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and Pondkeeper

JULY, 1961



MONTHLY
Vol. XXVI No. 4

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Editorial

IN this issue is a report of the highly successful British Aquarists' Festival, organised by the Federation of Northern Aquarium Societies and held in Manchester last month. The enthusiasm engendered by this annual event has, over the years, given the lie to those who say that the aquarium hobby is losing support. No one could fail to be impressed by the efforts made by the competing federated societies to present attractive displays of their aquaria. Nor could the evidence of the plentifully stocked stands of the dealers at the exhibition, and the sight of the crowds around these, be held to show that the visitors to the B.A.F. were merely curious outsiders to the hobby.

Now, is all this interest and enthusiasm confined to the north of England? We do not think so. Then why, it is being increasingly asked, is no large-scale aquarium show held in any other part of Britain? Why, in particular, are the densely populated areas of London and the Home Counties without such a show? Is the answer to this found in the fact that there is no organised body of aquarists to represent the other regions? We believe this to be at least part of the explanation. A functional organised body of this kind is needed badly, to raise the standard and scale of showing in the south of England.

We believe it is time that the Federation of British Aquatic Societies, if only to justify the national status of its title, did some thinking on this matter. The present number and strength of its federated societies is smaller than it should be, but a start could be made, and we urge such a course of action on the F.B.A.S., not in a spirit of criticism but as a friendly plea to save this body from the moribund state into which it appears slowly to be subsiding. A little more evidence that it really is concerned with the living subjects of fishkeeping and is not totally bogged in committee work and procedure would be likely to do the F.B.A.S. and, incidentally, the hobby as a whole, a lot of good.

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Life in the Garden Pond

by ASTILBES

Photographs by LAURENCE E. PERKINS

MANY pondkeepers like to maintain their garden pond in as natural a manner as possible. They are not concerned with breeding goldfish and so they are able to keep and study varied forms of life which would have to be excluded from the breeding pond. Such a pond can house many creatures which are very interesting and among these must be placed the water snails. When a natural-type pond is required there is no harm done by introducing a few of the pond-type snails. They may multiply rapidly or fail to become established, but in any case it is interesting to watch for the appearance of eggs and young ones.

The largest water snail usually kept in ponds is the freshwater whelk, *Limnaea stagnalis*, a fine shapely snail which grows to almost 2 inches in length. It feeds on vegetation and decaying animal matter. It has been said that it will attack newts and small fish but I cannot think that one would be active enough to be able to do this. The eggs are laid in rather long strands or sausage-shaped pieces of jelly, often on the under sides of water lily leaves. The tiny snails are eaten by most kinds of fishes when they are very small but once they reach maturity few fishes can manage them. Tench will suck the bodies from the shells and are able to crush all but the very large ones.

The disadvantage of having the snails in the pond is that they can eat some of the water plants, make holes in lily leaves and eat much of the food given for the fishes. If young fish are fed in the pond with fine dust-like food the snails soon find this and with a sucking motion of the mouth draw the food to them, and what they do not eat they soon cover up with slime so that young fish cannot eat it.

Another species of water snail often kept in ponds is the great ramshorn snail, *Planorbis corneus*, and, as its name implies, its shell has a whorl like a ram's horn. This species lays its eggs on water-plant leaves and rocks in the



Eggs of the freshwater whelk on the underside of a water lily leaf

shape of an oval blob. These snails feed as the first one described but do not appear to do as much damage to growing water plants, preferring softer decaying leaves etc.

Another interesting species is the freshwater winkie, *Paludina vivipara*, and these snails retain the eggs in the body and release them only when the embryo is fully developed. There are other species to be found in ponds and rivers, which make interesting studies. If water snails are wanted in the pond it will be better to exclude any fairly large tench as the snails form one of the major foods of this handsome fish.

Another pond mollusc is the freshwater mussel. There are several species to be found in the British Isles; one of the finest is the swan mussel, *Anodonta cygnea*, but a word of warning must be given here with regard to this, as with the others, of course, and that is they are not likely to survive for long in a freshly made pond, especially a concrete one. The reason is that these mussels can only live and move about in mud or silt. This is missing from the new pond and so it can be realized that a mussel's life would be very short in a pond which lacks plenty of silt. The danger in introducing mussels to a new pond is that once a mussel dies it soon decays and fouls the water and in a small pond this can be very dangerous.

When introducing new snails or mussels to a pond be very careful to make sure that ones collected from natural ponds go through a period of isolation or quarantine, as they can carry diseases. If possible get your snails from

Please turn to page 64



Freshwater whelk (*Limnaea stagnalis*) crawling over the glass of an aquarium

Freshwater winkie (*Paludina vivipara constricta*)



SOME OBSERVATIONS ON *Pelmatocbromis kribensis*

by DAVID C. SLATER

THE African cichlid *Pelmatocbromis kribensis* is a most interesting fish for both the beginner and the expert. It has many attractive features and, unlike its larger cousins, may be kept in a community tank of small or average-sized fishes. One of its best features is its colour; if the pure gold markings of the dorsal do not make the observer draw in his breath, then the wonderful bluish-pink belly will.

These colours can fade for a period according to the mood of the fish, but in my experience, faded colour periods are short and few. The female is brighter than the male, but he has wonderful finnage; his dorsal, for instance, ends in a point which, in a good specimen, develops into a filament 1 inch in length. Pelvic fins in both sexes are a bright red with a bluey-white leading edge. A black stripe runs from the snout to the tail and just behind the bright eye is an ocellated spot. One or more black spots appear towards the back of the dorsal fin and also in the tail fin.

The first specimens I obtained were bought from a dealer's stand at the British Aquarists' Festival and were only 1 inch in length. Their colour was more or less "fish grey." However, as time passed they grew rapidly; the wonderful colours began to appear, and in 6 months they were mature, sparkling fish, and I decided to try to breed them.

They were placed in a 24 in. by 12 in. by 15 in. tank and provided with broad-leaved plants (*Cryptocoryne*), a plant pot lying on its side, an untravelled nylon scourer and a rockwork tunnel. I had no idea what they would prefer to spawn in, hence the array of suitable spawning gadgets.

They soon settled in their new surroundings and 2 days later were locking jaws, wrestling and tail slapping and filling their mouths with sand from the half-sunk flower pot, and spitting it well away from the entrance. "Ah! so they prefer the flower pot," I thought. Sometimes I saw the female apparently on guard in the flower pot but I could not see any eggs.

Twelve days later there was still no evidence of eggs or fry in the flower pot; then by chance I happened to look down on the tank after removing the cover and in the 1 inch space at the back of the tank between the heater and the back glass I could see the female fanning eggs which were sticking to the tank side. The cheek of the brutes! After all the trouble I'd taken scrubbing rocks and plant pot and boiling the scourer.

Next day both parents transferred the newly hatched fry to a freshly excavated shallow pit in the gravel and then to another pit and another and so on.

Two days later I was fascinated to see both parents shepherding a shoal of fry slowly along the bottom of the tank. It was difficult to see how many there were because each tiny fish had broken dark bands round the body, which were perfect camouflage, and the strange thing was that when I approached they just lay still on the gravel whilst the parent who happened to be in charge at the time came to the front glass and forbade me to interfere.

It was not until two evenings later that I was able to approach them unobserved, and what a sight it was! The fry shoal was about 2½ in. across and its members were

foraging on the gravel whilst mother acted sentinel a bare ½ inch above them. I tried to count them but those camouflaging stripes wouldn't let me. I tapped the glass gently. Immediately the female backed a little and shook her head jerkily from side to side. The fry froze where they were and "disappeared" whilst their parent came and investigated. When she was satisfied that all was well, she returned to her position above her progeny and worked her pectoral fins like paddles to cause turbulence, and this must have been the "All clear," because the fry began to forage once more.

After a minute or two I tapped the glass again and the same thing happened; the same signals were given. During the next few days I observed this interesting behaviour whenever possible danger threatened.

At the end of 3 weeks, during which the female and the male took turns in protecting the young, the parents were removed to the community tank.

Now what would happen when the glass was tapped? Would the fry have associated the vibrations in the water caused by the tapping with the concussion-wave danger signal caused by the mother's head-shaking and lie still as usual, or would they wonder what to do about it, or take no notice or come and investigate? I tapped—they froze.

After about 20 seconds one or two wriggled with impatience as if saying, "Come on Mum, give us the 'All clear.'" Then a group of five swam out of the shoal without much caution and started foraging; the rest followed quickly.

To alter their reaction to my tapping I decided to "brainwash" them. I tapped—they froze. Then using a Pyrex pipette (actually a fat remover I once bought for my wife) I aimed a few hundred brine shrimp nauplia in the direction of the still shoal. As the minute creatures drifted past the fry all mother's careful teaching was forgotten and every tiny fish ended up with indigestion (even if they didn't, they deserved to).

This procedure was repeated three times a day from then on and after only 4 days the fry no longer froze when I tapped but became alert, obviously expecting dinner to be served. Even to-day I still tap just before I feed them.

As for what I feed them on I'll start at the beginning. When the eggs were first discovered I straight away started hatching brine shrimp. There was a plentiful supply 24 hours later but I saw no fry under 4 days old take a brine shrimp nauplius. This does not mean they did not take any, I am merely stating what was observed. Probably up to this time they are still absorbing the yolk sac but to use this seems doubtful. Their first food is probably Infusoria and perhaps their mouths are not quite large enough for newly hatched brine shrimps for the first 4 days. It would be interesting to have other observations on this.

Brine shrimps were supplied until the fish were 6 weeks old, then small white worms, the smallest found in the culture.

When about 1 in. long the fish could manage ordinary white worms and received scrapings from the Sunday joint

before it was cooked, a little proprietary dried food, mosquito larvae, a little crushed cooked cabbage and a few pre-swollen porridge oats (pre-swollen by soaking in a cupful of water then rinsed to get rid of the fine flour-like particles).

It was weeks before an accurate count of the fry could be made without a lot of trouble, but finally an accurate figure was obtained. I reared 92 specimens and there were no runts. The largest are now over 2 inches in length and they stopped shoaling some time ago; I regret this as I think there is nothing more wonderful than watching a miniature waterfall of fish pouring over the edge of a submerged rock.

Do keep this fish. Do breed them; they are not difficult. Do observe them and they will repay what little trouble you take with interest.

LIFE IN THE GARDEN POND

continued from page 62

an established fish pond, where you can be fairly sure that they are free from disease.

Many owners of natural-type ponds like to keep British freshwater fishes in preference to goldfish. Fishes usually kept are the green perch, rudd, minnow, dace and bleak. The bream and carp are also kept but the former is rather apt to be a bottom-feeder and so may not be seen very often. The carp is a slow-moving fish which also prefers to remain in deep water but it can be very long-lived and grows to a large size. Gudgeon are also sometimes kept but they are also bottom-feeders and may not be seen very often in the garden pond.



Ramshorn snail (*Planorbis cornutus*)

If any of the carnivorous fishes are kept they must be very small or they would attack the other fishes. The perch and pike are both handsome fishes but as the latter could grow to over 30 pounds in weight it must be left to the good sense of the pondkeeper whether this fish should be included in the collection or not. If a spare pond is available or a division can be arranged the perch is well worth keeping as it soon becomes tame and will take worms from the fingers when hungry. It is a fine-looking fish with its red fins and black vertical stripes on the dark-green body, and a small shoal makes a fine addition to a clear-water pond where small fishes are excluded. Garden worms can form the chief food as small fish may be hard to come by in sufficient numbers to satisfy the voracious appetites of the perch.



Photo: C. D. Sculthorpe
A beautiful cascade of maidenhair ferns. Top, *Adiantum capillus-veneris*; bottom, *Adiantum canescens*

Maidenhair Ferns

THERE is only one native maidenhair fern, *Adiantum capillus-veneris*, and this is an extremely rare plant of mild coastal and mainly southerly habitats. It possesses the features common to nearly all *Adiantum* species: the spreading fronds are borne on very thin, glossy black petioles and are much divided, the pinnae bearing many, lobed, fan-shaped pinnules. Another species, *A. canescens*, has fronds which are more divided and which bear smaller pinnules than our native maidenhair, so that the first impression of the plant is of cascades of pale-green foliage. Both these species, when once established, reach a height of a foot to 18 inches.

Adiantum canescens Don is lower-growing and has smaller fronds with more rounded, finely toothed pinnules. Fronds arise from a creeping rootstock and the soft green foliage often becomes tinted with gold and brown in the autumn. *Adiantum pedatum* grows to 2 feet tall and has spreading, linear fronds bearing a row of light-green, oblong pinnae on each side of the glistening, black petiole.

The maidenhairs flourish in a compost of loam and leaf mould, and should never be given lime. All the four species described are hardy only in very mild, humid parts of the country and really make better plants in a draught-free site at the water's edge in an unheated or a tropical aquaterrarium.

C. D. SCULTHORPE

THE AQUARIST

AQUARIST'S Notebook

by

RAYMOND YATES



THE winter meeting of the Goldfish Society of Great Britain at the Kingsway Hall included a display of breeders' classes, for which 42 entries were received. Talks on 1960 fish-breeding experiences were given by several members and some interesting points were made: (1) cleaning of parent fish in a bath of weak potassium permanganate solution or acriflavine was a distinct aid to obtaining healthy fry; (2) hand-spawning resulted in a much higher percentage of fertile ova; (3) hand-spawned ova could be kept clean and even washed with dilute acriflavine solution whereas naturally spawned ova were at the mercy of bacteria etc.; (4) the metallic-nacreous cross appeared to give more vigorous fry, but more crosses need to be made before this can be considered a consistent result; (5) amount of light did not appear materially to affect the growth of young fish whereas subdued light effectively controlled "green water" troubles; (6) the use of sifted *Daphnia* and brine shrimp at an early age was advantageous to young alevins; (7) temperatures of 68° to 70° F were found optimum for the development of fry; (8) movement of water in a tank, however slight, was better than none, particularly if suspended foods were being given; (9) there were difficulties in breeding celestials and bubble-eye types (less than 1 per cent. of the young fish were better than the parents and about 1 per cent. were as good). The March Bulletin of the G.S.G.B. prints some interesting points from the notes of the late Dr. R. Atleck, such as: "One bad fish beed into a strain may wreck several years' work." "If a fish becomes ill, it is not the fish's fault." "It is better to eliminate too many young fish than to keep a large number of runts." "Careful selection in the very early stages will save disappointments later." "Results at the end of the season will vary as the amount of effort put into the work during the year." "Use an air pump and diffuser for circulating water gently. Vigorous aeration often does more harm than good by stirring up sludge from the bottom." "Don't attempt to start a strain with poe fish." "Never mate a good fish with an inferior one." The editor concludes the Bulletin with a remark which other club magazines could very well copy: "Do not forget that this Bulletin is yours to give to as well as to receive."

The Japanese weatherfish is one of those species well known by description but rarely seen. I remember about 40 years ago reading the write-up given to this fish in Bateman's book and wishing I had one. Now Mr. Don Abel, writing in *Aquatic Life* (U.S.A.), tells us of his experiences with three specimens. It appears that they do not harm each other but can cause havoc in a community or any other tank. All told, 12 newts, five goldfish and numerous guppies disappeared over a long period from a 20 gallons covered tank. Mr. Abel thinks this is the first time any writer has mentioned the murderous tendencies of this species.

Talking of *Aquatic Life* the editor and publisher, Mr. A. M. Roth, is now in his eighties after 45 years of writing and publishing aquatic literature, which he started in 1916. Have you noticed that, generally speaking, aquarists as a whole are very long-lived? The cost of running the welfare vans will certainly increase when the medical profession get around to prescribing aquaria for ailing patients!

Five American societies exhibited at the World Flower and Garden Show at Chicago this spring. Attendance was expected to exceed a quarter of a million and admission was about 12c. (ordinary fish shows in the U.S.A. rarely charge for admission). The North Jersey Club are

holding a show and exhibition, one contest being for five male guppies displayed in 3 gallons tanks. With this advanced breeders' contest there will be 25 other classes, including one for colour "breakdowns" of pairs of guppies and fighters. Over 70 trophies will be awarded.

A new product on the American market is a powder which is added to the tank water for water-softening purposes. It is said to be excellent for breeding almost all egg-layers, and does not cause accumulation of salt in the water.

I am very well aware that freaks in the botanical world are legion. However, unusual development in aquatic plants is always interesting and worth recording. I am particularly fond of spatterdocks, one of many plants which have two different types of leaves according to whether these are submerged or at the surface. No matter how splendid your submerged leaves prove to be your spatterdock plant will sooner or later insist on sending up some long surface leaves. If these are cut off I have found the plant will often revert to submerged foliage again, as if it felt the circumstances were unsuitable for surface leaves. Recently I have had several unusual leaves thrown up by the same plant that are roughly half of the submerged style of translucent pale-green crinkled leaf, the remainder of each leaf being the normal ovate, waxy, surface variety of a much darker green. The effect is not especially pleasing and would not have any aesthetic effect for hobbyists. Perhaps other aquarists have come across this peculiarity with spatterdocks, but for my part it is the first time I have observed this rather odd behaviour.

There was a time when people who indulged in bird watching were considered to be a trifle odd. Nowadays nobody is ashamed to own to this hobby, which is just as it should be. I was, however, more than a little surprised to hear Peter Scott admit that one of his pet hobbies was fish watching. It turned out that he had spent several hours a day skin-diving in Fiji, just for the pleasure of watching the antics of the denizens of the silent world. This is a form of fish watching few of us can indulge in, but come to think of it, aren't we all fish watchers, we aquarists? No other pet fancy allows the enthusiast to build up a near-natural surround to anything like the extent which is possible with tropical fishes and, to a lesser extent, with coldwater fishes. Not for us the discomfort of early rising, of cramped positions for prolonged periods, of distant journeys and inclement weather conditions. On the contrary we can sit at home and enjoy our fish watching in comfort. Of course, we are at one small disadvantage insofar that we know exactly what we are likely to see whereas the bird watcher is never quite sure what new discovery he may make.

There is another form of fish watching, to be sure, which entails stealthy walks along the banks of rivers, ponds, lakes and canals, and this can be rewarding, given the right time and the right place. The watcher needs not only experience, however, but a keen eye and the knowledge of what he is looking for. Most people taken on such an excursion seem to be incapable of observing much, even when a fish is pointed out to them. Hobbyists will have to

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Is Your Gravel Really Clean?

by D. J. KIRK

ALTHOUGH usually it is dealt with but very briefly in the many books and publications produced for the practising aquarist, one of the most important items in the setting up of a tank is surely the gravel.

Its function as a rooting medium for the main decoration of the tank, the plant life, is obvious, but too often it is looked upon rather as an evil necessity, with little thought being given to its preparation and its importance in the smooth running of the aquarium. Many otherwise beautifully arranged and balanced tanks have been spoiled by careless choice of gravel. However, the decorative aspect of gravel is not the main subject of this article, which is to recommend ensuring that the gravel used is as clean as it should be if the proper functioning of the tank is to be maintained over a long period.

Sources of Gravel

The majority of aquarists, when setting up their tanks, will settle for purchasing the gravel they need from their dealer, in pre-packed bags, but there must be many who, like the author, prefer to search for and collect their own.

The most attractive gravels are usually to be found in wild, stony shores and usually in conjunction with severe cliffs and similar diversions which make it a much more interesting if often a hazardous and strenuous activity. (The cost of one large load of gravel which the author discovered was a broken car spring, caused by carrying the stuff over bumpy moor roads.) Those who collect their own gravel will also have to be prepared to give in to the urge to dismantle their tanks each time they find a gravel which seems more attractive than the one already being used.

The source of the gravel, however, is relatively unimportant as it will all have to be well cleaned whether it comes from the sea or from a bag marked "already washed."

Gravel, in its natural state, is essentially an aggregate of water-worn and partially rounded fragments of rock. The actual type of the rock fragments varies enormously according to the source from which it originated and the types of parent rock from which it was broken off. In theory the main constituents are quartz and the other hard minerals which resist weathering. Soft sandstone particles and soluble minerals such as chalk are broken down or dissolved into fragments too small to be considered gravel. (A diameter of 2 millimetres is considered by geologists to be the minimum size for particles to be described as gravel.) In practice, however, this state of affairs is seldom found. Geological processes are never really completed but are continuous, with the result that gravels found on the shores and at the edges of lakes and rivers contain much more than clean, insoluble mineral particles and crystals.

Contaminating Materials in Gravel

There will inevitably be large amounts of loose fine particles mixed through the coarser grains. This material, often too small to be seen with the naked eye, is washed away from the gravel on the shore by wave and tide action, but this same action causes the gravel particles to grind

together, thus continuously forming more fine material. This is the "dirt" which is washed away from aquarium gravel when it is stirred round under running water, and, being loose, it presents no great problem to the aquarist.

There is much more undesirable material in gravel, however, which is not too easily removed by simply washing it under a tap. In addition to the loose dust which will wash out in a few minutes there is a very large amount of dirt, which is loosely attached to the larger particles of gravel by one or other of the cementing substances always found coating small pieces of rock, especially when these have come from the sea. These are salts and minerals which have become deposited from the water, especially when the gravel has been allowed to dry.

These cements are usually composed of silicon oxide or iron oxide (which gives sand its typical brown colour) or calcium carbonate, which from the point of view of the aquarium is the most dangerous. Now while these cements, in very small quantities though they may be, will not dissolve quickly enough to be removed by washing the gravel in cold water, they will dissolve in the aquarium. There the water is warm, which in itself is enough to facilitate the process, and also the chemical reactions resulting from the life processes of fishes and plants release substances which affect the soluble mineral content of the gravel.

In addition to this, sea-shore gravel (and often, to a lesser extent, lake gravel) invariably contains a percentage of organic remains, mostly in the form of shell fragments which are too large to be washed away but are almost unnoticeable except under close examination. These are almost impossible to remove by physical means but will dissolve slowly in the aquarium.

There are two main results of these processes. Firstly an increase in the alkalinity and hardness of the water, and as soft, neutral or slightly acid water appears to be best for the majority of tanks this can create difficulties in time, especially if one wishes to breed fishes. The aquarist who carries out regular checks on the hardness and pH value (reaction) of his tank water will know how rapidly it can become hard or alkaline. The undesirable effects of water being "wrong" are too well known to need describing, and although these conditions can be corrected it seems rather foolish to have to go to that trouble when they can be prevented from occurring.

The second effect, which is really a result of the first, is that the minute solid particles, formerly held to the larger grains by the cement, become loosened and free. Although these particles seldom appear on the surface of the gravel in noticeable quantities unless it is stirred up, they drift downwards and tend to block up the small gaps between the larger grains and interfere with the free flow of water (and subsequently oxygen) through the gravel.

Importance of Bottom Circulation

Often it is insufficiently recognised that the presence of oxygen in and beneath the gravel is as important, from a long-term point of view, as oxygen in the water above.

Without it the bacteria which convert organic waste into the nitrates, sulphates and phosphates used by the plants cannot survive and their place is taken by other, anaerobic, bacteria whose activity produces substances poisonous to fishes and plants.

This state of affairs, which is usually associated with the presence of black, odorous patches in the gravel, is usually put down to the presence of an excess of organic waste (dead plant leaves, dried food, fish droppings etc.) and this is true, but there can be no doubt that it would not occur so readily if oxygen-carrying water were able to pass easily through the gravel. This it cannot do if its paths are blocked by fine particles of dirt.

A word about sub-gravel filters. There seems little doubt that these provide the most efficient and convenient form of filtration and with them the problems of the preceding paragraph should not occur, since oxygen-carrying water is sucked down through the gravel. However, experiments carried out by the author show that even these can lose their efficiency when there is a large quantity of fine particle material in the gravel, and they can be seriously affected by the accumulation of insoluble dirt at the bottom of the tank, although it does require a larger quantity than would normally gather in the average tank.

So far we have discussed the possible undesirable effects of gravel which has been cleaned only superficially; but what about methods of cleaning it properly?

Best Cleaning Method

The most effective method is so simple that it is well worth while for any aquarist to take the time to carry it out. It is simply a matter of dissolving the soluble minerals before the gravel is put into the tank. To do this an acid is needed and the most convenient is hydrochloric acid. This can be bought in concentrated form in any chemist's for a few shillings and so long as a few simple precautions are taken it is completely safe. A pint of concentrated acid is sufficient to treat thoroughly all the gravel for a 24 inch tank.

First, wash the gravel in the normal way until the water coming off it is clear. Then place the gravel into an enamel basin or sink (do not use metal) and add enough water to cover it to a depth of about half an inch. The acid should then be poured in and the gravel well stirred about with a stick. (Always add the acid to the water and not the water to the acid.)

In nine cases out of ten the solution covering the gravel, which had been so carefully washed and seemed quite clean, will resemble in a few minutes a basinful of coffee, dark, brown and thick with released dirt and with a bubbling froth from the dissolving alkali. No, your gravel was very far from clean!

It is best to leave the gravel in the solution until the bubbling has ceased, stirring it frequently. It can then be washed again in the normal way to remove the loosened dirt. No acid will remain in amount sufficient to cause any harm in the aquarium.

Your gravel will not only be free now from alkali and dirt which would otherwise be released into the aquarium, but will look much brighter and cleaner, as will be seen if some is compared with a handful kept back and not treated with the acid.

There is one other change in the preparation of an aquarium which will bring about an improvement from the point of view of the aeration of the gravel. Normally the advice given is to place the gravel in the tank first and arrange it before adding the water. The result usually is that the gravel is tamped down too tightly and it is doubtful if the water poured on afterwards has the power to loosen it.

Much better results can be obtained if 3 or 4 inches of water are put into the tank first and the gravel is then poured down through it. It can still be arranged easily

into hills and hollows as desired and with the advantage that each particle has a "cushion" of water around it to allow oxygen to pass through. This applies especially where sub-gravel filters are being used, and if the gravel has been cleaned by the method described there will be no problem of cloudy water.

The Natural Aquarium

ON Sunday 11th June, the Twentieth General Assembly of the Federation of Northern Aquarium Societies was held in conjunction with the British Aquarists' Festival in Manchester. An enthusiastic audience heard Mr. R. E. Legge, superintendent of Chester Zoo (late curator of Blackpool Tower Aquarium), talk on the subject of presentation of fishes in surroundings resembling the natural state. His talk was excellently supported by a colour film "Coralrama," which was made for showing at the International Congress at Monaco Aquarium last year, and by coloured slides of aquaria, fishes and natural rock formations.

The film demonstrated the way in which natural coral backgrounds have been built up for marine aquaria at Blackpool. The problem with coral is that it needs to be cleaned frequently because of the growth of algae on it, and this is most difficult to do unless the coral can be removed from the tank. The technique evolved by Mr. Legge permits this and also ensures that each piece is firmly held in place in an elaborate display whilst in the aquarium. This is done by forming a "wall" unit of concrete, reinforced with stainless-steel wire and coloured and brushed to resemble the rock also used as part of the unit, and embedding the pieces of coral (wrapped in polythene) into the concrete before setting so that the shape of each piece is moulded in the surface. The polythene protects the coral but does not prevent the contours and crevices forming an exact mould in the concrete, into which the coral can subsequently be fitted for the tank display. End and side units of rock-coral-concrete are made in this way to fit the aquarium. If only side units are built Mr. Legge demonstrated that the use of blue Perspex sheet, bent to curve forwards from the back corners of the tank, forms a background that gives the effect of distance in the aquarium. Alternatively the wall behind the rear glass of the aquarium can be painted blue or a card sprayed with blue emulsion paint can be placed behind to give the same effect. Among the many practical tips given by Mr. Legge was one to restore the colour of bleached coral: ordinary dyes used for clothing have been found to be quite satisfactory for this. He also stressed that in the marine aquarium horizontally projecting pieces of rock or of coral should be fixed, to provide shade beneath them from the overhead lighting.

SPAWNING OF SEA HORSES

As we go to press we understand that Mr. D. B. Green of the Paramount Aquarium, Hampstead, has succeeded in breeding the Far Eastern marine sea horses after several years of endeavour. There are about 150 youngsters and these can be seen at the Paramount Aquarium. It is hoped that more details about the breeding will be available for inclusion in our next month's issue.

The British Aquarists' Festival, 1961

by A. BOARDER

WELL—the Federation of Northern Aquarium Societies has done it again! I thought that after last year's very successful exhibition this year could not reach such a high standard, but how wrong I was. This show was even better than ever. There were 31 clubs competing and they all made a very brave effort; all their members who actively helped are to be congratulated for doing such a fine job. What a pity such a show cannot be transferred down to the south of England to show what can be done when one breaks away from the conventional type of show merely displaying rows of tanks. The clubs really went to town with ideas to present their fishes in an attractive manner and so make the exhibition very interesting to the non-aquarist as well as the dyed-in-the-wool type of aquarist.

The tanks were at such a height that they were all easily examined and the stands were on the whole very neat indeed. Most of the stands were so constructed that only the front glass of each tank was visible, which added to the beauty of the display. The staging of tanks that was judged to be the neatest and most attractive was that of Sheffield and District A.S., and was exceptionally neat and well balanced. The front was recessed in two places and these recesses held a fine aquascape, one a copy of the Taj Mahal. The whole stand was a perfect example of neatness and well-displayed tanks of fishes. Many other stands were excellent: Blackpool and Fylde A.S. ran a close second with a very attractive display and Gooch and District A.S. were rather unlucky to have insufficient containing at the sides of a very fine stand.

One of the many fine aquascapes was shown as the front cover of *The Aquarist* with the photograph feature represented by a fine watery glade, very attractive and well thought-out. Another fine one was "Swan Lake," a beautifully designed picture, water in front with fish and a small swan, with baller dancers on a lawn clearing in lovely woods. The background was very finely painted. I suspect that it did not get the first prize, only second, as it was hardly suitable for an aquarist's exhibition.

The Fancy Guppy Breeders Association had a fine display of guppies and I was very impressed by the fine triangle-tail guppies, especially by the fine females. I had always rather looked down on the drab female guppy but those on show had brilliant iridescent blue stripes on black dorsal and caudal fins, a great improvement on the ordinary type. The stand was well attended and I understand that many new members were enrolled.

As for the fishes, I saw some very fine tropicals and they were well displayed, mostly in nicely set-up tanks. I thought that the furnished tanks were very good and I could not understand why one well set-up coldwater tank was not awarded a prize, but I know that we judges rarely think alike. The coldwater fishes were a mixed bag and, of course, I realise that many of the fancy goldfish would be in the middle of their breeding season and so could not be spared for exhibition. Nevertheless there were the



Half-timbered effect (visitor and stand) arranged by Salford A.S.

best-coloured shubunkins I had seen at this show since it started in 1951. The best common goldfish was one of the finest I have ever seen. It was large, perfectly shaped and of a fine deep red colour, a real gem. The veiltails were poor: one scaled fish had fair finnage, but to no other fish in the class could I give a card.

The dealers' stands had a wonderful array of fishes and equipment, or so I was informed. I am sorry I cannot give any first-hand information about this as every time I went near these stands they were completely hidden by about four rows of interested buyers!

The attendance on the Sunday was most surprising; it was a marvel where all the people came from to fill the grand hall. Although I saw many old friends I saw very many new faces and so I am convinced that at least in the north the hobby is gaining many fresh adherents, and from talks with the dealers I realise that the hobby is once again becoming one of the leading hobbies in the country as it was in the years after the last war.

I must congratulate the organisers of this great show (once again a few of the old stalwarts did most of the work), for the wonderful exhibition, which I rate as one of the finest I have ever seen.



First-prize stand, by Sheffield and District A.S.



RESULTS

The full details were as follows:

Results: Best fish on show: H. S. Lee (Macclesfield) 96 points. Best other than best fish on show—Tropical apogonids: F. Davies (Middleton) 83 points. Tropical livebearers: S. Westwood (Middlesbrough) 78 points. Cold-water: Mrs. D. Matthews (Northern Goldfish) 90 points. Best society furnished aquarium: 1. Donchury 77 points; 2. Macclesfield 75 points; 3. Sheffield 71 points. Cold-water: 1. Northern Goldfish 72 points; 2. Bradford 63 points. Best individual furnished aquaria (tropical): 1. G. Taylor (Bradford) 83 points; 2. D. Hughes (Macclesfield) 83 points; 3. A. Brad (Goole) 75 points. Best individual furnished aquaria (cold-water): 1. G. Longden (Ashby-under-Lyne) 77 points; 2. G. Hadley (Blackpool) 70 points; 3. G. Holmes (Bradford) 69 points. Best aquascapes: 1. P. Stevenson (Accrington) 87 points; 2. Mrs. C. Kelly (Belle Vue) 83 points; 3. F. Stevenson (Accrington) 78 points. Crappies: 1. S. Westwood (Middlesbrough) 79 points; 2. S. Mrs. C. Kelly (Belle Vue) 73 points. Livebearers: 1. R. Sanders (Mansfield) 72 points; 2. S. Carr (Macclesfield) 66 points; 3. R. Sanders (Mansfield) 62 points. Common goldfish and comets: 1. Mrs. D. Matthews (Northern Goldfish) 98 points; 2. L. Baxter (Northern Goldfish) 84 points; 3. J. Yates (Northern Goldfish) 82 points. Sturgeon: 1. J. H. Hood (Sunderland) 88 points; 2. J. H. Hood (Sunderland) 85 points; 3. P. Hanson (Northern Goldfish) 81 points. Furcals: 1. G. Longden (Ashby-under-Lyne) 78 points; 2. W. Chaffern (Northern Goldfish) 72 points; 3. S. Taylor (Northern Goldfish) 67 points. Veinals: 1. W. Ransden (Northern) 77 points. A.O.V. fancy goldfish: 1. R. Baxter (Northern Goldfish) 79 points; 2. R. Baxter (Northern Goldfish) 78 points; 3. W. Chaffern (Northern Goldfish) 73 points. Cold-water fish (any species): 1. H. Pughall (Oram) 83 points; 2. G. Harper (Belle Vue) 79 points; 3. H. Charlton (Northern Goldfish) 76 points. Angels: 1. P. Farrington (Middleton) 88 points; 2. R. Kay (Macclesfield) 78 points; 3. J. Bassant (Sheffield) 77 points. Dwarf Goldfish: 1. G. W. Cooke (Dewsbury) 89 points; 2. A. Bloom (Salford) 86 points; 3. J. Bassant (Sheffield) 84 points. A.O.V. Goldfish: 1. H. S. Lee (Macclesfield) 96 points; 2. R. Mincehouse (Bradford) 88 points; 3. J. Hodgson (Accrington) 88 points. Fishers: 1. G. R. Wilson (Bradford) 82 points; 2. K. Biding (Bradford) 81 points; 3. A. Posing (Sheffield) 77 points. Labrynths: 1. R. Biddish (Macclesfield) 87 points; 2. R. Biddish (Macclesfield) 81 points; 3. R. Stanger (Macclesfield) 80 points. Bunnies: 1. R. Marshall (Bradford) 85 points; 2. R. Collins (Oram) 82 points; 3. H. Watwright (Middleton) 81 points. Gouramis: 1. Mrs. E. Swanson (Macclesfield) 85 points; 2. K. Ingham (Accrington) 84 points; 3. F. Davies (Middleton) 83 points. Carps and Minnows: 1. H. Fickup (Blackpool) 89 points; 2. R. Mitchell (Bradford) 87 points; 3. J. Preston (Bursley) 78 points. Catfishes: 1. A. Whistler (Bradford) 79 points; 2. L. Thurgate (Dewsbury) 78 points; 3. G. Haines (Bradford) 77 points. Egg-laying Tooth Carps: 1. H. Swanson (Macclesfield) 89 points; 2. R. Collins (Oram) 78 points; 3. G. Holmes (Bradford) 74 points. A.O.V.: 1. F. Davies (Middleton) 95 points; 2. A. Whitfield (Bradford) 89 points; 3. J. Hodgson (Accrington) 81 points. Breeders (Apogonids): 1. B. Revell (Middleton) 83 points; 2. K. Wilbraham (Hochdale) 83 points; 3. A. Posing (Sheffield) 80 points. Breeders (Livebearers): 1. Mrs. E. Swanson (Macclesfield) 78 points; 2. F. Proctor (Bursley) 75 points; 3. H. Stanger (Macclesfield) 73 points. Breeders (Cold-water): 1. J. H. Hood (Sunderland) 83 points; 2. J. H. Hood (Sunderland) 82 points; 3. W. Chaffern (Northern Goldfish) 77 points. Plants: 1. A. V. J. Turner (Ashby-under-Lyne) 85 points; 2. R. Watkinson (Bradford) 89 points; 3. R. Watkinson (Bradford) 85 points.

The Special Prize for the neatest and most attractive stand was won by Sheffield and the "Rose" Shield presented for inter-society competition between Lancashire and Yorkshire clubs was won by Yorkshire. The special prize for the society winning most awards went to Bradford with 26, Northern Goldfish being second with 24 awards and Macclesfield third with 14 awards. The trophy for the individual gaining most awards was won by J. H. Hood (Sunderland).

The Senses of Touch and Distance Detection in Fish

by ALEX BARTSCH

(Illustrations by the Author)

BECAUSE of the failure of our own senses of hearing and smell to function under water, we humans are only too prone to minimise the importance of these senses for other species in such an environment. What of the sense of taste, then? Here, we find ourselves better able to imagine the effect, because of the known capacity of water to act as the solvent of many flavoured substances. But this property, again, causes doubt. How should a definite flavour be determined by a fish from amongst the confusing mixture of many dissolved substances?

What about sense of touch? Since water is an excellent conductor of pressure and sound waves, it seems reasonable to conclude that this should have a special bearing on this sense. With certain reservations these reflections, admittedly based on the sensations experienced by man, are nevertheless correct. Although all sensory receptors play a more or less important role in the life of fishes, it is the sense of touch which must be regarded as the sense peculiarly suited to an aquatic life, and from among all the sense organs of fishes this is probably the most highly developed one.

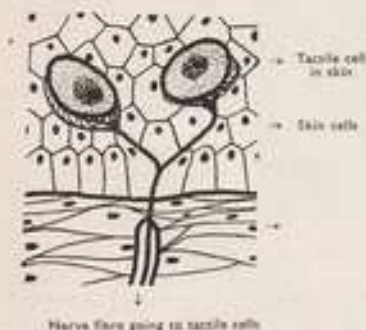


Fig. 1. Section of fish skin showing tactile (touch) cells (modified after v. Langerken).

Basically, we distinguish three groups of sensations of touch in fish; their sense of touch, obviously, is more highly specialised than that of man. The groups are: the general sense of touch, the so-called long-distance detection or current-detection sense and finally the sense which detects pressure and vibrations.

The sense of touch or position is understood to mean the capacity to observe sensations of pressure at one or more parts of the body and to locate them accurately. This capacity, however, may be developed in different degrees at various parts of the body of an individual, because the

number of touch receptors varies between one part of the body and another. As sensations of pressure are purely mechanical stimuli, the receptor organs are called mechanical sense organs. The sense of touch or position is therefore simply a mechanical sense.

The tactile cells, which in their most primitive form only respond to local pressure, are situated within or below the skin. They are sense cells with a specific irritability to various types of mechanical energy. Some of these tactile cells are primary sense cells and need to be addressed directly; others are secondary cells which respond to the pressure of a substance surrounding them, usually a liquid, as for example with the lateral line organ. But more of this later.

The tactile cells, whilst generally distributed over the whole body, are also found in concentrations, the so-called pressure points. In fishes the most frequent concentrations are found in the labial areas, in the cavity of the jaws, the pharynx and also at the barbels and fin rays.

It is often said that the principle underlying the structure of the tactile cells is a simple one, and this is perfectly true, for they are simply free nerve endings (Fig. 1). These adjoin the oval-shaped tactile cell, which is in size about 6-12 microns (1 micron is $\frac{1}{1000}$ millimetre). This cell has a nucleus and in many instances carries a sensory cilium which protrudes from the epidermis. Pressure against this

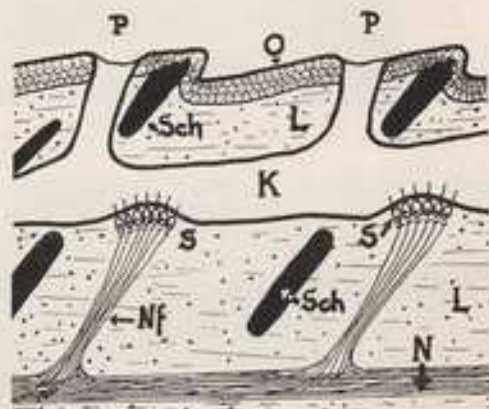


Fig. 2. Section through length of lateral-line organ. K, canal; P, main pores; O, epidermis (skin); Sch, scales (pierced by organ); S, sense cells; N and Nf, nerve and nerve fibres (after v. Langerken).

cilium will cause the touch stimulus to be transmitted, as by a lever, to the tactile meniscus and thence to the nerve fiber.

Although tactile cells are present in great numbers in the bodies of fishes, all functions of their tactile sense cannot as yet be circumscribed with precision. Specific details are known of only a relatively small number of fish species.



Fig. 3. Ends of the lateral-line organ in the skin (H). Pores (P) pierce the scales (Sch), the comb-like edges of which project above the skin.

The sense of touch is considered very important for the intake of food. The sense cells are accordingly well developed and present in large numbers in the labial and jaw areas. Detailed research results on this have been obtained from pike, a fish which as a rule consumes its prey head first. The only control organs available for ascertaining the correct position of the prey are the tactile cells of lips and jaws, which respond to mechanical stimuli and ensure the accurate positioning of prey for swallowing. It is also known that violent swallowing movements occur in freshwater sheat fish, dwarf sheat fish and carp when certain areas of the jaws are being touched.

Much more is known about the sense of distance detection, known as current-detector sense, than about the sense of touch. The sense of distance detection is seated in an organ which is peculiar both to fishes and a number of aquatic amphibia, and is placed down both sides of the body. Here, a "line," the so-called lateral line, runs from the anterior to the posterior, usually along the middle, and in

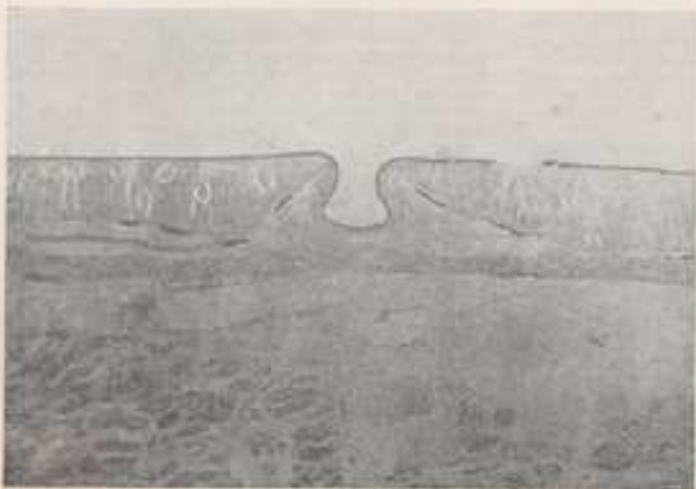


Microphoto: A. Bartsch

Fig. 5. Scale of bleak perforated by the lateral-line canal (-, lower opening; X, upper opening). The canal traverses the scale at an angle (magnified $\times 18$)

most fish forks near the head. On closer inspection it reveals itself as a chain of pores behind which the true sense organs lie embedded in the skin. In each species of fish the lateral line is arranged in a typical way. In fishes where the organ forms a tubular, closed system its branches do not penetrate only the skin, but the scales as well. Looking at these more closely will reveal indentations or even perforations at the outer edge (Fig. 5). Invariably the same scales are pierced in the same manner in each individual of each species, and the arrangement and the number of lateral-line scales are therefore one of the typical characteristics in the determination of species.

The lateral line, belonging to the group of tactile sense organs or receptors, is, of course, a mechanical organ. But secondary tactile cells also form part of the lateral-line equipment. They are usually placed in externally closed canals, or in tube systems. The canals may be embedded in the skin at various depths (Fig. 4). There are a large number of nerve nodules, made up of tactile cells, within the canals or in the tubes passing through the skin (Fig. 2). The canal or tube is filled with a mucous sub-



Microphoto:

A. Bartsch

Fig. 4. Section through skin of miller's thumb (*Cottus gobio*) showing lateral-line opening with its wall tapering towards the top (magnified $\times 120$)

stance and has a large number of branches (Fig. 3) which penetrate the epidermis and terminate as free endings on the surface. Here, the pressure and sound waves transmitted by the water act on the mucus, causing it to compress and to transmit the pressure stimulus to the sense cells within the system.

The function of the lateral-line system consists in the registration of vibrations inside the water or sometimes also outside it. Aquarium fishes, for example, will perceive the steps of a person approaching the tank. Even the smallest vibrations within the water are registered. A *Daphnia* swimming past the tail of a fish will be located and caught with astonishing accuracy. Other senses might, of course, also have something to do with this.



Fig. 6. Group of three sensory cones on minnow's skin. A, cones in the normal position; B, cones deflected from normal position by current of water over them.

The fact that a fish is capable of perceiving even the most insignificant changes of pressure in the water lends itself to the suggestion that the fish is also equipped to detect and locate its own reflected movements, besides the pressure waves of alien objects. Thus blinded fish, for example, will not collide with the walls of the aquarium, but come to a standstill a few inches in front.

Although almost all fishes are equipped with a more or less distinct lateral-line organ, this is most highly developed in predatory fishes, because it serves them to obtain food and therefore acquires a particularly important function. Tests have shown that blinded pike, for example, will catch fishes in their vicinity with absolute accuracy. Typical night fishes, on the other hand, such as for example eels, are not nearly so largely dominated by their lateral-line organ. A blinded eel will not, as would the pike, snatch at a piece of wood guided past its head, because its specially highly developed sense of smell will indicate the object as unsuitable for consumption as food.

A sharp distinction must be drawn between the functions of the sense of touch and the sense of distance detection. This becomes apparent when the nerve fibre of the sense of distance detection is severed before it reaches the brain, for the affected fish will still be able to respond to the general stimuli of touch and pressure. It is also alleged that chemical stimuli play a part in support of the functions of the lateral-line organ, but this has not yet been accurately assessed. Smith (1930-1933) reported that a few minutes after dye had been added to water, evidence of this was found in the mucus of the organ's canals and tubes. Smith concludes from this fact that a chemical stimulus exists which reacts on the lateral-line organ by means not as yet ascertained.

The third form of the sense of touch is called current-pressure detection. This sense is particularly highly developed in fishes. Nature lovers are well acquainted with the phenomenon of fishes in our waters standing head first against the current under bridges and behind weirs etc. This reaction to current may also be observed in the aquarium, where fishes are found to lie head first against

currents caused by the stream from the aerator or filter. The sense of current-pressure detection is to some extent connected with the acquisition of food, for prey is expected to come along with the flow of the current. The sense is particularly prevalent in bottom-dwelling fish.

This branch of the sense of touch also plays a very important role in reproduction. It causes salmon and eels, for example, to enter rivers by either swimming against the current or following it. In this way migratory fishes reach suitable waters for spawning or breeding.

The sense of sight and the sense of touch are co-ordinated in the sense of current detection. That is why blinded fishes lose the capacity to place themselves against the current head first. The essential means for the release of this response are the so-called sensory cones (Fig. 6), which are distributed over the skin. The current of the water deflects these structures, causing the fish to adjust itself to the direction of the current. The effects produced by the sensory cones as parts of the lateral-line organ suggest that this organ not only serves distance detection but in addition functions as a static organ. As it happens, blinded fishes, having lost the capacity to place themselves against the current in open water, regain this capacity the moment they are able to touch the bottom. Therefore, not only pressure stimuli of the water, but touch stimuli as well, are capable of acting upon the sensory cones.

Bed of Roses?

Weeping wife told a judge at Santa Monica, California: "My husband thought of nothing but fish. They were all over the house—in the sink, the bath, in the bedroom, even in the bed." "Oh, come now," said the judge. "Were they really in the bed?" "Quite often," sobbed the anti-fish wife, Jacqui Prescott. "Divorce granted," said the judge.—*Daily Express*.

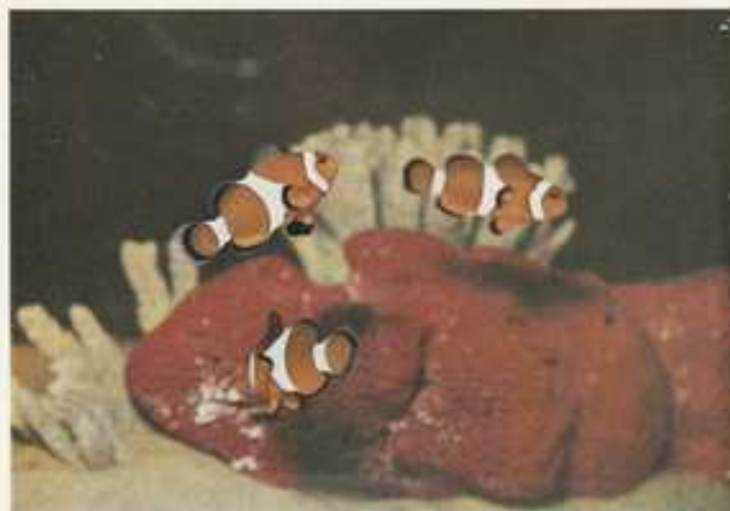
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consider whether the term "fish watcher" might not be brought into more general use when trying to get new members who may not have realised the analogy. Even the Boy Scout movement recognises bird watching by awarding a badge for this study.

"A rose by any other name would smell as sweet" says the poet. Well, there are many thousands of named varieties of roses, not to mention dahlias, chrysanthemums and carnations and I have often wondered if one day one might be called after a fish. Among all the many names, likely and unlikely, one would have thought the tropical fish world might have provided one, but I have not heard of such as yet. The coldwater fancy has got in first, I imagine, with the early-flowering chrysanthemum "Golden Orfe", which has a bright-golden true spray and which produces a mass of bloom flowering all at the same time. What possibilities there are for new nomenclature from our hobby, for example: "White Cloud," "Shubunkin," "Lionhead," "Swordtail"—you can almost visualise the flowers to fit these names. Coming back to fishes it has been said that a man can leave his name behind for posterity through a child, a book or a flower. One might now add, a fish, for there are many fishes named after piscine enthusiasts, names we often use without perhaps realising the fact.

CLOWN FISH among the Corals



Clown fish (*Amphiprion percula*)

AMONG the rich profusion of marine tropical fishes suitable for the home aquarium none can take pride of place. The handsome designs of body and fin, the bold abstract patterns of gorgeously coloured spots and bars, the marked individuality of each little fish, all these are matters of personal taste.

Far down in the blue eerie depths beneath the surface of the Indian Ocean and the western Pacific, vast reefs, often thousands of feet thick, extend for hundreds of miles like great submarine mountains. Built up through aeons of time by trillions of incessantly labouring polyps, their mighty walls and cliffs riven by storms and split into dark submarine canyons and crevasses tower up out of the jumble of boulders, coral debris and dreary miles of silent gloom to the warm surface waters, where the sun, the wind and the churning surf bring life-giving warmth and food and oxygen to repair the ravages of erosion by the sea. At high water the glassy surface betrays nothing of what lies beneath. But as the broad ocean swell hits bottom on the falling tide long lines of foaming breakers pound the seaward edge of the reef sweeping in through the bristling forest of jagged coral branches as the huge table-like massif emerges.

Low tide reveals a stony marsh in carbonate of lime; a vast honeycomb of holes, channels, pockets, stretches of warm shallow sea and clear coral pools of quiet sunny water. Here life seems in unbelievable abundance. Every millimetre of surface is inhabited, every crevice has its occupant. Schools of little black-and-white coral fish, sergeant majors and butterfly fish spar with each other and chase away the sunny hours among the stony branches. Electric-blue and saffron demoiselle fishes flash in the sunshine and are visible at quite a distance. Suddenly blurred white and orange figures appear, bobbing up and down. As you lower your water-glass on to the rippled

by JOHN BOURSOT

Photographs by LAURENCE E. PERKINS

surface and peer into the still deep water below, they are gone. But watch quietly, and soon brilliant little white and orange clown fish will appear among the deadly tentacles of their favourite giant sea anemones, some even emerging from the giants' stomachs. A second longer, and they are chasing plankton with abandon.

Amphiprion percula, the clown fish, anemone fish or golden coral fish, is neatly described by all three popular names; though the aesthetic beauty of the last might well supplant the artless flippancy of the first, leaving the second to puzzle the curious. For reasons hard to define this little fish is perhaps the most endearing of all marine tropicals. It is the most striking embodiment of the typical coral fish of our imagination. The rich golden orange of the head, body and fins is relieved by three chalky bands thinly edged with black. Viewed at eye level these bands are faintly pearly blue. The first band crosses the back of the head and opercula, almost meeting under the chin. The second, starting between the anterior and posterior dorsal fins, sweeps broadly across the sides of the body, bulging forward behind the pectorals and meeting under the belly. The third crosses the caudal peduncle. The large pectoral fins and tail fin are rounded, bordered with black, the border being especially heavy in the males.

The clown fish takes readily to aquarium life and is a



Scorpion fish or lion fish (*Pterois volitans*)



Coral fish (*Amphiprion bicinctus*)



Blue angel fish (*Angelicthys ciliaris*)

model of good behaviour in a suitable community. A number of clowns will settle down peacefully if all are introduced at the same time. However, once they have accepted each other any additional clown will very likely be repulsed. As with most marine fishes they have a strong sense of territory, and will violently defend the particular rock or shelter they have chosen as home. The fine male of a pair which has lived for 3 years in a 12 gallon cement tank will unhesitatingly launch the most dramatic attack upon any intruder, striking again and again with shattering fury.

When, on rare occasions, I have to submerge my hand in the tank I am met with a series of onslaughts which would be intolerable in a larger fish. The little clown charges my fingers, forces itself into my half-closed fist and once drew a tiny spot of blood. Upon withdrawal of my hand he feels he has won a smashing victory. Another remarkable and quite singular form of defence, though milder, is the tail swipe. The fish turns its back on the aggressor (perhaps the siphoning tube, or the long wooden forceps I use for removing uneaten particles of food) and with all the strength at its command suddenly gives a tremendous swipe with its tail, shooting light debris forward like pellets from a catapult and even moving small shells in the violence of the blast. This must be a highly effective way of dealing with small creatures that irritate rather than harm. When uneasy, clowns indulge in a peculiar up-and-down motion.

Feeding is no problem. Dried foods are readily eaten and live food, other than insect larvae, is especially relished. Large brine shrimp send them frantic with delight and the tender flesh of red earthworm squeezed free of earth

is a rich delicacy on which they will gorge with no subsequent indigestion. Raw shrimp and raw meat washed free of juices, and cut into bite-sized pieces, are also eagerly accepted. And when accustomed they will also take fragments of oats. Unlike the male, the female of my pair relishes the freshly killed young of *Mollusca aplousis*, and probably other species, provided that they do not exceed 1 in. in length. When in good health clown fish have huge appetites and should be fed accordingly. On one occasion I steadily fed my pair for an hour and a half, during which time they consumed 33 earthworms of about 2 inches long. In the end I was so tired I had to give up.

In nature clown fish live in friendly partnership with giant sea anemones of the genera *Discosoma* and *Stomatopora*. These anemones, which often reach a diameter of 2 feet, are normally dangerous to other small fishes, but totally innocuous to the clown fish, which will rush for shelter among the tentacles upon the slightest alarm. As in nearly all cases of symbiosis this remarkable partnership works both ways; the fish drops food among the tentacles and receives shelter and protection in return. Opinion is divided upon the exact nature of the fish's ability to penetrate the sea of deadly tentacles unharmed. One school of thought inclines to the idea that the anemone in some mysterious way recognises its little friend and avoids stinging it, and the other favouring the theory of immunity.

At this point I cannot refrain from recalling the similar and equally remarkable fish-coelenterate partnership between the virulent Portuguese man-of-war *Physalia physalis* and the pretty little fish *Nematus gressawi*. The



Damselfish (*Dascyllus aruanus*)

poison of *Physalia*, largely protein, is a neurotoxic poison which is nearly as strong as cobra venom, and which brings rapid death to fiddler crabs and kills other fishes in a few hours. Yet *Nematus*, which habitually lives among the long trailing tentacles, picking at food caught by them and ingesting masses of the poison-bearing nematocysts, is able to withstand ten times the lethal dose for other fishes. In view of this it would not be surprising if clown fish were also immune to the poison of their own particular coelocerate partners.

Clown fish in the aquarium do very well without anemones of any kind. This is fortunate, for whereas *Dicocosa* and *Strobilura* are virtually unobtainable, "ordinary" anemones, which bear little resemblance to either, fail to trigger the anemone-seeking instinct and are ignored. Nevertheless, my clown fish will smuggle down in a bed of long hair-like algae and remain there for several minutes, often quite still.

Female clown fish while breeding in captivity have been seen to lay their eggs at the base of an anemone for the protection of the stinging tentacles. Both parents care for the eggs, and the young, when hatched, are dull grey for the first 2 weeks of their lives. The best temperature for clown fish is between 80° and 83° F.

Clown fish sometimes contract a marine variety of white spot. When the disease first broke out in my tank I cured it by raising the temperature to 90° F and keeping it there till all was well. On the second occasion heat alone proved ineffectual, but the addition of two level teaspoonfuls of sulphathiazole sodium to the aquarium "did the trick." Algae (*Oscillansia*) growing on the sides and coral showed no ill-effects. Microscopic examination of these algae and their fauna isolated in dishes showed that the copepods and various protozoans usually present in all my tanks lived but a few hours, whereas nematodes (invisible to the

naked eye) survived for about 3 days. During treatment, which lasted about a week, the fish developed gargantuan appetites owing to the high temperature, and had to be fed sparingly. Finally, after the last spots of disease had gone the temperature was slowly allowed to drop to normal, and the whole unpleasant incident forgotten.

Occasionally fungus will appear on the sides of the fish in the form of white fuzzy patches. When this happens dip out the afflicted fish with a straight-sided plain glass tumbler. Then, with the three middle fingers of one hand, gently raise the fish to the surface of the water in the glass and, without pressure, dab the fungus with methylene blue applied by means of a wad of cotton wool tightly and smoothly twisted round the end of a toothpick. The fish is then left to swim about in the deep-blue water anywhere from 5 to 10 minutes while the tumbler itself floats in the aquarium in order to maintain an even temperature. Should it float so high as to obstruct the temporary replacement of the glass cover, it is best, as clown fish are good jumpers, to keep the tumbler to the centre of the tank.

The fish is released by lifting the tumbler from the water with one hand and covering the top with the fingers of the other. The blue water is then strained through the fingers into a separate container, and the fish slipped from the glass (not dropped) into the aquarium to join the others. This method is very effective, and eliminates the use of a net, with its accompanying danger of entanglement and inevitable exposure to the air. All movements should be carried out as neatly and quickly as possible in order to avoid a too sharp rise in temperature through long contact between the water and the aquarist's arm and fingers. Needless to say, hands and arms must be perfectly free from dirt, fat, oil, lotions, creams etc. And in warm weather a protracted rinsing will ensure the removal of serine, an amino acid found in human sweat and strongly repellent to most fishes.

Just Joe

by A. A. PONTING

BIG fishes versus little fishes. So the controversy rages, with both camps insisting on the "pros" and stoutly denying the "cons" of their arguments on this subject.

For myself, I like them both large and small, but for sheer personality and character my bouquets go to the "big-uns." Beauty and daintiness as found in small fishes are pleasing, extremely so, but the emotions inspired by them are fleeting ones. How often does the tale prefixed by "Now, I remember a ——" or "I once had a ——" concern something with a bit of weight behind it? Often it was a large cichlid—an angel, a fisemouth, an "Oscar," or even a blue acara. Which brings me to Joe.

When an enterprising dealer prevailed upon me to invest in four two-and-sixpence-worths of inch-long striped aggression, I admit, albeit grudgingly, that I didn't quite realize the majestic growth to which blue acaras are given. Despite the howls of the "you'll be sorry" brigade I can say, hand on heart, eyes piously closed, that not for one second since that dealer prised the ten bob note from my nerveless fingers have I regretted the purchase.

From the onset I realized that these were no "fully-grown-at-2-inches" softies I had bought. Their appetites were a joy to behold and their growth was in direct ratio. So much so that, bitter though the thought, I had to part with two of them.

The two I kept were by this time yanking each other unceremoniously round the tank by their jaws, and so aggressively marital was their behaviour that even I, in my ignorance, decided I had a pair.

The larger of the two was dubbed Joe. Understand me, I have no political bias, but the speed with which he organised a totalitarian state within the tank justified that appellation.

There was some controversy concerning a name for his spouse. I was all for calling her Josephine; "Joe and Josephine sounds rather neat," I thought, giving myself a mental pat on the back. In my house, however, counting one wife and two children (female) I am grossly outnumbered. The opposition decided she should be called Mrs. Joe. For once, I must admit, womanly intuition had got something. Such is the virility of our Joe that, under no circumstances could he be imagined saying to his wife those time-honoured words "not to-night, Josephine."

Still the Philistines mocked as the pair kept on growing, but respect, even admiration, began to creep in. The word ugly began to be used less and less until Joe made a base lie out of it. Displaying to his wife he was, and is, beautiful, nay magnificent. With dorsal, caudal and anal fins spread rigidly into a continuous fan of scintillating blue and deep maroon he is a regal fish indeed. He is king of his domain and looks it.

The time came when we recognised the need for the continuation of this noble line and with high hopes the pair were transferred to a 48 in. tank. No time was wasted. After a day or two of furious display by Joe, a stone, conveniently placed at the front of the tank, was cleaned to I.T.V. whiteness and the eggs were deposited thereon.

Surprisingly few eggs failed to hatch and within the week free-swimming fry were being sucked alarmingly

into parental mouths, washed over, spit-dried and accurately spat back into the heart of the brood in somewhat dazed condition.

Parental bliss was complete but for one thing. Mrs. Joe allowed Joe his stint at baby-minding during the day, but as night approached she gathered her brood behind a stone and with the aggression of motherhood she clouted Joe most unsympathetically to the other end of the tank. Presumably she had weighed paternal love against acara appetite and resolved: no Joe—no midnight snacks.

So the babies were reared until signs indicated the arrival of another regiment of snorks. It was decided not to push our luck any further and the youngsters were removed to another tank.

Since then eggs have been laid with monotonous regularity. Fry and eggs both have been given to various enthusiasts and, if even only a fraction of these reached maturity, there should still be enough around to stock a "frying-to-night" emporium for many weeks.

To be described as "fish-like" certainly does not conjure up visions of ardent and lasting passions. Fishes are often condemned as being emotionless. This may be true of the "titches" but certainly not of Joe and his pals. No, sir!

For 4 days Mr. and Mrs. Joe both moped whilst Joe was at one of the major national shows. His return and their reunion was something to behold. One adoring glance passed between them and they flew to each other with abandon. For spells of 20 minutes at a time they locked jaws and pulled each other ecstatically around their paradise. The following morning black semicircular bruises on their jaws (Joe's upper and Mrs. Joe's lower) bespoke the heights of their ardour. Needless to say they immediately took to polishing their favourite white stone.

Now, far be it that I should try to besmirch my paragon, but, I have to confess it, Joe has a weakness. Our first indication of this threw the family into a panic. Joe, fins folded limply round his ailing body, lay on the gravel of his tank looking lugubriously at the world without. The look of abject misery on his rugged features pierced us so, that laughter in the house would have been nothing short of sacrilege. We tried to tempt him out of his melancholy by dropping tit-bits on his nose. Considerately he bravely tried a few and nonpossed one and all by being actively sick. This may sound a bit fantastic but such are the facts.

It was then we realised that Joe's beloved outline had changed somewhat and he was decidedly deeper on the undercarriage. Could it be that our loedly Joe could be constipated? The bitter answer was—"yes."

Epsom salts dropped by his head elicited no response. *Tish/ee* worms, reputedly laxative, were contemptuously spurned. Still Joe gazed at us with accusing eyes. With trepidation I went for the biggest net. A clean cloth was soaked in lukewarm water and wrung out. When Joe was netted a typhoon seemed to descend on the tank. Water cascaded down the walls and rivulets ran down my shirt front but my mission was one of mercy, so I pressed on regardless.

When wrapped in the wet cloth the patient lay quiet and trusting as if confident in my motives. True he refused to open his mouth for the pipette with the cod-liver oil, but I

knew he'd had enough when it began to ooze from his gills. Back to the tank went Joe, indignantly ejecting globules of oil from his bellows. Off to bed went we with hope in our hearts and fingers crossed.

The next day dawned radiantly. Joe, slyph-like in his slimmess, had regained all the gloss that was, and the family breathed again.

For months now the girls (aged 3 and 4) have petitioned for a tank in their bedroom. For months now I have held

out against it on the grounds that my tanks are overstocked and that any new ones would be of more use in the fish room. My case has weakened badly in the past few days, however, because my wife has now allied herself with the girls. Resistance is ebbing rapidly, and in a moment of weakness I asked the female faction what on earth I should put in their aquarium if they got one.

Needless to say, the chorus which came in deafening unison was—"Just Joe!"

Breeding *Hyphessobrycon callistus serpae*

by A. HINDMARSH

WHEN I purchased four young *serpae* tetras I was not aware that there is another very similar species, known as *Hyphessobrycon callistus minor*. Later I found out that *H. callistus serpae* and *H. callistus minor* are in most respects the same; the main differences are in the colouring and the markings.

With *minor* the body colour is bright red, and it carries a black spot on the shoulder. The *serpae* has a darker red overall colouring and a pronounced black bar running vertically down the shoulder. Sexing of *H. callistus serpae*, which is the species I am dealing with, is not very simple until the fish become mature. So the four young *serpae* were lavishly fed on *Daphnia*, *Cyclops* and small amounts of dried food and Bemax. Placed in a large well-planned tank, and after some months on this balanced diet, the fish became larger and in tip-top condition. Still receiving as much variety of food as possible, the fish took on a marvellous appearance and eventually matured.

Love play was noticed and a serious attempt at sexing was possible. At first it was extremely baffling but, on close study, it was found that there are marked differences between male and female *serpae*, and in the end I found a positive way of distinguishing the sexes, provided that the fish are really mature and in the best of condition.

First of all take particular notice of the two which are paying most attention to each other. Look closely at this pair, and the female can be identified by her rounder appearance and slightly less colourful body; her anal fin shows only a small black wedge at its end, the dorsal fin is not such a pronounced black and it has only a thin hyaline border to its rear edge. The anal fin contains a small amount of white at the tip.

Now for the sexing of the male, which is much slimmer and brighter than the female. Its dorsal fin is jet black and has a wider hyaline border to its rear edge, but the positive identification is the larger black wedge at the back of the anal fin. This fin has a black border, and also shows a pronounced white tip at its bottom edge. Generally, the tail itself is a deeper red, and the vertical black bar is deeper and larger in the male.

After a definite pair had been found, two that showed a preference for each other (which is most important), the fish were netted and separated in different tanks. The pair were fed continuously three times a day on *Daphnia*, *Cyclops*, mosquito larvae and chopped earthworm when available.

In the meantime a 18 in. by 10 in. tank was prepared. This was thoroughly cleaned with hot water (not hot enough to cause the glass to crack), steel wool and a small amount of Dettol. After a good scour out, including underneath the top edge of the tank, it was rinsed thoroughly with running water until I could not detect the odour of the antiseptic.

Some pebbles were boiled, sufficient to cover the bottom

of the tank evenly, and then peat blocks also were sterilised by boiling. These were layered at one end of the tank and, before filling the tank with ordinary tap water, a large bunch of coconut fibre was dropped in. A very clean thermometer was used, the heat was switched on and vigorous aeration was commenced. I cannot stress enough the importance of extreme cleanliness. The temperature was raised to 80°F and the set-up was left for 2 to 3 days until the water had become a beautiful clear amber colour. Depth of the water was about 6 inches.

The male and female were captured with a sterile net and introduced to each other in the tank prepared for them. Late evening was chosen, so that it wouldn't be long before "lights out," giving them a chance to settle down during the hours of darkness.

The day after, a check was kept on them, because the following morning was quite bright, but little or no interest was taken in each other. By evening this situation had altered, and driving was noticed. The male began making quick darts at the female, enticing her to plunge into the coconut fibre, but when darkness descended no actual spawning had taken place.

Next day I had time to watch them in the early morning only for a few minutes; once again there were signs of thin sunshine. At midday the female hurried out of the fibre and she showed definite signs of wear and tear. Her fins were ragged, her body was much thinner and on close scrutiny of the tank one or two very small clear eggs were visible adhering to the fibres and resting on the peat blocks.

Needless to say, I netted the pair immediately, and in removing them wrecked the tank. The two were placed together with other stock fish, so that I could be sure to recognise the actual spawning pair again. Later, when the tank had settled, all I could see were a few "white" eggs. I then shaded the tank with the aid of newspapers, to cut out as much direct light as possible.

The next evening I witnessed a remarkable sight when I switched on the cover light over the tank. Flitting in all directions, and almost too quick for the eye to follow, were spiralling small elongated transparent eggs with whip-like tails. In other words the eggs were just hatching. On the second day after spawning I counted about a dozen intensely black fry, quite small, adhering to the glass sides of the tank.

After 2 or 3 more days the fry began to swim freely and I commenced feeding on tube fry foods, and then on brine shrimps. Small amounts of dried egg, mixed thoroughly in a test-tube with the same tank water, were used sparingly. After a while sifted *Daphnia* and *Cyclops* and an occasional pinch of fine dried food were used, until the fry were big enough to be netted and placed in a larger tank for growing on. The eventual number raised was about 50, but I'm certain the original brood was a little larger.

How Does a Fish Swim? by DAVID GUNSTON

HOW does a fish swim? Just by swimming—some may be tempted to retort, but it is not so simple as that. There are three ways of swimming, not all readily obvious to the eye. Indeed, in its own strange, dense, heavy medium the fish is a continual miracle of locomotion.

The three distinct swimming methods are, first and foremost by muscular movements of the entire body, by fin and tail movements and by jet-propulsion of streams of water from the gills. Most fishes use all three methods, sometimes together, sometimes singly.

It is generally assumed that a fish swims by moving its fins, but in actual fact a fish's principal motive force lies in its elaborately muscular body wall. The fins play a very secondary role in forward motion in almost all kinds of fishes. Every fish has a great body mass of marvellously inter-connected W-shaped muscle segments reaching from gills to tail. These segments are the main portion of the fish we eat, and without their very specialised design no fish could glide through the water as it does.

This muscular construction enables the fish to move forward in sinuous fashion by driving the resistant water backwards from the body surface. The easy, co-ordinated body strokes produce waves of pushed-back water. As these pass along the body alternately on each side, successive parts of the creature's body are pressed against the water and so sufficient forward forces are produced to drive the fish along, even against currents. This successive contraction of the muscular segments with its alternate pushing against the water first on one side and then on the other may be compared with the way a skater pushes against the ice with alternate legs. The faster the fish moves, the more violent this muscular action has to be, as is immediately obvious to anyone watching any fish endeavouring to make a swift getaway. And the narrower and slimmer the fish, the greater the size of the muscular contractions, which are largest in the eels and lampreys. This side-to-side method of progression is the exact reverse of the swimming technique of aquatic animals such as porpoises, seals and whales. With a totally different body structure, and the need for continual replenishment of air, they have found it easiest to swim by a vertical up-and-down style.

It is this completely concentrated muscular construction that gives the fish its mastery of the water. No land creature has its main motive force compacted entirely into the body wall: instead, the forces are dissipated into limbs, arms, legs, wings, each with their own operative set of muscles. The fish is really a single complex unit whose every movement is controlled by the successive interplay of its linked muscles stretching from head to tail.

Nevertheless, it is easy to exaggerate the fish's performance in its chosen habitat. To ourselves, living continuously under the law of gravity, water seems so dense and heavily resistant to our physical movements that we tend to assume that fish really achieve something superhuman when they reach speeds of 20 or 30 miles per hour in it.

What we may forget is that, compared with our own motive efforts, the fish can achieve much greater economy of energy. The water in which he lives has a specific gravity almost equal to that of his own body. This, of course, means that most of his weight is held up by the water, and hardly any effort on his part is needed to support himself. By way of example, a 20-pound fish in salt water weighs only about 1 pound, so when he swims along or rises, he has only to lift one-twentieth of his actual weight.

In this way he can conserve almost all his energy for swimming forward. It is as if a man of average weight found himself on land weighing only 7-8 pounds. How agile and mobile he, too, could be!

This also explains why we can catch a 20-pound salmon on a line with only a 5-pound breaking strain, provided that we gaff him! A played fish allowed to tire himself on a run line actually does so almost entirely by moving forward, not by dragging the strain.

Fin and tail movements play a comparatively minor role in swimming. For a long time it was thought that both were of paramount importance to fish motion and balance, but much of this theory has been exploded by experiment. Fins and tail aid forward progression and play a small part in maintaining balance, but their chief use is in general manoeuvring and steering, in the countless delicate movements—a flick here, a glide there—that keep a fish on the course he wants. They help him to dive or rise in the water, and the fins especially enable him to remain motionless in one spot whenever necessary. As the normal backwardly expelled water from the gills tends to move the fish forward, the sinuous back-paddling of the fins counteracts this and keeps the creature immobile.

But the importance of fins is much smaller than might be expected. Experiments in which the caudal fins of certain tank fish were trimmed off with scissors showed that they could swim as well and as fast as unmanipulated fish of identical size and kind. Removal of the dorsal and anal fins affected balance a little at first, but this was soon adjusted. Total removal of the fins did not prevent the fish from swimming normally, though it reduced manoeuvrability, for many fishes find the pectoral and ventral fins useful for sudden braking in the water. For this reason, fishes with small or stiff pectorals tend to swerve aside from obstacles rather than stop suddenly before reaching them. Black and striped bass, on the other hand, with their highly flexible ventrals and pectorals, can brake swiftly and even swim round in a flash, as if on a pivot.

The third method of swimming, by simple jet-propulsion, is used all the time by a fish swimming normally forward, and as we have seen has to be counteracted when the fish wants to remain stationary. It is possible that it is also used especially to aid a sudden getaway when the fish has to dart off at speed from scratch. But its chief use is confined to flatfish, which spend much time more or less motionless on the bottom, lying on one side. Most flatfish seem instinctively to realise that if they breathed with the upper, exposed gill, its opening and closing would betray their presence to enemies, for the avoidance of which Nature provides natural camouflage. So instead the body is slightly arched and breathing is carried on by the lower, hidden gill, which sends its stream of water along under the back and out by the tail. When a flatfish wants to move off in a hurry, it simply sends a powerful stream of water out through this same gill, which lifts it right off the bottom and well away to a good start. Jet propulsion of this kind enables all flatfish to become instantly mobile if necessary.

There is also a theory that closing one gill chamber and sending a strong jet of water out of the other may also enable a heavy fish to turn easily, but of all the three swimming methods this one has received the least attention, and much of our knowledge of it is speculative. Yet it is clear that the gills are primarily breathing organs, not swimming devices. A fish's best swimming device is its own marvellously designed body.

The Firemouth Cichlid

by JAS. STOTT

THE firemouth cichlid (*Cichlasoma meeki*) is a fish capable of attracting immediate attention, especially the male, with its extra brilliance of colouring. A red flush on the underparts, which extends to the mouth, provides the fish with its popular name and this, as well as the large, clear eyes, makes for an arresting appearance. They are not fish to be recommended for the community tank, for they are pugnacious, particularly when in breeding condition. Despite this they are worth that extra large tank to themselves.

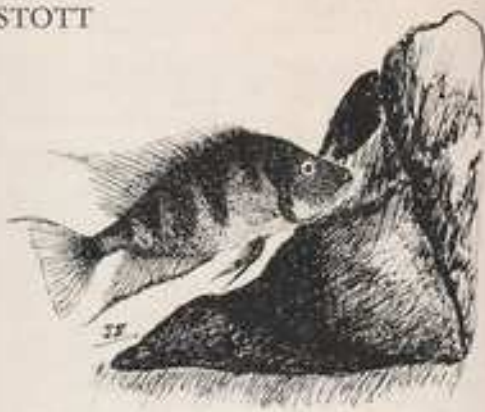
When young these fish may accept plants in the aquarium but adults will seldom tolerate plant life of any description, and uproot plants and tear them about almost as soon as introduced. This does not mean that the tank needs to be bare and uninteresting; rockwork placed in a natural manner can produce some attractive effects and, what is more, these fish, as with other members of the cichlid family, look quite well in such a setting, which seems to be right for them.

They are, in the main, carnivorous and heavy feeders, needing plenty of good, meaty food for tip-top condition. The food should consist of earthworms, white worms, shredded meat and raw fish, *Tubifex*, mosquito and midge larvae and such like, with a change as frequently as possible to provide variety to the diet; this is also a help to retain condition. They soon become tame and can be trained to take food from the fingers, which is always impressive to onlookers.

Sexing the firemouth is not difficult. Apart from the slightly more intense colouring of the male when coming into breeding condition, he can be picked out by the longer, pointed tips to the dorsal and anal fins; those of the female are more rounded. She is, of course, fuller in the body just above the ventral fins when in breeding condition. When a male and female have decided to pair there is much displaying on the part of the male and the fish circle around each other. Later they begin the well-known cichlid habit of gripping each other by the mouth and having what looks like a trial of strength.

The pair begin to make shallow depressions or pits in the sand but these are seldom used for the actual spawning. The eggs are usually deposited on a rock or on the inside of a plant pot if one is placed into the breeding tank as is often recommended (although, of course, this is not necessary). Wherever the eggs are placed, however, the area is used only after it has been thoroughly cleaned by the breeding pair. Until the fry hatch turns will be taken to aerate the eggs and guard them instinctively, but after the hatching the fry are moved by the parents and placed in one of the pits or depressions in the sand, where they can be seen as a wriggling mass of tiny bodies.

Periodically the youngsters will be moved to a fresh pit; this will be done several times a day until they become free-swimming, which should be in about 3 or 4 days at a temperature around 78°F, a good temperature for the breeding tank. Now, along with food for the adults, food for the fry



should be supplied; micyn worms and newly hatched brine shrimps provide a good start (Infusoria is not necessary for the fry are big enough to take larger foods at the start). Chopped white worms can be added after a few days when growth permits. When the youngsters are 5 or 6 weeks old the parents can be taken away.

While I do not think the degree of hardness of the water matters very much with this fish, within reason of course, I do think that a slightly alkaline water is beneficial, say about pH 7.2. The temperature seems best in the region of 75° to 78°F (the higher temperature is used when breeding). For a breeding pair it is advisable to use a tank no less than 24 in. by 12 in. by 12 in., a little larger if possible. The tank should contain at least an inch of sand to provide sufficient working depth for the fish in their pit-excavating activities.

ARE THE POND FISH HUNGRY?

DURING the summer months, when it is probable that there is plenty of natural food in the water for the fishes, it is unwise to feed them artificially. If the fishes are not hungry the food will be uneaten and could pollute the water or at least encourage the formation of Infusoria and green algae. To test the appetites of the fishes just throw a small piece of dried brown bread crust on the water. If they are hungry they will soon be up at the surface biting at the food. Some broken worms or other food can then be given but if no sign of feeding is shown by the fishes then give nothing for a day or two, when the test can be repeated.

Guppies Like Things Clean

by PETER DENDY

THAT guppies do best in crystal-clear water has long been realized, but a great many people do not give this particular aspect of their hobby enough thought and attention. It is a sad sight to see guppies moping about near the top of the water or else banging their gills frantically against the gravel or the stems of plants. Guppies are particularly sensitive to an increase of bacteria in the water, which has an immediate effect on them, irritating their gill membranes and making them really distressed.

The guppy is essentially a lively and happy little fish, in which lies much of its charm, so if you are going to keep guppies at all, then give them an environment which is to their liking. This may involve you in extra work and care and attention with your feeding technique, but you will be well rewarded. If you are the type of aquarist who tips in bags of food and leaves the bottom filter to look after the water then I hope I can persuade you to mend your ways.

Paul Hahnel was over here from America last summer and had a great deal to say about water and the guppy. His technique has since been the subject of much discussion and some people have disagreed strongly with his methods. Nevertheless there is much to be commended in his system and if you don't feel like adopting his routine altogether then you can still benefit, as I have, by adopting part of it.

Setting up the tank

Place a piece of glass 1 inch wide vertically along the front of the tank, held back by two other pieces each 3 inches long, to form a clear area behind the front panel of the tank. Fill behind with well-washed compost, sloped up towards the back to provide a good crossfall. Plants are arranged in straight rows each way like an orchard to facilitate cleaning. Hahnel uses Indian fern plants about 1 inch high. He has chosen this plant as an indicator to sub-gravel conditions, as it is sensitive to bad compost and the roots then quickly rot and allow the plants to rise to the surface, so giving warning if anything goes wrong.

The tank is filled with water drawn from the tap and allowed to mature for a week, during which time the hardness is adjusted to 12 to 14 degrees (Clark's scale). Hahnel considers that the hardness figure is quite critical and the water all-important for guppies. It must not only be sparkling, but chemically pure as well, and a concentration of urine, let alone malm, is detrimental. The tank equipment is completed with a feeding square anchored to the front of the tank and any food particles falling to the bottom are immediately visible in the clear area and so may readily be siphoned out. Each tank is also provided with an external filter to remove suspended matter from the water. After setting up, the tank is left for 3 days before the fish are introduced.

Hahnel has flock-bred on a selective basis for 15 years and starts each tank off with selected pairs of fish, 8 to 12 weeks old, these being allowed to breed undisturbed in the same tank. Gravid females are not removed and the fry fight it out with their parents. He also installs a catfish in each tank, who trivates about all the time and works malm and other particles down the slope of the gravel into the clear area for removal.

Routine Maintenance

Every week the compost is stirred by running a planting stick up and down between the rows of plants, to dis-

lodge any matter lying there, and then one-third of the water is siphoned off and replaced with matured hardness-adjusted water. If an undue amount of sediment comes up an even bigger water change is made. (Try digging about in your nice clean compost—you'll get the shock of your life when a fog and bubbles of methane come up!)

When each tank is set up a date exactly 3 months hence is put on it and at this date, and no later (even if the wife wants to go to the pictures), the tank is taken down and the whole process started again. The guppies are put into an inspection tank and sorted over. The best are put aside for continuing the line, the next best put into a sale tank and all the poor and mediocre fish are fed to the cat! Yes, really, apparently the Hahnel cat loves live guppies and makes short work of the runts at a call of "puss, puss" from Mr. Hahnel.

Feeding

Hahnel feeds little and often and uses a variety of dried foods as well as miniature white worms and brine shrimp. The brine shrimp is raised in two heavily aerated hatchers and well washed before being fed to the guppies, to avoid adding even small amounts of salt to the water, which might upset the chemical composition. He does not bother to separate the egg shells; he considers these to be sterile and therefore harmless.

Paul Hahnel says that he does not know what "hollow belly" is, and never experiences moping about or gill-banging with his guppies, and I will bet that very few, if any, other breeders of guppies could say the same. I have tried the Hahnel system exactly as set out and to start off with my guppies had such a shock from all the cleanliness around them that it took them a week to get used to the idea. I also found that the water clouded after a week or so and it was necessary to be extra careful with the feeding until it cleared again. This seems to be a common experience with this system and can be avoided by saving half the old tank water to seed the new water.

If you don't adopt the system completely then at least use the strips of glass to keep the front area clear. Use a feeding square and make a quarter to one-third water change every week. Some people may sneer at the use of a feeding square and say that it is beginner's stuff, but believe me you will be amazed just how much food does fall to the bottom, however carefully you feed, and you will never know this until you adopt the feeding-square and clear-area system. Surplus food should be removed frequently by a dip tube or siphon.

Thermometer Tip

I have two thermometers, one stick-on type and one of glass pinned to a plastic scale. Both are losing the black defining marks. How can I make the scale legible again?

Treatment of engraved scales of thermometers by rubbing a piece of cobbler's heel-ball over them is a satisfactory way of restoring the visibility of the marks. The black wax does not readily come off in the water and is harmless to the aquarium inmates.

our readers

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.

Consumer's Survey

A FEW months ago two fellow aquarists and myself conducted a survey of half a dozen well-known aquarist shops in the London area.

Prices and sizes of fishes and plants were jotted down and impressions of condition of tanks, shop, lay-out and manners of the manager and any assistants were noted down.

In only one shop did we find that more than two nets are used—in this shop the nets are kept when not in use in a can not only filled with a disinfectant but kept on a stove so that the disinfectant is always hot.

We hope to conduct another survey soon, on a larger scale, visiting more shops and taking more notes, to compare amounts of live foods given and range of brands of foods and equipment stocked.

J. R. HOOTON,
London, N.W.10.

Tape Recordings and Picture Shows

MR. H. J. Vosper makes some very interesting points in his letter about tape recordings and colour slides (*The Aquarist*, May). Some 18 months ago a few members of the Walthamstow and District Aquarists' Society formed a small unit, called "Sapere Aude Productions," our aim being to produce slides and tapes relating to the hobby. The work involved in producing complete programmes of, we hope, a high standard is indicated by the fact that it took 9 months to prepare our first tape/slide show. This runs for 1 hour and is in two parts so that a break can be taken in the middle. The show is about egg-laying roach and has already been shown to several clubs in London and Essex.

Quite a few interesting points arise from preparing such a show and some of these may be of help to others embarking on similar projects. Firstly it is imperative to make up your mind just what the show is to be about (not such an unnecessary comment as it may seem!). Then you must write a treatment and a shot list. Without working to a plan you can waste a lot of time, and money, on colour film. Just photographing things which, at the time, appear to be pertinent to the subject, will result in a lack of continuity in the finished show. An official of one London society proudly told us that the show which his club was presenting to a large audience was the result of selecting some 80 slides from the several hundred taken! With a good plan, and a capable photographer, you should not waste more than one-fifth of the shots taken.

About one hundred slides, with titles, seems to be a reasonable quantity for a 1 hour show, and we strongly recommend a break half-way through this period.

Having prepared the slides the next job is to write the commentary. Ad-libbing a taped commentary is quite



write

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

unsatisfactory, and, a point which Mr. Vosper missed, you can have someone with possibly a much nicer voice to act as commentator than the would-be lecturer himself! The commentary should be complementary to the picture and should tell a story. It does, however, quite often happen that the commentary relating to a particular slide does not last as long as you wish the slide to be projected. Such gaps should be filled with music or, if appropriate, a sound effect such as a pump working over the shot of a filter.

Synchronising the slide changes with the tape may worry some producers. We just rely on an intimate knowledge of the commentary and use that as a cue; it has proved quite satisfactory. We did consider superimposing a click on the tape, or operating a cue light, but decided against these as they can be exceedingly distracting to the audience.

Our group is now planning a recording about breeding a particularly difficult characin with which a member of the Walthamstow Society is currently having notable success. We also hope to produce further slide/tape shows. Mr. Vosper's views are heartily endorsed and we look forward to an increasing exchange of information via the medium of slides and recordings.

W. J. CHENEAU,
Sapere Aude Productions,
Walthamstow and District Aquarists' Society.

Tough Kuhl

IN Mr. R. W. G. Cole's letter (*The Aquarist*, February) he mentions that he had trouble with a white fungus in his tanks. He put the empty tanks outside to be cleaned and later he found a guppy still living in a small quantity of dirty water.

A few months ago, I received some tanks with fish in them, from a man who lives across the road. He had three tanks and decided to put the fish from one of the tanks into another tank to save trouble when bringing the fish over to my house.

After 3 days, he and I were going to bring the tanks from his house. I happened to glance into the empty aquarium when I saw a kuhl loach swimming about in about half an inch of water which was very cold.

I now think that, in the sense that Mr. Cole means, the kuhl loach would be a close second to the guppy as the King of Tropicals. I am sure that many other readers will agree that the kuhl loach is a very fine fish to keep.

DAVID TWISS,
Glasgow, W.I.

Tropical Marine Aquaria

I AM pleased to see the recent articles on tropical marine aquaria. As a dealer I am more than aware of the present difficulties in launching out into this fascinating branch of our hobby. I personally, and no doubt several other

dealers throughout the country, am trying to overcome these difficulties. The main problem is obtaining an uncontaminated supply of sea water. Special sea salt mixes are available, but these are very expensive and only used by myself when water is urgently required at a time when collection from the coast is not possible.

However, for those hobbyists who are near the sea, or who have the time and facility to visit the coast, obtaining a supply of sea water is no real problem. It is important that the collection point should be on a wind-swept coast away from heavily populated areas where contamination would be present. The water should be taken before the turn of the tide and at the highest point of the tide. In so doing the hobbyist will be taking water which is coming in from several miles out to sea, and this will be reasonably pure. Sea water must be transported in glass, polythene or enamel containers, and metal must not be in contact with the water at any time. Heavy filtration is generally recommended to keep the risk of contamination down to a minimum.

The one other real headache, apart from the sea-water collection, is the feeding. Most marines will not readily take dried food and brine shrimp hatchlings will be required to help out with other foods. White worm is excellent but cannot be fed as a constant diet and must be supplemented with other foods. *Daphnia* is readily accepted and should be offered whenever available. *Tubifex* worms are not to be recommended. However, after a while most marines will learn to accept dried food and this helps in the feeding problem. It is of paramount importance that overfeeding is not practised. Any uncast food or other foreign matter in the aquarium must be removed as soon as it is noticed.

By observing the above basic points any hobbyist will find marines easy to keep. Although rather expensive compared with the general run of freshwater tropicals, the sheer brilliance of colour and variety of shape makes the marine tropical fish outstanding against the freshwater tropicals. Also, it needs only three or four fishes in a 24 in. by 12 in. by 12 in. aquarium to give maximum effect, with a background of exotic corals. Indeed, it is essential that the marine tropical aquarium should not be overcrowded.

I hope that your series of articles will stimulate demand for marines to be made more readily available in this country and that the trade will meet this demand without delay.

M. GIBBS,
The Goldfish Bowl, Oxford.

Brighton Aquarium

WE are very concerned over your reference to our Aquarium in your Editorial of the June issue. It seems that you could not have made any attempt to verify the facts; we discontinued dancing in the Casino Ballroom which is part of the Aquarium Buildings at the end of last year and have started a permanent exhibition of Veteran and Vintage Motor Cars etc., and it is called the Brighton Motor Museum; it is a separate undertaking and quite apart from the Aquarium. For your information, the animals and birds were removed from the Aquarium during the past winter and new pumping, air plant and filtration plant are being installed and it is anticipated that all the work will be finished by the end of the year.

F. C. GLOVER,
Director, Aquarium Entertainments Limited.

Appreciation

REFERRING to the Foreword in this year's B.A.F. Catalogue, I would not be human if I did not feel pleased to read the appreciation of my work towards

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Part of the grass-grinder's hand for British fish (7, 9)
- Ode (3)
- Vegetable appears in the middle (3)
- Disclamation of the gnomes on 13 across (2)
- See 12 across
- Inserts in first stage after egg (6)
- Dark-red transparent resin of the lac insect (3)
- Little saltshero (2)
- He has nothing less than a halo (3)
- W. T., sometimes called Father of Fishkeeping (5)
- A minor operation? (abbrev.) (2)
- Corruption (3)
- Period of darkness (3)
- Fish of feeding (3)
- Red yarn for fish (7)
- Load and wear mixed up on hands and knees (5)
- Insisted (6)
- Latin prefix meaning "two" (2)
- See 4 Down for a fish (7)
- Flash amid the fishes (2)
- Ancient Barbarian (3)
- Free from (3)
- Monique fish (11)

CLUES DOWN

- Osprey (5, 4)
- Large fishy notion (6)
- Bloodsucker (5)
- (and 31 Across) Barred parrotfish (9, 7)
- Sappers (1, 1)
- Vain tail for aquatic plant for tank (8)
- Put her on for a fisher to rain my garden pond (5)
- Head from Sal and rag (5)
- Vegetable sounds as if locked (3)
- Genus of small fishes allied to grey mullet (8)
- A short night (2)
- She started all the trouble (3)
- Mixed type has half a pint (2)
- The Spanish part of the ed (2)
- 14 Across (4)
- Formerly *Eloaka* (6)
- To drop but gently into water (3)
- Half the donor from 37 Across saves the fairy (4)
- Perforated (3)
- The half dance of 37 Across (3)
- As 42 Across (3)
- Plus (3)
- Male (2)

(Solution on page 85)

making the British Aquarists Festivals successful.

May I in turn pay tribute, through your journal, to all who have done a job of work this year and for the past 10 years to make the Festival possible. The event has been successful because of team work and readers will find the names of the workers on page five of the Catalogues.

GEORGE W. COOPER,
Batley, Yorks.



from AQUARISTS' SOCIETIES

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

THE members of the **Thorne A.S.** have been very active lately, commencing with a visit to Dewsbury for the Open Show of the Association of Yorkshire Aquarists Societies. This was the first attempt at an Open Show and the Society was awarded one first, one second and a third. Wombwell was also visited where a very interesting talk recorded by Dr. G. Cuet was heard. A return visit to Goolse was also made and a challenge Table Show lost by 99 pts to 43 pts. The result of the Table Show for Livebearers was: 1. Mr. M. Hobson (Thaxt); 2. Mr. D. Machin & Son (Gospy); 3. Mr. M. Machin & Son (Swordth).

AT the recent Annual General Meeting of the **Haden A.S.**, Mr. A. T. Smith was again elected to the Chair. The officers of the Society were all re-elected for a second term of office. Mr. P. H. Billings, 90 Abbey Road, Cradley, Staffs, is in charge of all Society Correspondence.

The Haden Aquarist Society is maintaining its membership by its progressive programme of shows, lectures and entertainments. Successes were again achieved at Midland Show in 1960 and the Society's Talisman was put into the Birmingham Show by special request. Anyone who keeps fish, Tropical or Cold-water, is cordially invited to attend any of the Society's meetings or Shows.

RECENTLY the **Blackpool and Fylde A.S.** was conducted round the Tower Aquarium by Mr. G. Beaman where they saw the beautiful coral tanks which Mr. E. F. Legge made the subject of an illustrated talk to the Society earlier this year before he left Blackpool to take up his appointment at Christie Zoo. The recent table show winners were: Livebearers: 1. Mrs. J. Taylor; 2. Mr. J. Taylor; 3. Mr. C. R. Wilson. Characins: 1 and 3, Mr. F. Dorset; 2, Mr. R. Crook. Barb, Minnow and Rainbow: 1, Mr. F. Davies; 2, Mr. B. Simons; 3, Mr. R. Crook. Catfish and Loach: 1 and 3, Mr. B. Dorset; 2, Mr. G. Gower. Egg-laying Toothcarp: 1, Mr. Farrington; 2, Mr. B. Lander; 3, Mrs. Wilson. Anabantids: 1, Mrs. F. Crowther; 2 and 3, Mr. C. R. Wilson. Goldfish: 1, Mr. H. Pickup; 2, Mr. E. Crowther; 3, Mr. C. Walker. A.O.V.: 1, Mr. F. Dorset; 2 and 3, Mr. G. Gower. Breeders and Livebearers: 1, Mr. R. Crook; 2, Mr. B. Dore; 3, Mr. J. Bryan Crowther; 2, Alan Scrimmer; 3, Anthony Lawrence; 4, Neil O'Hare.

AT the annual general meeting of the **Association of Yorkshire Aquarists Societies** the following officers were elected: Chairman, Mr. A. Singleton (York); Vice-Chairman, Mr. R. Winterburn (Bradford); Hon. Secretary, Mr. D. M. Crowther, 95, Lane Hill Road, Thornhill Lane, Dewsbury; Hon. Treasurer, Mr. D. Dandell (Dewsbury); Auditor, Mr. J. Skinner (Leeds).

The results of the first annual table show were as follows: Livebearers: 1, C. R. Wilson (Bradford); 2, P. Moorhouse (Bradford); 3, H. Lee (Leeds). Barb: 1 and 3, B. Norris (Bradford); 2, K. Barlow (Shepton). Characins: 1, D. Machin (Thorne); 2, G. Holmes (Bradford); 3, Davies (Middlesbrough). Anabantids: 1,

C. R. Wilson (Bradford); 2, D. M. Crowther (Dewsbury); 3, Gashly (York). Fighters: 1 and 2, C. R. Wilson (Bradford); 3, C. Shillan (Leeds). Goldfish: 1, D. Hirt (Leeds); 2, D. Machin (Thorne); 3, P. Moorhouse (Bradford). Breeders (Egg-layers): 1, C. R. Wilson (Bradford); 2, B. Norris (Bradford); 3, A. Brown (Dewsbury). Breeders (Livebearers): 1, R. Winterburn (Bradford); 2, H. Lee (Leeds); 3, P. Reynolds (Leeds). Catfish and Loach: 1, G. Taylor (Bradford); 2, K. Barlow (Shepton); 3, W. J. Wells (Thorne). Carps and Minnows: 1, P. Farrington (Middlesbrough); 2, Wilkinson (Leeds); 3, Davies (Middlesbrough). Coldwater: 1, Mrs. C. Holmes (Bradford); 2, G. Holmes (Bradford); 3, A. Singleton (York). A.O.V.: 1, Davies (Middlesbrough) (Burr in Show, 93 pts.); 2, P. Reynolds (Leeds); 3, A. Parsley (Leeds).

RECENT activities of the **Leeds & District Aquarist Society** have included a talk by Mr. Prosser of Barnley, illustrated by his colour slides, and a film show "Round the Zoo" made by Mr. Arthur Bray.

These events were followed by the Society going to the British Aquarist Festival, where all agreed that the wonderful standard of the exhibits at this show had been maintained. Mr. Raymond Large's talk, and the showing of his film, gave all a great deal of pleasure and food for thought in the effort to furnish tanks in a natural setting.

This month, Mr. Foden of Huddersfield will talk on Fish Keeping.

The winners in the 1961 Home Furnished Aquaria Competition were: 1, Mr. D. Goodwin (for third year running); 2, Mr. Geo. Leonard (Society Secretary); 3, Mr. C. Shillan.

Table Shows continue to be well supported, and the leaders for the Annual Trophy are: 1, H. Lees, 10 points; 2, P. Reynolds, 8 points. Entry forms for the Annual Show are now in print and will be circulated to Society Secretaries but intending exhibitors can obtain these from the Show Secretary, Mr. David Lees, 58, Cooper Street, Leeds, 7.

THE June meeting of the **Bournemouth Aquarists Club** was well supported by members who saw Mr. E. Arnold receive the Payne Memorial Trophy for the best Home Furnished Aquaria.

Members of the Weymouth Club were invited to this meeting and their support helped to make a very interesting evening. They heard Mr. R. Coombes, the Bournemouth Chairman, give a talk on coldwater fishkeeping and Mr. R. Marley commented on the results of the Home Furnished Aquaria competition.

In return the secretary of the Weymouth Club invited Bournemouth members to their October meeting and it is hoped that as many members of the Club as possible will make the short journey to the neighbouring coast.

THE **Independent A.S.** was the host club to the N.W.L.G.A.S. recently. During the judging Mr. R. Midland gave the members an interesting talk. The winners were as follows: Swordtails: 1, P. Hilt (Independent); 2, P. Lagan (Willesden); 3, F. Tomkins (Independent); 4, P. Lagan (Willesden). A.O.V. Labryrinth: 1, D. Biggs (Riverside); 2, E. R. S.

London (Willesden); 3, J. Morris (Hendon); 4, F. Tomkins (Independent); Characins: 1 and 3, F. Tomkins (Independent); 2, B. Robertson (Hendon); 3, E. Daines (Riverside). Goldfish: 1, B. Anwarath (Riverside); 2, 3 and 4, E. R. S. London (Willesden). Total points to date stand as: Independent, 40 points; Hadden, 38 points; Riverside, 30 points; Willesden, 26 points; Hampstead, 15 points.

The next Competition Meeting will be the Goldfish Classes to be held at the Willesden Borough Show on 9th-10th September.

A TABLE show for Livebearers was held at a recent meeting of the **Waltham National A.S.** The first prize was taken by Mr. M. Hardy (Red Platy), second Mr. B. J. Trentham (Old Sword), third Mr. Hunt (Red Platy). Table Shows have been arranged for the next two meetings, and new members would be made most welcome. The secretary is D. G. Smith, 73, Alfred Street, South Park, Cardiff.

THE **Chelsea Aquarium Society** open table show results were as follows: A.V. Platy and A.V. Sweetwater (amalgamated): 1, R. Luff (Surrey Aquarist Circle), Spotted Platy; 2, V. McKee (Willesden), Wagtail Platy; 3, D. Arnold (Chelsea), Red Platy. A.V. Angelfish: 1 and 2, J. Stewart (Chelsea). Black Seahorse Mollies: 3, D. W. Ellis (Kingston), Valdez Mollie. A.V. Characin: 1 and 2, C. Fullerton (Clapham), Blooding Heart and Neon Tetra; 3, G. D. Forrest (Chelsea), Black Widow. A.V. Barb: 1, G. D. Forrest (Chelsea), Cherry Barb; 2, Luff (Surrey Aquarist Circle), American Barb; 3, R. G. Fowler (Surrey Aquarist Circle), Filamentous Barb. A.V. Tooth Carp: 1, C. A. Stevens (Clapham), Aphroscium calliarum; 2, A. H. Hamity (Frisby), Pachyprochilus pleurostictus; 3, A. H. Hamity (Frisby), Epplatys spilargenteus. Dwarf, Goldfish and A.O.V. Goldfish (amalgamated): 1 and 2, R. Luff (Surrey Aquarist Circle), Pelmatochromis kribiaensis; 3, R. G. Fowler (Surrey Aquarist Circle), Brown Acan. A.V. Fighter: 1 and 2, J. Stewart (Chelsea), Red Fighter; 3, C. Fullerton (Clapham), Red Fighter. A.O.V. Labryrinth: 1, Miss L. N. Wainor (Riverside), Dwarf Gourami; 2, G. D. Forrest (Chelsea), Lethi Gourami; 3, J. Morris (Chelsea), Lethi Gourami. Danos, W.C.M.M. and Rainbow: 1, R. Luff (Surrey Aquarist Circle), Giant Danos; 2, G. D. Forrest (Chelsea), Pearl Danos; 3, A. Barnes (Chelsea), Zebra Danos. A.V. Goldfish or Loach: 1, J. Yaggar (Riverside), African Glass Catfish; 2, D. W. Ellis (Kingston), Walker Catfish; 3, J. Morris (Chelsea), Synodontis nigricans. A.V. Guppy: 1, L. Yaggar (Riverside), Male; 2, J. Morris (Chelsea), Female; 3, J. Stewart (Chelsea), Male. A.O.V. Tropical: 1, J. Morris (Chelsea), Butterfly Fish; 2, D. W. Ellis (Kingston), Redota geryi; 3, A. Barnes (Chelsea), Hammer-headed Lima. Breeders Livebearers, Breeders Egg-layers (amalgamated): 1, C. A. Stevens (Clapham), Aphroscium calliarum; 2, C. Fullerton (Clapham), Tiger Barb; 3, G. D. Forrest (Chelsea), Aphroscium calliarum. Common Goldfish: 1 and 2, D. W. Ellis (Kingston); 3, C. R. Parlow (Surrey Aquarist Circle). A.V. Shubunkin and A.O.V. Fancy Goldfish (amalgamated): 1, C. R. Parlow (Surrey Aquarist Circle), London Shubunkin; 2, K. Phillips, London Shubunkin; 3, V. McKee (Willesden), Valdez. Bear Fish in Show: Blooding Heart Tetra, C. Fullerton (Clapham).

FOR their June meeting, **Cambridge and District A.S.** members were fortunate in having the services of Mr. P. T. Marshall, M.A., to talk and show film taken during the voyage on "Investigation of an Arctic Fishery." Members learned of the methods used in plotting the movement of large shoals of fish and of the work involved in analysing the plots in conjunction with prevailing conditions in order to predict, for the benefit of the fishing fleets, the probable future movement of the great shoals. At the close of the meeting,

trophies won at the recent members show were presented by the chairman.

At the meeting of the **Basingstoke A.S.** the speaker for the evening was Mr. Fred Parsons of Cove, the subject being Egg-laying Tooth Carps, their breeding habits and general requirements. The main event of the year is the "Three Counties Aquarist Show," this year to be held at Queen Mary's School, Basingstoke, on the 18th and 19th August.

At the monthly meeting of **Aireborough and District A.S.**, the speaker was Mr. Wilson of Witley. Mr. Wilson gave a very interesting talk on the breeding of livebearers for showing, a subject in which he specializes. He went on to describe the setting up of the tank, the feeding of the fish, sorting the fry, showing the fish to their best advantage, and how to obtain the best of stock to breed from.

Mr. Wilson judged the table show, an A.O.V. class, and the result was: 1, H. Merris, Nigger Barb; 2, B. Wade, Egyptian mouth breeder; 3, Bartholomew, Zebra.

New members are welcome and the meetings are held at The Yeasdale Meeting Hall, Copper Hill, Top of Henshaw Lane, Teesdon, the first Thursday of each month.

AN entertaining and instructive evening was given by **Stretcham A.S.** recently when they were invited to view the fish-house of Mr. J. E. Edwards of Sarisbury who is Secretary to the British Aquarist Study Society. Mr. Edwards outlined the well-balanced apparatus and general well-being of his tanks to the fact that he rarely shows them in any way, and the make at the bottom is left as long as is safely possible.

NEWS of a revival of interest in fishkeeping in the Chester area comes from the **Chester and District A.S.** which has now grown large enough to afford to hire a room.

Meetings are held the first and third Thursday in every month at the Odd Fellows Hall, Lower Bridge Street, Chester at 7.30 p.m.

Prospective members will be welcome, and enquiries should be addressed to Mr. Peter R. Wilkinson, Hon. Secretary, 129, Appleton Lane, Chester.

THE Secretary of the **Prelesham A.S.** states that during the Hobbits and Handycraft Exhibition held at the Cardon Town Hall recently, the response from the public was far above expectations and many new potential members had been contacted. The general theme of the society's exhibit was to show various aspects of this hobby. On show was a large tank, furnished, containing various species of fish, tanks, and plants. Another tank depicted parents and young (Angels) and a third one contained Red-eyed Loaches and Ferns Black in striking contrast to colours. The whole set-up was screened with rock work effect. A further stand depicted three different types of set-ups for breeding including one for Fighters and one for Kory Barbs. Both these fish appeared white on show adding further interest for the public.

THE East of Hills A.S. have now joined the Inter-Society Panel. Quite organized by the Barrer & District A.S. Recently a visit was made to the Zoological Gardens and aquarium, and the Society also visited Dismantling for the second Inter-Club Show of the season.

AT the last meeting of the **Merseyside A.S.** a discussion took place between Mr. S. Cameron and Mr. Kelly on goldwater and terraria. Three prospective new members were also introduced. The Society have had a lecture recently from Mr. H. C. Turner, B.Sc., on "Water." Mr. Turner is deputy water analyst for Merseyside.

AMONG the recent events in the programme of the **Coventry Pond and Aquarium Society** was a talk by Mr. Lockley who spoke on the

infected surround of the garden pool and the use of variegated and colourful shrubs, plants, etc. Results of the Table Show were as follows: Trout: 1, Mr. Ryan, 78 pts.; 2, Mr. Davies, 72 pts.; 3, Mr. Ryan, 70 pts. Goldwater: 1, 2 and 3, Mr. Randall.

North Eastern Federation of Aquarist Societies

The Federation has announced the staging of a four day show in conjunction with the Non-aquatic-Type flower show at the Exhibition Park, Newcastle-on-Tyne. The dates are Wednesday, 26th July, 2 p.m.—9 p.m.; Thursday, Friday and Saturday the 27th, 28th and 29th July from 11 a.m. to 9 p.m. There will be 28 classes including aquarists, dealers, trade stands, and run on B.A.P. lines, i.e. decorative club stands. The Exhibition Park is on the A.1 (Great North Road) with good parking space.

THE open table show of the **Bradford and District A.S.** was extremely well supported and over 300 fish were brought for judging. The results were as follows:

Guppies (Non-F.G.E.S.): 1, Mr. J. J. Patten (Bradley); 2, Mr. P. Moorhouse (Bradford); 3, Mr. H. Norcross (Colnes). **Livebearers:** 1, Mrs. E. Mowbray (Skipton); 2, Mr. C. B. Wilson (Bradford); 3, Mr. H. Lees (Leeds). **Barbs:** 1, Mr. R. Marshall (Bradford); 2, Mr. J. Hodggett (Barnley); 3, Mr. E. Bradley (Macclesfield). **Charrans:** 1 and 2, Mr. F. Davies (Middlesbrough); 3, Mr. J. Hodggett (Bradley). **Danios:** 1 and 2, Mr. A. Lindley (N. Middlesbrough); 3, Mr. B. Wilkinson (Leeds). **Fighters:** 1 and 2, Mr. A. E. Whitlock (Tadcaster); 3, Mr. P. Reynolds (Leeds). **Anabantids:** 1, Mr. R. Biddolph (Macclesfield); 2, Mr. B. Norris (Bradford); 3, Mrs. H. Mirton (Skipton). **Cichlids:** 1, Mr. H. S. Lees (Macclesfield); 2, Mr. D. Hest (Leeds); 3, Mr. C. Walker (Gillham). **Catfish and Loaches:** 1, Mr. A. Whitfield (Bradford); 2, Mr. K. Burden (Skipton); 3, Mr. A. Connor (Colnes). **Woodwrasps:** 1, Mr. J. Gerrard (Tadcaster); 2, Mr. F. Farrington (Middlesbrough); 3, Mr. J. Hodggett (Gillham). **A.O.V.:** 1, Mr. P.

Davies (Middlesbrough); 2, Mr. L. Lewis (Bursley); 3, Mr. A. Lindley (N. Middlesbrough). **Breeder-Fighters:** 1, Mr. J. E. Shore (Oram); 2, Mr. R. M. Bardsley (Tadcaster); 3, Mr. B. Norris (Bradford). **Breeder-Livebearers:** 1, Mr. J. Preston (Barnley); 2, Mr. J. E. Shore (Oram); 3, Mr. H. Lees (Leeds). **Goldwater:** 1, Mrs. G. Holmes (Bradford); 2, Mr. G. Holmes (Bradford). The Best Exhibit in Show was won by Mr. H. S. Lees (Macclesfield) with a Pike Gubler.

SECRETARY CHANGES

CHANGES of secretaries and addresses have been reported from the following societies: **Chelsea Aquarium Society** (J. Stewart, 64, Tenny's Buildings, Brompton Place, London, S.W.1); **Association of Yorkshire Aquarist Societies** (D. M. Crowther, 295, Lees Hall Road, Thornhill Lane, Dewsbury, Yorks.).

Crossword Solution

M	I	L	L	E	R	S	T	H	U	B
I	D	E	P	E	A	E	E	E	E	E
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AQUARISTS' CALENDAR

8th-9th July: Dorset A.S. Open Show, Ottery St. Mary, Devon, N. Devon.

8th-9th July: Dagenham Town Show: All enquiries to Schuchman, etc. to the Show Secretary, Mr. A. T. Smith, 125, Hauxton Avenue, Broomfield, Essex.

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

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

9th-12th August: Portsmouth A.S. ninth open show at the Community Centre, Tierside Avenue, Stanbury (writing-up date 8th August). Show schedules are available from the show secretary Mr. W. Reder, 493, Commercial Road, Portsmouth, Hants.

18th-21st August: Three Counties Aquarist Show at Basingstoke. Details can be obtained from the show secretary Mr. R. Footen-Jones, 5, Park Lane, Old Basing, Basingstoke, Hants.

18th-20th August: Midland Aquarist & Pond Society Open Show to be held at Bingley Hall, Birmingham. Show Schedules from Mr. J. Edwards, 4 Amy Terrace, Oler Street, Ladywood, Birmingham 18.

1st-2nd September: Bristol Tropical Fish

Club open show and exhibition of tropical fishes at the Temple Colston School, Victoria Street, Bristol. Schedules are available from the show secretary Mr. J. D. Brown, 79, Prall Street, Bristol, 3.

2nd September: High Wycombe and District A.S. Open Show, held at The Rise, High Wycombe, Bucks. Schedules and information from Show Secretary, Mr. R. P. Baynton, 248, Hughenden Road, High Wycombe, Bucks.

2nd September: Federation of British Aquarist Societies general assembly.

2nd-3rd September: Accrington and District A.S. seventh annual open show at the Town Hall, Accrington, Lancs.

9th-10th September: Wilton Open Show, Roundwood Park, London, N.W.10. 23 Classes. Details from Mr. J. B. Heaton, 24, St. John's Avenue, Harlesden, N.W.10.

12th-15th September: Leam and District A.S.

12th September: Kingston & District A.S. Open Table Show to be held at St. Luke's Social Centre, Elm Road, Kingston-upon-Thames. Details from Mr. N. Towell, 11 Belmont Terrace, Chislewick, W.4.

29th-30th September: Bristol Aquarist Society. Open Show to be held at Bishopscote Parish Hall, Gloucester Road, Bristol. Schedules available from Mr. V. Canfield, 18, Ghent Park, St. George, Bristol (Closing date 10th September).

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Dear Sirs,

I am writing in the hope that the following information may be of some interest and value to you.

Some time ago I was having trouble in my tanks, fish were dying for no apparent reason.

Post-mortem examination by Mr. W. Harold Cobon, the ichthyologist disclosed that the fish were dying because of some internal parasite, caused by dirty live foods. I'd read, of course, the adverts for “Dissolve” but had quite frankly regarded it as another chemical “gimmick.” However, I decided to try it, and I'm glad to say I've had no more trouble from dirty live foods.

However, that's not the point I want to make.

Some weeks ago, my valuable, prize line-bred Siamese male fighter, developed a bad case of what looked like “pop-eye.”

The eye looked like it was ready to come right out of its socket.

Now any previous experience I'd had with a fish with “pop-eye” was that I couldn't cure it, and the fish was doomed, consequently I was in quite a panic about my fighter! He was a magnificent fish and it looked for certain as if I was going to lose him.

Nowhere, as I can see, on your adverts, or leaflets, do you specifically mention using “Dissolve” for “pop-eye,” so it was probably just desperation on my part that made me pick up the bottle and wonder.

Now I keep my male fighters in compartments 6 in. by 8 in. at a temperature of 80° F. and into the compartment containing the fish with the bad eye I dropped in six drops of “Dissolve”—in three days that fish's eye was back to normal! There has been no recurrence of the trouble.

A week or so after this I noticed a female fighter with a protruding eye.

I keep all my female fighters in one tank and there's always a certain amount of squabbling going on.

The female's eye was probably the result of some battle.

I did the same as I had with the male, into a 6 in. by 8 in. compartment six drops of “Dissolve”—in three days trouble cleared up!

I would hasten to add here that I'm not a bacteriologist or chemist or an authority on fish diseases, and that the points and experts would require more exhaustive tests and proof than I have given, but I am not giving the facts as I saw them.

I would add, however, that I passed on the information to many of my aquarist friends, and some of them agree with me, they discovered the same as I have.

There's one other point I'd like to mention. When spawning fighters, after removing a hatched turn female I always pop them into a tank containing a few drops of “Dissolve” to heal their torn fins.

As I said at the beginning of this letter, I hope the facts I've given are of some interest or value to you.

One thing I know, there's always a bottle of “Dissolve” in my fishy medicine chest.

Yours faithfully,
R. G.

*Just one of the many reasons
why you should always
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