty in keeping brine shrimps alive for more than 3 days. I hatch them out in sea water. How can I keep them?

You appear to forget that these brine shrimps need food. You might be able to keep them alive with constant supplies of sea water. The shrimps feed on tiny plankton and other small matter in the water and, of course, unless they get plenty of this food they soon die.

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.

1959 proved a very interesting and enjoyable year for the **Burton & District A.S.** There were visits to fish hatcheries and zoos and many talks were given at the meetings on coldwater and tropicals, plant propagation and setting up of aquascapes.

Mr. A. Adams won the award for the best fish in the table show and Mr. T. Henshaw took first in the "Home Aquaria" competition. The chairman, Mr. R. L. Walker, was awarded the "Aquarist of the year" trophy.

THE annual general meeting of the **Goole and District A.S.** was held recently, Mr. P. Hill presiding. The treasurer reported a satisfactory financial position. The chairman was pleased to report that 1959 had shown a member increase of 25 per cent, and two new members were also welcomed at the annual general meeting.

The officers elected for 1960 were as follows: Chairman, Mr. P. Hill; vice-chairman, Mr. R. Hunt; secretary, Mr. F. Marshall, 88, Edinburg St., Goole; treasurer, Mr. K. Coulthick, P.R.O., Mr. J. N. Nank.

AT a recent meeting of the **Riverside A.S.** the

following members were voted the committee of management for the ensuing year: Chairman, H. Ainsworth; secretary, I. G. Flintham; show secretary, J. Rowe; treasurer, L. Taggart.

Meetings are held on alternate Monday evenings at the Hampshire Hoag, King Street, W.6., and visitors are always welcome.

THE annual open show of the **Southampton and District A.S.** is to be held on the 23rd, 24th and 25th June (Thursday, Friday and Saturday), at the Avenue Hall, The Avenue, Southampton. Further information may be obtained from the show secretary, Mr. D. E. King, 55, Magnolia Road, Bitterne, Southampton.

AT the annual general meeting of the **Romford A.S.**, the following officers were elected: Chairman, Mr. Morgans; Secretary, Mr. J. A. Hayes; treasurer, Mr. A. Wilson; president, Mr. F. Aherns. The retiring chairman and secretary did not offer themselves for reelection.

The club would welcome any enthusiasts of the hobby in the area, on the first and third

Thursdays in every month, at 8 p.m., at Church House (Wytham Hall), Romford.

THE **Leicester A.S.** held its annual general meeting recently. The officers elected were as follows: President, Mr. J. N. Ballard; chairman, Mr. E. G. Johnson; chairman-elect and treasurer, Mr. J. H. Williams; hon. secretary, Mr. B. M. Payne; show secretary, Mr. H. Ward. Committee, Mr. S. G. Scargill, Mr. L. Matthews, Mr. E. Calver, Mr. J. Hayes; show committee, Mr. G. Meese, Mr. P. Hill.

Meetings are held on the first Thursday of each month at the Leicester Museum, Princess Road entrance, at 7.30 p.m. and new members are most welcome. Any further particulars may be obtained from the secretary, Mr. B. N. Payne, 37, Rutland Drive, Thurmaston, Leics.

THE **Boston and District A.S.** was reformed recently. The chairman is Mr. J. McGinn; the secretary, Mr. A. Bainbridge, 8, South Terrace, Boston (near General Hospital), and the treasurer, Mr. Veal. The secretary would like to hear from any clubs in the Lincolnshire area interested in inter-club relations, shows, etc.

MEETINGS of the **British Herpetological Society** arranged for 1960 include the following: 22nd April, lizards and crocodiles; 23rd May, British species; 24th June, snakes; 13th September, tortoises, terrapins and turtles; 28th October, films and slides (members are invited to bring slides to this meeting); 28th November, annual general meeting.

All meetings start at 7 p.m. and are held in the Linnean Society Rooms, Burlington House, London, W.1 (except for 28th October, which will be in the London Zoo Lecture Room).

AT the annual dinner of the **Stroud and District A.S.** Mr. V. E. Jones, the president of the society, awarded the cups and shields to the winners of the Society's Home Aquaria Com-

petition. The winners were: Mr. B. Hewlett, Mrs. R. Parton and Master K. A. Riddiford in the men's, ladies and junior sections of the club respectively. The Best All Rounder Cup for 1959 went to Mr. W. Gray of Cheltenham.

The following members received certificates won at the Table Show earlier last year: Mr. W. Gray, Mr. A. Bainbridge, Mr. F. Dainty, Mr. L. C. Griffiths and Mr. B. T. Timbrell. During the evening presentations were made to Miss P. A. Huxford and Mr. T. R. Artus in appreciation of their services.

AT the recent annual general meeting of the **Sheffield and District A.S.**, the following officials were chosen: President, K. Colton; vice-presidents, S. A. Abdy, J. Beaumont; secretary, Mrs. M. Knowles; ass. sec., F. R. B. Nutt; treasurer, H. Grove; committee, R. P. Middleton, H. Townsend; show sec., W. Weeks; librarian, Mrs. L. Frost. Recent activities included a talk given by one of the members, Mr. F. R. B. Nutt on "The Outside and Inside Makeup of a Fish." The Guppy Table Show was won by J. J. Beaumont; 2 and 3, P. J. Lowe. A quiz on similar lines to I.T.V. "Dots" was well received.

Meetings are held on alternate Fridays at the Postman's Club in Milk Street (at the rear of the Odeon Cinema), Sheffield, at 7.30 p.m. Prospective members and visitors are always made welcome.

AT the fifth meeting of the season of the **Dundee A.S.**, there were 10 entries for the Scott Trophy Table Show, which was for A.S. Anabantidae, and the results were as follows: 1, A. Cross (Helostoma rotundif); 2, A. R. Bell (Colisa labiosa); 3, A. R. Bell (Beta splendens); 4, A. J. Roger (Colisa lala). This now makes the Scott Trophy placings to date: A. R. Bell, 11 points; A. Cross, 8 points; E. J. Seymour, 5 points; G. B. Kirkland, 4 points; P. N. Geering, 3 points; A. J. Rodger, 1 point.

The programme included the Federation of Scottish Aquarist Societies tape recording made by members of the Henden and District A.S. on breeding methods. This tape was greatly enjoyed by all present and it was unanimously agreed that this was, so far, the best tape heard.

AT the 12th annual general meeting of the **Cambridge and District A.S.**, it was reported that although present membership was rather low, the club had maintained its sound financial position. The Founders' Trophy, for most points gained at the society's shows during the past year, was awarded to Mr. Aldridge, and the following officials were elected for the ensuing year: Chairman, Mr. A. Amps; secretary, Mr. T. W. Isgrove; treasurer, Mr. N. Radford.

Before closing the meeting, the new chairman paid tribute to the work of Mr. Elkerton, the retiring chairman, who had held continuous office in the society for 10 years.

THE **Edinburgh A.S.** Annual Show is to be held in their club-rooms at the Working Men's Club, Infirmary Street, Edinburgh, from the 2nd April to the 9th April inclusive. Schedules will be obtained from Mr. G. Gunn, 25, Polworth Crescent, Edinburgh, 10.

RECENT activities of the **Dunstable and District A.S.** have included a lecture on "Aquarium Management," by Mr. J. V. Mearns, and a visit to the St. Albans Society for an illustrated lecture by Mr. Calrow of Henden. The secretary is Mrs. M. L. Dixon, 24, Crossland Road, Luton.

THE **Leicester A.S.** would like to hear from any speaker who would be willing to visit the society during the year. The secretary is B. M. Payne, 37, Rutland Drive, Thurmaston.

THIS year the Annual Show of the **East London Aquarists' and Pondkeepers' Association** will be an open one. The venue is as before at the Central Hall, Barking Road, East Ham, London, E.6, and the dates are 28th, 9th and 10th September.



The Aquarist's Badge

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

To obtain your badge send a postal order for 2s. 6d. together with the **Aquarist's Badge Token cut from page xlii**, to Aquarist's Badge, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

LECTURES on "Fish House Construction" have been given to members of the **Merseyside A.S.** recently by Mr. S. Messenger and Mr. A. Bland. It has also been arranged to continue publishing the society's fortnightly news-letter and Merseyside would be interested to hear from other societies in this respect to arrange to receive other news-letters on an exchange basis. The hon. secretary is Mr. W. T. Kelly, 31, Siddeley Street, Liverpool, 17.

THE fourth meeting of the **Federation of Scottish A.S.** will be held in the Station Hotel, Kirkcaldy, on Sunday, 6th March. Included in the programme will be an illustrated lecture by Mr. R. Niall Campbell on the "Experiments on Fish." The Federation regrets to report the death of Mr. Fred Wilkinson, the president of the Glenoches A.S., who suffered a fatal collapse while on his way home from a meeting. Two more societies have joined the Federation. They are the St. Bernards A.S. and the Ayrshire A.S. St. Bernards is a school society from Glasgow.

THE Bulletin of the **Goldfish Society of Great Britain** recently received a wealth of information and a report on the Conventions. During this year there will be an evening series of lectures on Genetics on which more details will be given later. The dates of the quarterly meetings are as follows: 19th March, 28th May, and 23rd July—all at 2.30 p.m., at Kingsway Hall, W.C.2.

CUPS were received by Miss N. Barnatt and Mr. P. Randall from Mr. P. O. Smith, the president, at the annual meeting of the **Coventry Pool and A.S.** Miss Barnatt received the Course Cup for Tropical Fish and Mr. Randall the Smith-Jones Cup for Coldwater Fish and the Chaytor Cup for the best aggregate in both sections. A successful year was reported with new membership the highest for some years. The society maintained tanks at seven local schools and hospitals, and two more were being installed at the Coventry Spastics' Home at Meriden.

The following officers were elected: President, Mr. P. O. Smith; chairman, Mr. G. Glover; secretary, Mr. P. Prescott; assistant secretary, Mr. V. Wockman; treasurer, Mr. H.

Court; editor of the news letter, Mr. F. Randall.

IN his report at the **Bradford and District A.S.** annual meeting, the president, Mr. G. Taylor, expressed his appreciation of the work done by all members throughout the year, especially in staging such a highly successful show during October. The secretary, Mr. K. Barrett, said that there had been a very slight drop in membership but this had been more than offset by the society's wonderful achievements during the year. The election of officers was as follows: President, Mr. C. R. Wilson; vice-president, Mr. A. E. Thornley; secretary, Mr. R. Marshall; treasurer, Mr. B. Norris; equipment officer, Mr. R. Winterburn; social and publicity officer, Mr. K. Barrett. The committee were elected as follows: Mr. G. Holmes, Mr. K. Riding, Mr. G. Taylor, Mr. K. Smith, Mr. R. Mitchell, Mrs. A. E. Thornley and Mrs. K. Barrett. It was decided that no "annual" show should be held in 1960, but instead, the committee be instructed to consider the possibilities of holding a large-scale one-day open table show.

SECRETARY CHANGES

CHANGES of secretaries and addresses have been reported from the following societies: **Barton and District Aquarists' Society** (T. A. Bear, 61, Anglesy Road, Barton-on-Trent); **Cambridge and District Aquarists' Society** (T. W. Isgrove, 14, Charles Street, Cambridge); **Croydon Aquarists' Society** (D. N. Cooper, 37a, Selhurst Road, South Norwood, London, S.E.25); **Greenock and District Aquarist Society** (L. B. Scott, 31, Lyle Street, Greenock); **Independent Aquarists' Society** (R. N. White, 1, Lough Road, Barnsbury, London, N.7); **Oldham and District Aquarists' Society** (H. Shaw, 2, Lynton Avenue, Hollinwood, Oldham); **Romford Aquarists' Society** (J. A. Hayes, 45, Woburn Avenue, Elm Park, Hornchurch, Essex); **Sheffield and District Aquarist Society** (Mrs. M. Knowles, 171, Woodseats Road, Sheffield, S.1).

OBITUARY

WE regret to announce the death of Mark Welch of the **Nottingham and District A.S.** A member of the society since 1947, Mark Welch was also a member of the Goldfish Society of Great Britain and the Guppy Breeders' Federation. He was well known for his prize-winning fancy goldfish and guppies and also for his judging, lecturing and articles in the aquatic magazines. He was 55, and died after a heart attack.

Crossword Solution

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

DO YOU KNOW THE NAMES? (Solution)

Reading horizontally the names of the plant families are: Ranunculaceae, Cruciferae, Labiatae, Scrophulariaceae, Gentianaceae, Haloragidaceae and Ceratopteridaceae. Thus the second vertical column reads Araceae.