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OCTOBER, 1962



MONTHLY  
Vol XXVII No. 7

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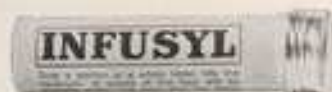


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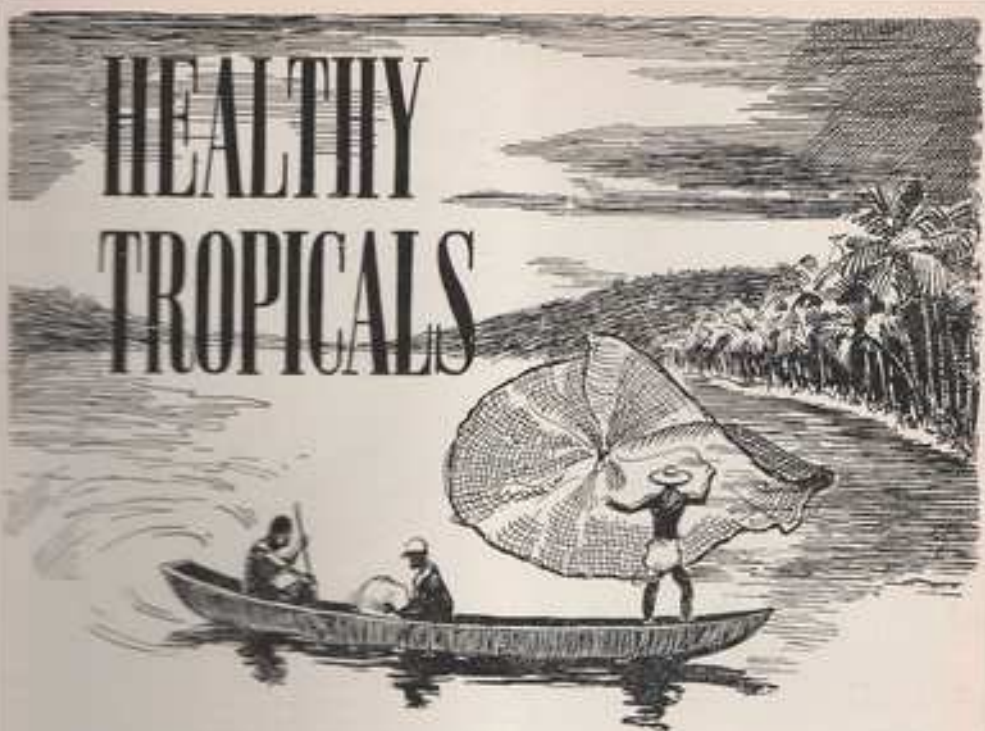
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*Aquaria by QUEENSBOROUGH*

*(on page vi overleaf)*





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## Giant Prawn's Secrets

**G**OURMETS throughout Asia esteem the giant freshwater prawn as a delicious food. Nutritionists think of it as a fine source of protein, and would like to see it available to more people. Up to now, no one has been able to culture them in captivity. Now, after work lasting 2½ years, a fisheries scientist in a Penang laboratory has solved the scientific part of the problem. Although prawn larvae are plentiful in their natural homes their subsequent development has always been a matter for conjecture.

Dr. Shao-Wen Ling studied the giant Malayan freshwater prawn (*Macrobrachium rosenbergi*) to find the best conditions under which eggs, after a long incubation period, would hatch into healthy larvae, and then, to develop ways of bringing the larval prawns to maturity. At the beginning the thousands of larvae produced in the laboratory were reared in freshwater but they all died within 4 to 5 days after hatching. Dr. Ling added a small amount of sea water to the freshwater, and soon he had young larvae living for as long as a week. However, it takes almost a year for a baby prawn to become an adult. He started again, with a different percentage of salt. The prawns lived a little longer. He found that, by gradually increasing the salinity of the water, he could make them live longer, but each failure meant starting again, and it took 2 years for him to succeed in rearing the larvae to juvenile stage and from juvenile to adult.

Each larva had gone through 15 different moulting periods before it became a juvenile and the water had been increased in salinity until it contained 40 per cent of sea water. Then, he found, they could successfully be put back into fresh water. All this led him to believe that the larvae hatch up river in fresh water, and gradually move down river towards the sea until they become juveniles in brackish water round the coast. Juveniles then move back up the river to grow to full size and breed again. At this stage they can survive in rivers, canals, ponds or even rice fields, and it is in these places, in fact, that they are usually collected.

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# How to Sex Aquarium Fishes

by J. S. MACDONALD

HOW many of us know how to sex our fishes? In most cases the primary sexual characteristics are not visible, being inside the body, and it is only after the fish matures sexually that the secondary sexual characteristics start to show.

With the livebearers, from an early age sex is quickly discernible; the female, besides having a rounded anal fin, has, in nearly all cases, a small dark patch just above the ventral fins called the gravid spot. This is noticeable in some cases at birth. Male livebearers are somewhat lame in showing sex, sometimes as long as 8 to 10 weeks elapse before the anal fin starts to thicken into the intromittent organ known as the gonopodium.

However, as I said, livebearers are easy to sex. With some of our other fishes, however, there is no apparent difference between the male and female; we have a harder task to sex them. I shall take them in families and try to give a few pointers.

First the barbs. These are not a difficult group to sex because as a rule the female becomes very distended in the belly when full of roe. Also in most cases there is a colour difference between sexes and in some barbs there is the appearance of nuptial tubercles on the head or gill covers. This is especially noticeable on *Barbus auratus*.

Next we come to the characins. Sexing these fishes gives most aquarists a good deal of trouble. Apart from the obvious differences, like extended or larger fins and size and shape of body, the male characins have, in many cases, small projections on the anal fin known as the characin hook. This can be used by the aquarist as a positive means of sex identification. This method is useful with black widows, *Pristella riddlei*, blood fins and glowlights. The method used is to catch the fish in a fine nylon net, and hold the fish in the net with one hand and gently rub the net against the anal fin. If you have a male the fin will almost certainly catch in the mesh.

The anabantids or bubble-nest builders are all very easy to sex, as, almost without exception, the males have longer or more pointed fins. This is not apparent until the fish reaches sexual maturity. So, if you go into a shop and buy some three-spot or lace gouramis 1½ in. in length and expect to sex them, I am sorry, you will be unlucky. This brings me to one of the points about the whole business of sexing fishes. Don't expect to sex them before they have reached sexual maturity.

The egg-laying tooth-carps are quite easy as generally the males have longer fins and, in most cases, more colour. A good early indication of sex in species like *Aphyanesson lineatus* or *Panchax playfairii* and blue panchax is a dark spot in the dorsal fin of the female.

Now we come to cichlids. Here again the sexes mature slowly. With a good many of these fishes sex is apparent by longer and more pointed fins in the males, larger size of males and, again, their brighter colours. However, with some of the cichlids, where there is no apparent difference between the sexes one can always study the smaller points—such as the genital papillae. These are the tubes that protrude from the vents of our cichlids. In the male they are thinner and longer than in the female, which are, by comparison, very short and thick. This is quite a reliable way of sexing angels and most of the other cichlids. However, before these genital papillae appear,

the fishes have to be mature, in tip-top condition and about to breed. It is always best to let the difficult ones choose their own mates.

In general, to sex your fishes the best way is to make a careful study of them, to see if there is any obvious difference. If there is not, give heavy feeding with mainly live foods for 2 to 3 weeks and then no food for 1 week; the fish that remains fat will in all probability be the female, owing to the eggs keeping the abdomen pressed out. This plumpness is best viewed from above or below, so place your fishes in a glass or plastic container that you can see through. The males are streamlined or torpedo shaped and the females diamond-shaped. This is one of the only ways I know to sex catfishes.

When studying your fishes for sex identification pay good attention to details. For instance, with some of the more transparent fishes, the position of the organs in the body may give an indication of sex, particularly the size and shape of the swim bladder. Also, by shining a strong light from one side and viewing the fish's body from the other, eggs can sometimes be seen in the body of the female fish.

If you want to sex your fishes for breeding purposes make sure that when you purchase them you have at least four, preferably six. This guards against possible loss of one of the partners through mishap or disease. How often have you heard someone asking "Have you a large male 'so-and-so'?—mine has died and the female is ripe for spawning." By the time they have reared another male the female will be past it and they have to chase around to try and get another one, often unsuccessfully.

Anyway, good luck with sexing your fishes.

## Rockwork

IN choosing rocks for the aquarium it is essential to exercise some care. Naturally soft or acid water, which long experience has proved is best for most plants and fishes and is inimical to algae, can soon be rendered excessively hard and alkaline (and, in some cases, milky-looking) by the introduction of lumps of marble, limestone, gypsum, spar, alabaster, chalk and similar calcareous formations.

Yet another point to observe is to soak all concrete ornaments in several changes of water before introducing them into the aquarium. In fact, some cautious aquarists go so far as to pickle well-soaked concrete ornaments for a while in vinegar or diluted hydrochloric acid, to make sure they are completely rid of free lime.

Among the most decorative rocks which will not alkalinise aquarium water are Westmoreland and Somerset stone, red, green and grey sandstone, the various charmingly-tinted granites and waterworn flints. Well-scrubbed, craggy lumps of slate or coal can also be used to good effect.

But whatever sort of rockwork is used, do make sure that it is free from deep fissures, which act as a haven for unrotten food and dying fish or snails, and free from sharp edges to damage the scales and thus lead to sore places and/or fungus disease.

J.H.

## Breeding *Tilapia mossambica*



by PETER DENDY

THE Hawaiian mouthbrooder, or *Tilapia mossambica* seems to be called in this country, is a prolific reproducer and in this respect leaves even guppies in the dust. So if you are going to keep a pair you are in for trouble with tank space unless you ditch the resulting broods at regular intervals.

A few common species is always interesting, but with the fish I think the novelty will very rapidly wear off, and I don't imagine they will be particularly sought after in the aqua new forum. I think we all hope for the odd chance that brings a new species our way, one from which we are able to breed without much loss of time. For a short while at least with such a species there should be a pretty good market for the young fish and it just might be possible to make a little money for a change. Happy dreams, and I had some about *T. mossambica*, but I was rudely awakened when I found that there was just no market anywhere for all my lovely babies. The usual comment from dealers was "Who on earth wants a fish like that? It's uninteresting, dull and gives far too big." In which comment it must be admitted there is more than a grain of truth.

*T. mossambica* seems to be ready to breed any time after reaching a length of 2½ inches. The female is always a pale brown color and the male usually looks the same, although both carry patchy markings of a darker brown. The male can be distinguished, as can most male cichlids, by a more pointed and longer dorsal. When in the mood to breed the male assumes a striking change and becomes nearly black, with an orange-edged dorsal and a red-tipped caudal fin. Unfortunately, this attractive male coloration does not seem to last, and all too quickly the drab brown appearance returns.

*T. mossambica* seems to be quite the roughest fish on plants that I have met, and although I provided a breeding tank with all the plants prescribed by others, it was a waste of time. In short order the pair had uprooted all the plants and even completely smashed the sub-gravel filter. As they seemed to prefer to carry out excavations at the back

of the tank and to pile the gravel up at the front I let them have their way and replanted along the front, with slightly better results.

My pair were wild imports and very shy, so I added a flower pot with the end knocked out to give them some sort of privacy, which they seemed to appreciate. The male was responsible for all the heavy work and furniture shifting; the female was content to observe the goings on without much apparent interest. However, it was not long before the female was doing her stuff, refusing food and incubating happily in her mouth. I could not be quite certain when incubation started but the process seemed to take from 10 to 14 days. After this period fry gradually escaped and were free-swimming in the tank. The new-born fry are surprisingly large and pretty to watch as they school and move about in a shoal all the time.

The parents took absolutely no notice of the fry once they were free-swimming and made no efforts to protect them or to eat them. I deliberately frightened them to see what happened and the parents fled for the flower pot, without any protective instinct being shown towards the fry.

The young are obviously left to fend for themselves in this species. I should imagine that in fully developed fish under natural conditions the brood sizes must be enormous, as my pair produced 70 to 100 fry and are themselves under 3 inches long. The interval between broods seems to vary from 8 to 10 weeks, and as might be expected is shortened by the copious feeding of live foods, of which white worm and *Daphnia* seemed to be the most enjoyed.

The fry are avid eaters and grow at an amazing rate if you can keep pace with their appetites. I feed with micro worm and brine shrimp for the first week, after which Grindal worm and screened *Daphnia* were eagerly accepted, the fry going on to white worm and anything else I could lay my hands on. Water conditions do not seem to be at all critical, although for the record my water is nearly neutral and the temperature is round about 75°F (24°C).



# How to Repair AQUARIUM HEATERS

by A. JENNO

**T**HE diagram with this article shows the construction details of the more popular type of aquarium heater. This is an immersion heater and, as such, should never be switched on unless it is immersed, as it is designed to operate under water and will burn out under any other conditions.

As will be seen from the illustrations, the heater consists of six major components: element, former or element support, lead-in wires, mains supply cable, bung and tube (not shown in the diagram). These will be described individually.

## Element

The element consists of a coiled coil of nickel-chrome wire. For those unfamiliar with the term "coiled coil", it describes a method of winding the element so that the wire is first wound into a helical spring and is then stretched so that all the turns are separated and equidistant from each other. This helical length is then wound around a grooved former, care being taken to keep all its turns separated. This stretching also ensures that the element holds itself tightly on to the former. By winding the original helix into another helix the "coiled coil" is obtained.

Somewhat lengthy calculations are necessary in order to determine the correct wire size and length and type of wire to use for a given required element, so unless one is familiar with these details it is unwise to attempt to manufacture one's own replacement elements.

The former or element support is a hollow cylinder of heat-resistant refractory material, with its outside surface carrying a continuous helical groove from top to bottom, in which the element is wound. Holes are provided at each end for the lead-in wires.

## Supply Cable

The two lead-in wires bring the supply current from the mains supply cable to the end of the element. In some heaters the lead-in wires are omitted and the element is connected directly across the mains supply cable. One lead-in wire passes down the hollow centre of the element former to the bottom end of the element; the other lead-in wire is connected to the top end of the element. As nickel-chrome wire is difficult to solder, the joints are usually made by twisting the wires together. The lead-in wires are usually prevented from coming into contact with each other by fitting small refractory insulators on them between the element former and the junction with the mains supply cable. As the lead-in wires and the mains cable are both usually of tinned copper, these junctions may be soldered.

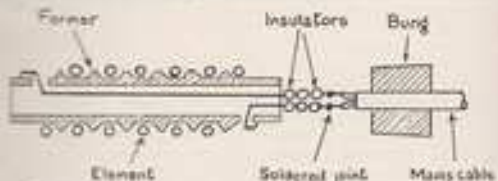
The mains supply cable should be well insulated as it will be immersed in water for part of its length. It should be of sufficient size to carry the current drawn by the heater element. As a general guide it can be assumed that a 100 watt heater will draw approximately 0.5 of an ampere and a 200 watt heater 1 ampere and so on. This is, of course, assuming the normal mains supply of 200-250 volts (a.c.).

If a twin-core cable is used, with each core consisting of a single large strand rather than several small strands, it will be found that the cable has an added stiffness which is a great help in arranging it in a hidden position in a decorative

aquarium. A single-strand cable should not, however, be repeatedly bent at the same point or it is liable to snap.

When the heater has been assembled and connected to the mains supply cable, a watertight method is required to seal the heater into its tube. A rubber bung is used for this. It should be of good quality rubber to prevent, for as long as possible, the effects of constant contact with water, and should have only a very slight taper from one end to the other so as to form a good seal when inserted in the tube. The hole through which the mains supply cable is drawn should be slightly smaller than the cable diameter so that a good tight fit is ensured.

The tube used with a heater must be of heat-resistant glass, such as that used for domestic ovenware, and on no account should ordinary glass test tubes be used, as these will not stand the high element temperatures. Some tubes



Sectional view of arrangement of components of a typical aquarium heater.

are made with a ridge around the inside circumference which helps to ensure that the bung forms a watertight seal with the tube. The seal between bung and tube should be so strong that it is impossible to remove the heater from the tube by pulling on the mains cable. One well-known writer states that it should be possible to hang a 14 pound weight from the mains cable without any effect on the heater.

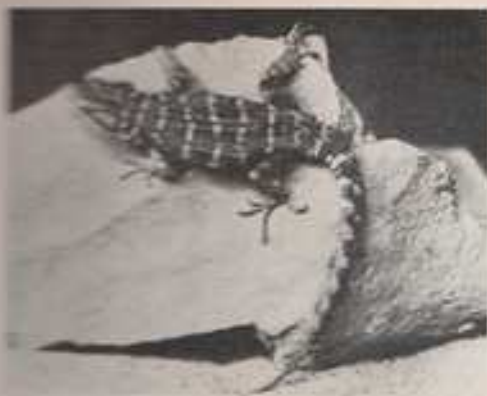
## Repairs

It will be seen from the above description that an aquarium heater is quite a complex piece of apparatus when considered in detail; but if one reflects on the points mentioned it will be realised a good measure of common sense is enough to attend to all these details and only a very basic technical knowledge is necessary to understand fully the faults which occur in a heater in normal use.

The main point about aquarium heaters is that the most difficult part to replace, the element, seldom breaks or burns out if used in the correct manner and at the supply voltage for which it has been designed. This leaves a number of faults which do occur in normal use, especially after long periods of continuous operation. These will be treated individually.

(1) *Mains supply cable.* Most heaters nowadays use p.v.c. insulated mains cable, which is able to withstand the disadvantages of long contact with water far better than the older rubber-covered cables. The insulation on these tends to become hard after a time and therefore subject to

Please turn to page 130



## Crag Lizards

by ROBERT BUSTARD, B.Sc.

*Photograph by the author*

THE two lizards which form the subject of this article are natives of the rocky areas of South Africa. They belong to the family Cordylidae, the members of which are popularly known as armours or giraffe-tailed lizards, and, like the black armour (*Cordylus zornifus*) and the remarkable girdled armour (*Cordylus cataphractus*), they do well in captivity.

The crag lizards are good climbers and are active lizards. They should be housed in ponds when a vivarium is being prepared. Since the common crag lizard (*Pseudocordylus subviridis*) attains a total length of about 12 inches, the vivarium should measure at least 30 in. in length by 15 in. high or thereabouts. If it can have a height of 24 or 30 in., then the lizards will really be well to advantage. They are quite at home on the highest precipices of their native mountains, and to make their vivarium as natural as possible I build up a pile of loose stones reaching to within a few inches of the vivarium roof. The gaps between the stones provide excellent hiding places and the lizards become tame. The floor area that remains is covered with a layer (2 in.) of dry sand into which a small water dish is sunk. A temperature of 70°-75° C. should be maintained for about 10 hours

daily by means of a pearl electric light bulb of suitable wattage. This is switched off at night when the temperature can fall to between 50° and 60° F. (10° to 15° C.). The crag lizards occur in the southern areas of South Africa and are therefore accustomed to cold nights during the South African winter.

The common crag lizard is a very handsome animal when in its adult colours. The dorsal coloration is largely black but half a dozen bright yellow triangles are present on the flanks and these extend some distance on to the dorsal region. The contrast of black and yellow is most striking. The throat region is also black, the belly greyish and the underside of the legs are yellow. Young specimens are less spectacularly coloured. One youngster which lived for several years in my collection was a drab grey with several narrow cross bands of pale cream when he arrived. As the lizard grew, however, the grey darkened slowly and the pale cream changed gradually to the bright yellow of the adult. This particular specimen is illustrated when he was nearing maturity and measured about 8 inches.

I have been fortunate to keep some half-dozen of these delightful lizards. I say "fortunate" as they have several desirable habits, especially if the collector has a fair number of insectivorous lizards to feed. Crag lizards will readily accept the usual lizard fare of mealworms, gentles and bluebeetles, but, in addition, they will soon learn to accept strips of raw meat, which is, of course, a great advantage. Also they soon become very tame and will take this food straight from the fingers.

When first received they may bite, and this can be quite a severe nip as they have strong jaws. 'Seldom, however, do they penetrate the skin and they do threaten with jaws agape to warn one! This defensive behaviour is quickly



Top of the page: adult coloration is commencing to develop in this 8 inch crag lizard (*Pseudocordylus microlepidotus*). Lower picture: specimen of the rare crag lizard (*Pseudocordylus subviridis*) in typical postures

lost, and they become exceedingly tame and seem to enjoy being handled. Many reptiles like the warmth of human hands.

#### Availability and Cost

The common crag lizard is fairly readily obtainable in this country and I have seen them offered for sale for as little as 15 shillings, although they may cost £2. The other species, *Pseudocordylus subviridis*, is more difficult to obtain. In my opinion, however, it is well worth looking for, because of its very fine colouring. These specimens in my collection had a dark grey to black ground colour with a greenish suffusion dorsally. On this was imposed small patches and flecks of yellow. The sides were reddish orange and this colour was also present on the jaws. Below they were greenish. I found *P. subviridis* to be an extremely shy lizard and this is borne out by those who have been lucky enough to see it in its native haunts. At first I kept my specimens in a community vivarium with skinks (*Mabuya sabyana* and *M. homolepida*) and zonures, where they appeared to do well. Their smaller size, as compared with the common crag lizard, also favoured their inclusion in this vivarium. After some time, however, I wondered if they were obtaining sufficient food. When I put in some gentles or mealworms they were almost all consumed by the skinks and zonures before the beautiful, rare crag lizards had plucked up enough courage to venture out from their hiding places. Finally I gave them a vivarium to themselves.

A few general tips will be useful to all but the most experienced collectors. Many years ago I found that the best time of year to obtain South African reptiles was in the early autumn—October is ideal. The reason for this is that they have had the benefit of the South African summer. Since South Africa is in the southern hemisphere the seasons there are the reverse of our own. Specimens which I received in March or April suffered quite an appreciable mortality compared with those that arrived in the autumn. Specimens purchased in our spring have been collected during the warmer periods, and then the effects of the sudden changes involved in capturing them and sending them to Britain may be too much for them.

When feeding insectivorous lizards it is often easiest to put in a few spoonfuls of gentles or mealworms all at once every few days. This should be avoided since the lizards then set upon them with excitement and may consume six to ten in a matter of a minute or so. Soon, however, they bring them all up. This is often seen in the skinks and zonures mentioned above, especially with gentles, which are maniacated much less than the larger and tougher skinned mealworms. The cause may well be the sudden influx of wriggling maggots to an empty stomach! Reptiles do have a tendency to swallow their food without chewing it and gentles and earthworms must often be alive for some time in their stomachs. I have found that if the first few are given at intervals of about a minute then this difficulty does not arise.

## How to Repair Aquarium Heaters

*continued from page 128*

cracking. Where single-strand core cable is used, the core will sometimes snap if bent in the same place repeatedly. Should either of these faults be present a new cable should be fitted and no attempt made to "patch up" the old one. It should be remembered when fitting new cables that the entrance hole through the rubber bung must be of the correct size in order that a perfect seal is formed between the cable and the bung.

(2) *Rubber bung.* The bung does not usually cause faults. The difficulty is in removing it successfully to repair or examine the heater. In a fairly new heater the bung can usually be extracted by heating the tube evenly around the top, over a flame, and then quickly pulling while the tube is hot. Another method is to insert a perfectly straight needle or harpen between bung and tube and revolve the needle in the fingers so that it travels around the circumference of the bung and breaks the seal between the bung and the tube. In older heaters it will be found often that the bung has perished and has actually stuck to the tube. The only way to remove the heater in this case is to break the tube at the bung, cut the main cable on each side of the bung and discard bung and tube. The mains supply cable must of course be reconnected.

(3) *Lead-in wires.* These are, in my own experience, the most frequent cause of trouble, particularly the one feeding the bottom end of the element. This wire passes down the centre of the refractory cylinder and is subjected to the full element temperature in this position. After a period of time this high temperature will often cause the wire to snap or burn out. The thinned copper normally used can be replaced with nickel-chrome or other temperature-resistant wire, but this will cause difficulties when making the soldered connections to the mains supply cable.

(4) *Element and element former.* These are only usually damaged by misuse, i.e. by dropping, knocking

against hard objects or by overloading the element by applying the wrong supply voltage. Both element and former can only usually be replaced by obtaining the correct spares from the manufacturer.

In some cases it will be found that the end of the element has broken away from the joint with the lead-in wire. This is easily remedied by twisting element end and lead-in wire together again, remembering that the element should not be shortened by any appreciable length in doing this, because the heater wattage is dependent upon the length of wire used. If an element is overshortened the wattage will increase to a point where the heater will burn out.

If the element has, for some reason, become slack and does not lie correctly in the grooves on the former, then one end can be disconnected and the element rewound, although it will be found difficult to do this successfully without a fair amount of practice.

#### Testing

The best method of testing after repair is obviously to use the heater in an aquarium. If, however, the heater is not required for use immediately, a quick test is to plug the heater into a suitable mains supply and hold the tube in the palm of the hand. If the heater is in working order it will begin to warm up. The mains should then be immediately disconnected or the heater will become so hot as to burn out.

The repair of aquarium heaters is not a difficult thing to accomplish as long as common sense and patience are employed. One should always remember that safety is a prime factor and that the utmost care should be taken that good workmanship is used. Bearing this in mind, anyone with a basic knowledge of electricity and the ability to use a soldering iron and a pair of pliers should be successful.

Some people will, no doubt, decide that this is a great deal of time and trouble to spend on an article costing about 10 shillings from the local aquarist's suppliers, but in cases where a number of aquaria are owned, and some people have a great number, then heaters can represent a large cash investment and are well worth maintaining in good working order.



## How Sensitive are Fishes?

by DAVID GUNSTON

**F**IRST, can fishes smell? Closely allied to that question is the one here they any sense of taste? Smell and taste are connected faculties, as is well known; smell being concerned with a source acting from a distance, and taste being concerned only when the taste organs are in contact with the object or liquid concerned. They are important faculties to most fishes, and the angler who may sometimes wonder whether a fish can taste his baits at all need have no doubts on that score.

How fishes can taste quite well, many can detect food from a distance by smell. Yet neither sense is all-important to fishes, as is proved by the successful use of spinners and artificial fly.

Taste and smell are chemical reactions, special sense cells transmitting a chemical impact into nervous impulses in the brain. The sense of smell in fishes lies, as it does in most animals, in the nostrils, but these are quite different organs from our own. Most fishes have two nostrils, and in all cases they are merely small holes in the top of the snout leading, not down to the throat, but only into small sacs lying just below the surface of the skin. Each sac is lined with densely folded sense cells, which react to substances in the water that passes over them, guided by tiny waving hairs. Usually there are two sacs connected and supplied with a constant current of water in through the front nostril and out at the rear. There is no connection with the mouth, but the fish has a continual flow of smell impressions to its brain.

Taste is picked up by the tongue, which, although stiff and scabbled, instead of being muscular, erectile and persistent as in human beings, does have a number of taste buds along its length. These are not relatively so numerous as the taste buds on a human tongue, but they equip the fish with a fair sense of taste at all times. Human taste has been boiled down to four definite ones: sour, sweet, salty and bitter, the rest being regarded as false tastes, or smells caused by minute particles of the foods entering the nose through the back of the mouth. Experiments have shown that many fishes can tell salty, sour and bitter tastes; sweet seems to be unknown under water, and salty only in freshwater fishes. Sea fishes probably cannot appreciate salt.

In general, the sense of smell directs a fish to its food, and the sense of taste tells it that the food is good to eat. A number of interesting experiments have been made on these points, but not nearly enough yet to give us a really clear picture of the subject. Fishes that feed much by sight have weaker taste and smell senses, and vice versa. Some fishes have both faculties in strong form, and most of the voracious feeders smell out their food. Tests made with sluggish loach have shown that its nostrils lead it close to its food, when it swims round in a loose figure-of-eight, gradually drawing closer to and finally pin-pointing the food when it actually sees it at short range. If the nostrils are plugged with petroleum jelly-soaked cotton wool, no indication that food is near is obtained by the dogfish, and if only one nostril is blocked, it swims round and round with the good nostril opening out the inside, nearest the food.

Many other fishes have been shown to have almost as good a sense of smell as this, but among the daytime sight-feeding fishes, the faculty of smell sometimes diminishes

altogether. Trout and salmon can smell out food when they want to, but rise to a fly solely by sight. Congers and pollock, usually highly sensitive to scents under water, have been known to take food tainted with such things as camphor, quinine, iodoform, alcohol and creosote when they are really hungry. Thus the sense of smell may be a discriminating one, most useful when food is plentiful.

The sense of taste, on the other hand, is more constant, telling the fish whether the morsel it has picked up by sight or scent is worth swallowing. There is some evidence that certain species of fishes, catfish and several deep-sea blind fishes, for instance, have elementary taste cells scattered all over their skin surfaces, apparently to aid them in finding food amid darkness and mud. In general, there seems to be good reasons for the use of flavoured baits and ground baits, especially for coarse fishes; the bigger game fishes will be attracted most readily to strong-smelling or blood-filled baits.

Touch is the one faculty that is common to all members of the animal kingdom, from the most intelligent mammal down to the maggot and even the *Amoeba*. It seems quite feasible that many of the existing senses grow out of the elementary sense of touch. Fishes are no exception to the general rule, and have sensitive touch papillae, or sense cells, dotted all over their skin surfaces, so that they can register the impact of outside objects at once. This sensitivity to external objects applies only to solids, as far as we know, and apart from certain cells designed to tell the fish temperature and current changes in the water, a fish's touch cells in its skin do not register the contact of the water in which it is swimming.

Some kinds of fishes have this universal sense of touch specially developed to aid them in hunting for food. The East Indian mahseer, related to the barbel, has sinuous spines projecting from its jaws that are peculiarly sensitive to touch, obviously for picking up food, and loach, paddlefish, grey gurnard, rockling, lungfish and many other bottom-feeders have touch organs in their snouts, barbels or fins, which first come into contact with food. The pectoral spines of the gurnards are skilful touch organs, as are the long fin-rays of many deep-sea fishes. Sole and other flatfish have minute sensory threads on their undersides, which first feel any food before it is eaten, even though they can see tolerably well. And the tickling of trout into a state of semi-stupefaction is probably yet another example of the way in which fishes can experience touch.

Lastly, can fishes feel pain? We have established that they are fully sensitive to even the slightest touch—for that made on a dark ocean-bed by a minute morsel of food cannot but be very slight in many cases—and now we have to consider whether that sense is so well developed that fishes can actually experience pain, under various circumstances.

This is a question that has perplexed many people for quite some time, not a few of them being anglers incited perhaps to a little self-examination by the outcry of those who condemn their quiet sport on the grounds of its cruelty. Is fishing cruel? Do fishes feel the pain of the hook? Even Walton himself, for all his sometimes barbarous methods, often tells us to go gently, to use the live bait "as though you loved him", although the poet

Byron, in a fiery mood in *Das Juan*, called the immortal Izak a "cruel monster", and described how he would like to see a small trout pulling a hook in his gullet! Thus does alleged cruelty inspire its opponents.

But before getting too involved in the ethics of the matter, it is well to examine scientific facts. Fishes can obviously feel a hook should it penetrate their mouths, but whether they feel pain is another question. Although able to absorb many sensations, a fish's nervous system is nothing like so complex as ours. This has nothing to do with being cold-blooded; fishes lack the cerebral cortex of the human brain. Their brains are simpler, the dominating features deal with seeing, not thinking or imagining. Therefore there is very strong evidence to suggest that fishes do not have physical sensations on anything approaching the human level. Therefore a hooked fish, although probably feeling a dull, aching pain in the actual spot, and a vague sense of discomfort and fear at being restricted in movement, has little else to worry it. Indeed, cases where fishes have been caught again soon after release are too numerous to mention.

A perch, foul-hooked, was released by removing the hook through its eye socket, and was caught again a few minutes later with its own eye as bait! A shark has been caught on a bait of its own intestines, swordfish have been seen to feed whilst playing on the hook, and so on. All of which shows that the sensation of pain was far from intense, and was probably only momentary, leaving no memory of the event, nor any imaginative working on the experience for future reference.

The question of live bait can be judged from a similar standpoint, although the use of very fine tackle for playing salmon over a long period might appear to prolong the period of discomfort for the fish. But whether there is any more so-called cruelty in angling than in wholesale commercial fishing, where countless fish die gasping in the air, is a moot point for the prohibitionists to tackle.

The truth lies in the fact that fishes are incapable of suffering in the way we use the term. Unfortunately our discussion of the matter is all too often coloured by human experience, human values being placed where they have no real significance.

## The Scales of Fishes

by R. E. MACDONALD

**T**HERE are four kinds of scales—cycloid, ctenoid, ganoid and placoid, all of which have several different forms. Some fishes have no scales at all, most possess either cycloid or ctenoid scales; some have both. When a fish has scales it is known as possessing an exoskeleton.

Scales are disc-like in shape and develop from the dermis (a layer of the skin). They are fixed on one side to a pocket or cavity in the skin, lie obliquely to the body of the fish and overlap the scales behind and at each side.

Since the nature of the scales varies to some degree, they can assist in classifying the various species of fishes. More important than the type of scales in this respect, is the number possessed by each individual species.

### Scale Count

The number of scales is used to determine or "fix" closely related species. This is known as taking a scale count and is achieved by counting the scales, in a single line, from the upper edge of the operculum (fish's gill-cover) to the base of the caudal fin rays, as shown in the diagram.

This is an extremely good method to adopt when identifying fishes, as the number of scales, regardless of age,



Method of making a scale count of a fish as an aid to identification



Surface view of a cycloid scale (magnified)

remains the same throughout the life of each fish. If a scale is lost, perhaps through an accident or fighting, a new one will always grow in its place.

### Age and Scales

During the development of a scale, certain visible marks occur in its structure. These marks are in the form of rings or circles that are proportional to the rate of growth. Whenever the rate of growth slows down, e.g. during the winter months or (as with certain fishes) during the breeding season, the rings fail to form a regular pattern on the scale and an irregular circle, known as an annulus, is formed (see diagram).

Obviously, if an annulus is formed each winter it is possible to determine the age of a fish by the number of annulus circles that an individual scale possesses. This ring pattern is similar to that observed when viewing a cross-sectional cut through a tree trunk.

## Black-lined Tetra

by JAS. STOTT

**A**LTHOUGH the black-lined tetra (*Hyphobrycon scholzei*) is not a colourful fish, especially when compared with such as the rosy tetra or the neon, it is undoubtedly an attractive species, which, in a quiet sort of way, seems to have the ability to provide added interest to a community collection when it is included. The back is a deep olive colour with bronze tints with the underparts a silvery grey. There is a black line stretching from just above the eye to the tail, where it diffuses over the area of the caudal peduncle. There is little or no difference in the coloring of the sexes but the female can be identified by the deeper body and slightly larger anal fin.

I well remember a tank in the class for tropical furnished aquaria at our show I attended. It contained eight fully grown black-lined tetras against a background of skillfully placed rockwork and was thickly planted with banks of *Carex* and a thicket of *Vallisneria spiralis* at each side. What a surprisingly attractive picture they made (and the tank was in the tickets as well).

When fully grown this species should be around 2 inches in length and they must be allowed to reach this size before attempting to breed with them. They are easy to keep if they are allowed to attain full maturity and well conditioned before introduction of a pair to the breeding tank. A diet consisting of mixed live foods such as finely chopped earthworm, *Daphnia*, white worms and shredded string is needed to produce tip-top conditioning, and the ones should be conditioned separately if this can be arranged, for it seems to produce the best results.

The breeding tank should be the standard 24 in. by 12 in. by 12 in., one-half of which is planted with clumps of the sword plant such as *Myriophyllum* and the other half left clear except for the gravel over the base; this provides an open area in which the breeders have plenty of room to display in the highly excited pre-spawning activity common to the tetras.

It is suggested that the water should be old, well matured and slightly acid. It can be filtered before it is put into the breeding tank to ensure clarity and freedom from pollution. Temperature will be found satisfactory at 80°F (26°C). Allow the breeding tank to be set-up and un-disturbed for about 5 days before the pair are introduced.



Black-lined tetra

Transfer the fish to the breeding tank in the evening and in all probability spawning will take place the following day. Remove the breeding pair immediately the spawning is completed.

Hatching should occur in about 48 hours, when the fry will be seen clinging to the plants. It is usually around the fourth day that the fry become free-swimming and are ready for Infusoria feeding. They can be kept on this for about 2 or 3 weeks, when they can be given brine shrimps, screened *Daphnia* and finely shredded white worm. When the young fish are about 8 weeks old drop the temperature to 75°F (24°C) and provide as much variety in the diet as possible, for this helps to make good growth.

## Feeding Problems in the Garden Pond

**S**o many pondkeepers are puzzled by the need for feeding their fishes in the garden pond. Some almost starve them and others over-feed them. Hardly any two ponds will be exactly alike and so it is quite impossible to give any hard and fast rules about what kinds of food to use or how often. It is only by long experience that the pondkeeper will know what and how much to feed. If the pond is well-maintained with plenty of growing water plants it is probable that very little artificial feeding will be necessary. On the other hand if the pond has been fairly recently made it is possible that the fishes will require feeding once a day. Another important point to consider is the number, size and kind of fishes in the pond. Obviously if many fishes are kept the natural foods in the pond may not be enough.

Most ponds will contain a number of types of goldfish. These are very easy to feed as they will take almost anything edible. Either live food or artificial will be eaten avidly by any hungry goldfish. It will be well to remember, however, that these fish will eat plenty of vegetable matter in the shape of algae and any soft-decaying leaves from the oxygenating plants. It is quite safe to assert that in the average sized garden pond containing water plants and a few goldfish, any feeding by the pondkeeper is unnecessary.

Many insects lay their eggs in or around the pond and the resultant larvae will be eaten by the fish. Flies may drop in the water and be taken and worms can crawl in at night. Frog tadpoles can provide food, as can small water snails. If the pond contains many fishes it is probable that they



will require some extra feeding. Consideration must also be given to the age of the fishes and whether you want them to breed. If you are growing on small fishes then obviously they will need plenty of food. The same will apply to fishes wanted for breeding. It is very important to make sure that such fishes get a good varied diet as although it is probable that there is a fair amount of natural food in the pond the needs of the fishes mentioned will be unsatisfied if they have to grow or breed.

There are two types of fishes, the omnivorous ones and the carnivorous ones. The former will eat almost anything living or dead whereas the latter will take mostly live foods, especially the young of other fishes. These carnivorous types are not often kept in the garden pond, with the exception of the coldwater catfish. This can eat any fish small enough for it to tackle and I would say that any fish half its size would be eaten. The other kinds of fishes often kept with goldfish are golden orfe, golden and green tench, rudd, hi-got carp, minnows and trout. All these fishes can be fed with the same kinds of foods. The orfe appreciates plenty of live foods but will take dried food as well. The trout also like small live foods but will take live and meat, and they will eat the usual dried foods.

For all the above-mentioned fishes there are plenty of packet foods on the market, but for those who prefer to mix

their own the following can be used. For fry from a fortnight old make a mixture of fine Bemax (wheat germ), dried shrimp and dehydrated meat (dehydrated meat can be bought at pet shops in packets ostensibly for cat food); put all the ingredients separately through an old-fashioned coffee grinder, and then sieve them through a nylon stocking. The large particles can be used for larger fishes and the fine ones can be mixed to a proportion of 2 of Bemax to 1 part each of the dried shrimp and dehydrated meat. This same mixture can be used, but much larger in pieces, for older fishes.

For good-sized goldfish and most of the other omnivorous fishes mentioned there is little they like better than rolled oats. The amount of this which medium to large goldfish can eat in a day will be a surprise to many. Fishes grow very quickly on this food. However, I do not recommend that it should be given without some variation: garden worms and the other usual live foods can be given at intervals. Regulate the amounts of foods by the way it is cleared up, and use of the easiest tests to see whether the pond fishes need feeding or not is to place a piece of dry brown bread on the top of the water. If this is not taken within 5 minutes the fishes are not hungry.

*Astilbes*

## Black Widow Fish (*Gymnocorymbus ternetzi*)

by JACK HEMS

IT was in the 1890s that Dr. Carl Ternetz, a versatile Swiss scientist who, for a time, combined ranching in far away Paraguay with collecting zoological specimens for English and American scientific institutions, first discovered the black widow fish, sometimes called the blackmoor, the black tetra or the peacock fish, in the Mato Grosso region of Brazil.

G. A. Boulenger, F.R.S., of the British Museum (Natural History), classified it and commemorated the collector's name in its formal appellation of *Gymnocorymbus ternetzi*. Yet it was not until the 1930s that it was introduced to aquarists in Europe and America.

The fish is a member of the family Characidae and attains a length of about 3 in. in the wild and roughly half that size under domestication. Like several other characins known to tropical aquarium keepers, the species is diamond-shaped and flattened from side to side. The sexes wear identical garb, but in mature fish the female is larger and fuller bodied than the male.

Anteriorly the sides are silver, ornamented with two vertical black bars. The posterior half of the body, the tiny adipose fin, the upright dorsal fin and the longish anal fin (always kept well spread) are sooty black. Sometimes, however, the black in the body and fins temporarily fades to a dowdy grey.

We cannot know every cause of this phenomenon but that it is often brought about by fright, sickness or a sudden or gradual change in the lighting or temperature of the water is plain enough to anyone willing to accept the evidence of his senses or his eyes. Incidentally, the butterfly-like young fish wear more and deeper black than old fish. The caudal, pectoral and pelvic fins are clear.

The black widow fish stays alive longest (10 years or more) when it is given plenty of swimming space in well-aerated water maintained at a temperature around 75°F (24°C) and a diet rich in live and flesh food. Nonetheless, it is not a faddy feeder, and is always ready to accept any of the regular dried foods.

*G. ternetzi* is a schooling fish, and six or more seen swimming together in their favoured middle levels of the

water is a pretty sight. Although old fish often develop short tempers, and young ones indulge in some teasing and nipping among themselves, the species is quite suited to living in a community tank stocked with fishes that are neither extraordinarily timid nor small enough to be swallowed whole—livebearer fry, for instance.

*G. ternetzi* is not a ready breeder, but once a couple take it into their heads to start a family, and conditions are propitious for spawning, eggs will follow as a matter of course.

The fry are easy to rear on Infusoria and green water (for the first week or so), followed by larger live food such as brine shrimps, micro worms or powdered Bemax and the like. As black widow fish are vigorous chasers, the tank for spawning them should be on the large size (at least 24 in. by 12 in. by 12 in.); the temperature of the water should be maintained at about 80°F (27°C) and masses of plants should be anchored to the bottom with stones or lead weights to offer a safe harbour for the scattered eggs. One other point: there is more likelihood of a well-fed couple spawning after they have been parted for a month or two than if they are left to share the same quarters day in and day out.

As soon as a pair have finished spawning they should be removed from the aquarium with all possible speed. Failure to carry out this advice will result in most, if not all, of the eggs being eaten in a fraction of the time that it took to lay them.

The eggs hatch out in 2 days, and 2 days later the fry should be free-swimming and snatching at every passing morsel of food. With plenty of the right sort of food (live food mostly) and no overcrowding, the fry will reach 1 in. long within the space of 6 to 9 months, but thereafter growth is not so fast.

## Aphyosemion australe



Photo

Photo: Aquatic Interests

by A. STEVENS

**T**he African rock-creep, which abounds in the west equatorial area of that continent, is one of a whole family of what may be termed 'annual fishes', that is, they are born, mature rapidly, mate and die all within a comparatively short time.

In natural conditions they live in bodies of water that increase in size seasonally with the rainfall. Eggs, whose development is triggered off by the influx of new water, start hatching and the fry grow rapidly as insect life also hatches in the water. Maturity is soon reached and with a good supply of food they are easily capable of spawning within 2 months.

Spawning takes place over a period of about a week, a few eggs being laid every day. The eggs are laid singly, two groups of two or three may be found on any medium that is present—surface plants, fallen leaves and twigs, and even mud at the bottom of the pool. As the eggs are quite hard-shelled and take 2 to 4 weeks to hatch, a natural distribution of the species is possible. Mud containing eggs is easily lodged on the feet of animals drinking at the pool and is deposited in other waters. When the water dries up living fish die and if rain falls within the hatching period of the eggs the species lives on in that pool. In strong conditions eggs may lay dormant for double the normal period before hatching. If rain comes too late natural distribution will take its course. Some pools may shrink to less than half an inch of very muddy water, which in the full blaze of the sun reaches temperatures far in excess of those in which we keep fishes. The fitter fish survive and are spared by a bill of rain—it is surprising just how tenacious life is.

The water the fish live in varies very much also. Rain water is soft and in collecting in pools it runs over soil from which it dissolves chemical salts and may become quite

hard. Fallen leaves make the water acid. With the advent of roads through the scrub the fish have spread to the drainage ditches at the road-side, and can be in water-filled ruts made by carts in primitive dirt roads. Temperature variations are considerable, too; small water-filled hollows in damp ground, despite a covering of shading grasses and broad-leaved plants, soon take in heat, giving high temperatures. Overnight the temperature falls rapidly from small expanses of water.

All these water and temperature changes take place in Nature, and how many of us keep our tanks at the same temperature year in, year out? Give the fishes a change—turn the thermostat up or down (by say 10°F; 5°C) in time with the season. The temperature rise will take place relatively slowly if a low-wattage heater is used. Cooling can occur too rapidly (as my electricity bill too often shows!) but can be achieved by reducing the temperature a few degrees per day. When topping up a tank just pour hot or cold water straight into the tank.

The fishes welcome the fresh water and will swim into the stream so as to be against the current (only natural!) and at the same time will rid their bodies of accumulated dirt obtained from stale water—I believe they actually enjoy such a 'bath' despite their living in water all their life.

Conditions need not change much when *Aphyosemion australe* is kept in aquaria. A tank, say 18 in. by 10 in. by 10 in., is filled with any fresh water available, hard or soft tap water, rain water or 'matured' (ugh!) aquarium water. Enough horticultural bale peat is added and allowed to soak and sink to give a layer about half an inch deep. In soaking, the peat will acidify and colour the water. The temperature may be set anywhere between 70° and 90°F (21-32°C), preferably controlled by a wide-differential thermostat.



A trio of fish is added. One male can quite easily manage two females and as he can become quite aggressive, his attention is divided. A spray of dead willow root or a bunch of nylon wool just dropped in or suspended on a large cork complex the set-up.

The male will select a female and will court her by displays of his finery. He drives her into a suitable position amongst the spawning medium, where he will lay alongside her, and with much quivering an adhesive egg is laid. They drift apart and in a few minutes lay another. This continues with either female for about a week.

The eggs when first laid are slightly amber in colour and are about one-thirtieth of an inch in diameter. The eggs can be left in with the parents provided that the parents are well fed. To raise a number of young *A. auratus* quickly, the eggs may be gently picked off the spawning medium with the fingers and placed in a bare hatching tank.

Infusoria is unnecessary for the newly hatched fry. Bosc shrimp is readily taken and the bare bottom of the tank ensures that the fry have no difficulty in finding the food. They grow rapidly on plenty of live food—Grindal worm, *Daphnia*, *Cyclops*, white worm, blood worm etc. Scraped beef and shrimp meat are also taken. One of the easiest methods of feeding mosquito larvae is to collect the eggs of this insect and float these in the tank. The lady of the house need have no worries about swarms of mosquitoes

buzzing about the home as hungry fish will soon deal with the larvae before they pass into the flying stage.

Sexing of the youngsters may be done in 3 to 4 weeks, as they colour up quickly. The accompanying photograph shows a male in all his courting glory. By comparison the female is drab; she doesn't have elongated fins nor bright colours. Her basic body colour is a translucent brown, which is bespattered with very fine dots of dark brown, red and black, which spreads to some fins. The males do not do too well in a community tank as other fishes are apt to chase the white filaments on their fins. Males kept together will quarrel and this is another reason for loss of finery (but not so severe as with fighting fish).

To raise a team of these fish for a breeder's entry I have found it necessary to rear the selected three males separately in a partitioned tank so that each develops its filaments. With such easily sexed fish it is a good policy to exhibit three of each sex, to show that both males and females are of good quality. To show them at their best, take along some of their own tank water and put them in warmer water than they have been used to—the increase in liveliness and colour intensity will be worth the effort.

As they are 'annual fish', a great longevity cannot be expected even under artificial conditions. Females last up to 12 months, depending on how many spawnings are made from them, and males may last to 15 months.

## The Three-spined Stickleback

by LAURENCE E. PERKINS

Photographs by the author



During construction of the nest the male stickleback fans the area with his pectoral fins and drags the rapidly moving tail fin across the depression in the sand.

OF all our native freshwater fishes the three-spined stickleback (*Gasterosteus aculeatus*) is by far the commonest and most widespread and is familiar to every child who lives within reach of a country pond or a town canal. It is undeserving, however, of the somewhat references to its lowly status and perhaps the violent blushes exhibited by the male during the mating season

may be attributed to its justifiable shame at being dismissed as a 'tiddler'.

Out of season, this drab little sparrow of the water holds little attraction for the aquarist, to whom its savage nature and insatiable appetite are far from endearing qualities. With the onset of spring, however, the male stickleback displays characteristics which compensate in full for its ills. At this time of year the schoolboy refers to the male as a red-throat, in reference to the mating livery which it assumes. Contrary to his usual fondness for hyperbole, our schoolboy understates the case, because the red coloration extends along the whole of the underside and is of a most beautiful hue. Moreover, the sides assume an iridescent sheen of green and the dorsal area becomes a metallic blue. As a finishing touch the eye rims become turquoise blue. The general appearance is so colourful as to vie with any of the popular tropical beauties and has to be seen under aquarium conditions to be credited.

To witness the interesting sequence of events which constitute the stickleback's brief spell of domesticity, it is necessary to obtain a good male and two or three large females. These should then be housed in an aquarium of not less than 12 in. by 10 in. by 10 in. Furnished with gravel and aquatic vegetation such as willow moss (*Fimbrinella asperata*) and blanket weed, the aquarium will be ready to supply all that is required for the home-building operations to be carried out by the male fish. Firstly, however, he and his harem must be brought into condition, and generous daily feeds of live *Daphnia* will ensure that this is accomplished. Although sticklebacks will attempt to take other forms of live food, such as small garden worms



Courtesy of the female (top fish) by the male stickleback, during which the female is driven into and through the nest where the eggs are laid and fertilized. At this time the colours of the male are at their greatest brilliance, rivalling those displayed by many tropical fish species



Male stickleback and nest, which is made with portions of blanket weed in the form of a sloping tunnel



Here the male stickleback is seen trying to drive the female into the nest (centre). Note that his dorsal spines are not erected.

etc., it is safer to keep to *Daphnia* because the mouth of the stickleback is extremely small for the body size and they can choke themselves through their greed and subsequent inability to deal with the capture.

When once the little community has settled down the male begins to prepare a site for the nest, in which the eggs will be laid and hatched. His initial actions consist of swimming slowly over the selected area close to the ground and in an inclined position with his caudal peduncle bent so that it is parallel with the bottom of the tank. As he swims in this curious fashion his fins are fanned rapidly so that the resulting disturbances shift the gravel away to right and to left, leaving a depression. To increase the depth and extent of this depression he also removes gravel a piece at a time with his mouth, picking up each piece, swimming away and forcibly blowing the unwanted particle into a remote corner of the tank.

After a suitable depression has been made the male begins to seek pieces of material with which to construct the nest proper. Small portions of plant are carefully selected, carried in the mouth and placed into position, blanket weed being greatly favoured for 'knitting' the whole into a workable mass. Then, using his head as a tunnelling instrument, he burrs and burrows into the pile of vegetation, eventually passing through and partly emerging at the other side. Carefully withdrawing himself in the reverse direction our builder leaves a tunnel with a down-sloping entrance and an up-sloping exit. The nest is now ready to receive occupants and the male has next to coax his brides into the nuptial chamber.

During the whole of his active endeavours the female have paid neither him nor his activities the slightest attention, but have contented themselves with remaining aloof, gently moving their pectoral fins to support almost stationary postures. Now, however, their spell of ease will terminate, for the male darts among them, his colours

increase suddenly in brilliance as he huffs them seemingly in aggressive attack; but his unerected spines belie this impression, for he has no wish to disembowel them at this stage of the proceedings. His energetic efforts at length bear fruit and one of the females is coaxed, chased and guided into the nest, where she spawns before being quickly chased through and out by the male, who fertilises the eggs *in situ*. The remaining females are each, in turn, persuaded to emulate the actions of their sister and the first phase is over.

The male now returns to the nest and employs himself busily fanning vigorously with his fins to aerate the eggs, breaking off occasionally from these duties to look around and ensure that nothing threatens his charges. Any interloper will be bravely challenged and driven off, including the mothers of his brood, and it is at this juncture that the females should be removed from the aquarium. To leave them there will result in their death and will also possibly distract the male to such an extent as to make him neglect the nest.

The duties of guarding the nest and aerating the eggs continue to employ the male's attention for several days, and even after the young have hatched he continues to aerate by fanning. When the young are free-swimming and become venturesome, any that leave the nest are taken up into the mouth and blown back into the nest. By this time the neat little construction in which the females spawned has become reduced to an untidy heap of rubbish; but it has fulfilled its function, for soon the tiny fry will dart away before their elder's paternal ministrations are stretched too far and he recognises in them their dietetic potentials.

The male illustrated in the photographs with this article was continuously employed for over 3 weeks on nest-building, egg-aerating and guard duty and his unerring endeavours and astonishing energy were wonderful to witness, exemplifying an unswerving, if instinctive, sense of duty and parental care.

## THE GOLDFISH AND ITS VARIETIES

# (9) The Lionhead

by A. BOARDER

THE lionhead goldfish may be likened to a fantail with the head of an ananda. One characteristic, however, is very odd in this variety; there is no dorsal fin. This gives the fish an even stranger appearance than the bisonhead hood that it bears. This fish may be all visibly scaled or apparently scaleless like the shubunkin, although most of the lionheads seen in recent years at the shows have been scaled fish. The colour of the lionhead can be a self red or yellow and red. This variegated fish can have black and silver as well. The shubunkin type should have the colours of that variety.

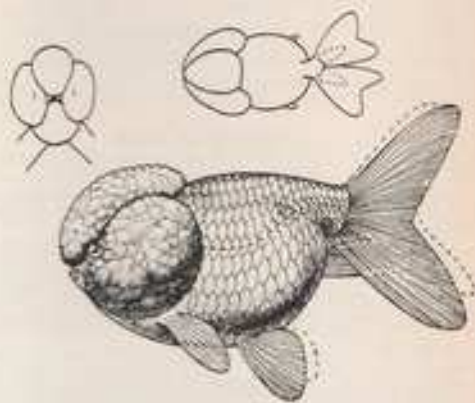
### Colour and Body

It is usual these days to have these fish red and silver, but the all-red one is very attractive and would stand a better chance of getting good points for colour than a variegated one. This fish should have a short thick body with the depth more than half the length, with the caudal peduncle set high. The head and gills should be covered by a raspberry-like hood, which should be almost completely round, starting at the nose and running over the whole of the head. It should also cover the gills. There should be no dorsal fin and any bump or false fin in this position will lose points for the fish at a show. The caudal fin is divided completely, as for the fantail. It should also have the deep fork at the ends as in that fish and the tail must be held well out from the body and not droop in any way.

### Finnage

The pectoral and pelvic fins must be half the depth of the body. The anal fin must be double and each part held away from the other. The fish should be of a hardy type and appear quite cobby. Any lack of complete covering of the head by the hood would lose points for the fish. Under the new standards for the lionhead no points are allowed for the hood. This is a great mistake, as this feature is the very important one that differentiates it from an ordinary fantail. Under the old rules there were 28 points for the head of the scaled type and 27 for the shubunkin type. This enabled the judge to reward any fish with a good hood but now all that can be done is to include these markings under those for the body.

The keeping of the lionhead presents few difficulties; especially is this so with the scaled type. These can be kept in an out-door pond all through the winter and they should cause no harm. The shubunkin type may stand the winter out of doors in a sheltered part of a garden and towards the south of England but they are not quite as hardy as the scaled types. They are not at all fussy about foods, and will take all the usual ones. A good general diet would be milled oats, Bemax, dried shrimp and dehydrated meat (as fed to dogs and cats). Live food is also much appreciated and garden worms, broken, can be given every day in the warmer months of the year. The other usual live foods such as white worms, *Tubifex* and maggots can also be given. I always prefer to break the maggots before feeding them to the fish; I think this is safer but probably it is a



Outlines of the lionhead goldfish from the Federation of British Aquatic Societies "Show Standards"

mistaken idea of mine—just one of those things one does without any logical reason.

Although this fish is not difficult to breed it is not at all easy to breed fish of sufficient quality to win at any large show. In the first place the lack of a dorsal fin is often the spot on the back where a nasty hump or false fin appears. Many an otherwise good fish is spoiled by one or two nasty little humps where the dorsal fin is usually found on other types of goldfish. A good smooth back is needed and so any fish not having this quality should not be used for breeding purposes.

### Hood

As to the hood, the difficulty here is that many fish do not develop the hood until they are 2 or more years old. This means that the breeder must hang on to his youngsters for a long period in the hope that a good hood will develop. Many fish do not grow a hood even after many years and this can be very frustrating for the breeder. When sorting out the fry examine all for the completely divided tail. Then place them in an all-glass container so that the dorsal position can be seen. Do not keep any young with deformed backs as these fish will never make the grade; a bad hump or false fin will never go away.

As for the hood, the breeder must have plenty of patience, sort out the fish assessed as best at that stage and then wait for the hood to develop. Plenty of space and a liberal diet will at least hasten the growth of the desired hood.



## 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.*



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

### A Show for the South

I HAVE read your Editorial on the lack of an exhibition in the south of England, in the July, 1962 issue, with great interest. I also regret having missed your editorial comment one year ago. Had I read that I would also have liked to reply.

When I was active in the F.B.A.S. it was my earnest desire to see an exhibition in the south of England which would rival the very popular British Aquarists' Festival. Of this Festival I can speak with some experience, having been intimately connected with it at the inaugural Festival in 1951.

There are to my mind only two problems to be overcome, both of which are very closely interwoven. They are capital and venue. London is notoriously expensive as a showground, but if one could find a venue which does not cost the earth, where would the funds come from? There are three possibilities: (1) To find a sponsor (either one person, a consortium of persons or a business house). (2) To be provided with funds on loan from societies, or suitable guarantees, and these societies should be prepared for losses. (3) To make revenue (show stands, entrance admission fees and entry fees) that would enable all loans to be repaid in full.

This latter course would not be all that acceptable, as a show must encourage the small man in the hobby. They are our successors whom we should foster.

Equipment, entries, technical know-how we have in abundance. Let us have a team put together to iron out the ideas. We have the men able to do this. If the results find favour with the organised hobby, may we then ask you to put them over to your readers?

My views on organisation may be a little unorthodox, but many will no doubt agree with me when I say that a little honest to goodness work with plenty of initiative and a little shove in the right direction will enable the southerners to see an aquarist show which is in keeping with our aquarist endeavours, which so say the least of it has earned a lot of respect from those who know how to recognise earnest endeavour.

R. O. B. LAY,  
London, N.W.6

### Fishy Friendships

MOST aquarists have seen and read of fish that pair off and have eyes for no other. I have a trio of angels; two have paired off to the total exclusion of the third and have far outstripped it in size and bearing. I hope shortly to spawn them.

On another occasion I had a magnificent "pair" of angels which spawned in a community tank. The female laid many eggs which the "male" duly "fertilised", all of which were, of course, eaten. About a week later the "male" of the first spawning, after much courtship, laid "his" eggs, the original female in close attendance—as a "male" this time. I have read of "like-sexed" fish pairing off but never of an actual spawning.

In my large community tank I have a female thicklip gauram which appears to be full of spawn (a young male is being brought up to size in another tank). This thicklip has formed an attachment with a red-finned shark. It seems to be mutual as each will seek the other out. They pursue each other about the tank and will stop and "court" each other by "bumping and smooching". Also they rest side-by-side, nose-to-tail, shimmoering and have on occasions sunk to the gravel in this position. There is no fin damage to the shark so it is not being done with intent to damage. I don't think the shark's mouth is built for biting so I wouldn't expect damage to the thicklip, but I have observed labios "mouthing" other fishes, particularly angels, to what end I don't know. In this case the attention of the shark is solely for the thicklip.

In this liaison a frustrated spawning need by the thicklip and attempts by the shark to discourage her or what is it? I would like to hear other readers' opinions on this particular subject or any other stories of unusual "pairings".

The idea of red-finned thicklips has been dismissed!

E. G. ROCKALL,  
Abingdon, Berks.

### Fishing Birds

I HAVE been very interested to read the recent articles and correspondence on the subject of owls preying on fish. Like Mr. Boarder I, too, have lost several fantails from my pond and I naturally fell to wondering whether an owl might be the cause.

The other day, while I was having breakfast, I was called by my wife, who said there was a large black bird by the pond and very likely this was the culprit who had been stealing my fish. I thought it rather amusing to entertain the idea that this bird (it was a rook or a crow) could be responsible but we decided to sit still and see what it was up to. It was, in fact, fishing! A large number of newts came to my pond every year and the bird actually fished out several of them which were apparently resting on the black-wood round the sides. The bird kept up this performance for quite a while, walking all round the pond and stopping whenever it saw a newt. The surprising

thing is that none of the newts was eaten; they were just killed and left.

I think it is quite out of the question that my fantails were in this way (some of them were almost as large as my hand), but this incident has certainly given me cause to wonder whether something other than cats or small boys were responsible.

W. H. GOODERHAM,  
Wembley, Middx.

#### Nymph Goldfish

IF Mr. H. G. Berger (*The Aquarist*, August) cares to contact me he can have some young nymphs bred as specimens from my fantails this year, quite free. If he can produce fantails equal in quality to mine from any good strain of goldfish I will give £100 to any charity he cares to name. The fish must be scaled and all red.

A. BOARDER,  
Ruislip, Middx.

#### Why not Centigrade?

ON the subject of centigrade and Fahrenheit scales I should like to point out that most scientists use the former, as it is more convenient to use.

In schools only a very few experiments are carried out with the Fahrenheit thermometer, as it was found that the children find it so much easier to use the centigrade scale. I know in my own school only one experiment in the whole course from the eleven-plus to "A" level exams at the age of seventeen uses the Fahrenheit scale, and this is done in the first year. The children heat cans of water and compare the readings on two thermometers, one being Fahrenheit the other centigrade. Since children of eleven find it easier to use the centigrade scale I should think Mr. Boarder (*The Aquarist*, April) should be able to cope with it.

Incidentally, nobody is forcing Mr. Boarder to change his equipment; as it wears out he can replace it with new centigrade equipment or keep on using the same equipment and use a graph for easy conversion.

Now do I think it is repugnant to change over to a decimal monetary system, as our present system seems to me to be messy, and just trying to make difficulties for both foreigners and schoolchildren.

CATHERINE TRIVALDWYN (age 15 years),  
London, S.W.14

#### Tank Pollution by Tubifex

I WAS interested to read Mr. J. W. Wilson's comments on *Tubifex* pollution (*The Aquarist*, August).

As a dealer, I am most concerned with this problem, and have found that it is easy to keep *Tubifex* alive and in the best possible condition by keeping it under running water and actually sold, when it is put into plastic bags with water. This ensures absolute cleanliness, and I feel the additional expense is more than justified by the satisfaction of our customers.

With the ever-increasing interest in both tropicals and marines, it is vital that dealers pay attention to this matter and only supply worms alive and in a fit state to be used.

R. A. BASSETT,  
Proprietor, Regency Aquaria,  
Brighton, Sussex.

#### Ten-spined Stickleback

I AM trying to collect data on breeding variations of the ten-spined stickleback (*Pisinae pinnatus*), and would like, through the medium of your widely read magazine, to ask your readers for extra information.

I am especially interested in discovering whether any person has noticed a particularly high percentage of

deformed fish after each spawning of normal parents, with special emphasis on the number of spines.

I will also be interested to hear of any specimens with only a few spines, say, up to four, found in natural waters, and also the approximate percentage of these to the normal fish. I will gladly refund any postage.

JAMES McM. URS,  
Secretary General,  
British Ichthyological Society,  
Glasgow, S.A.

#### *Exodon paradoxus*

WITH reference to Mr. L. Lewis's letter in *The Aquarist* (August), he states that *Exodon paradoxus* has never been bred in captivity. By this I presume he means the young have never been reared to maturity. If, however, he means the fish have never spawned, I must refer him to the *Encyclopedia of Tropical Fishes* by Axelrod and Vorderwinkler (page 649), who claim that *Exodon* has been spawned by Turwiler. If this spawning was hatched and reared, then I hope Mr. Lewis gets a good price for his "telly".

I. HARVEY,  
Basildon, Essex.

#### Success with Angel Fish

I AM a newcomer to the hobby, having started in 1960 with a tank of guppies. I have two 24 in. by 12 in. by 15 in. tanks now. In the lower I have some angel fish. The largest was purchased in the summer of 1960. This proved to be a female, laying three batches of infertile eggs. Late in 1961 I purchased a further two fish from a local shop. One of these grew extremely quickly into a fine specimen but the other seems stunted and has still only reached a size of just over 1 inch (they were the same size when bought).

After returning from a fortnight's holiday this year I fed these fish with *Tubifex* worms and the female soon began to fill out and bully the others. She is just over 3 inches long and the second fish, which is obviously a male, is only just over 2 inches long. When the lights were on the female chased him incessantly, but as soon as they were switched off the couple would begin to court vigorously and clean leaves. I removed the other fish and Monday 27th August at 10 a.m. the female began to lay her eggs on a *Cryptocoryne* leaf. These the male duly fertilised. The female began to eat the eggs so I divided the tank with a piece of glass, set up a diffuser stone by them and dripped in some 5 per cent. solution of methylene blue.

The eggs hatched on Thursday morning and by Saturday night the fry were free-swimming. I fed them with liquid fry food, graduating on to micro worms.

This is the first batch of fry I have had—apart from guppies. I have written to you because I thought your readers would be interested in the difference in size of the fish—the "books" say the pair should be the same size and over 3 inches.

I would like to get in touch with a hobbyist in my area for at present I do not know of anyone keen on tropicals here.

I would also like to take the opportunity to thank you for your magazine, without which I would never have come as far as I have and enjoyed it—in my first 24 years I have had only six casualties—thank you very much for your help.

HILARY BISHOP (age 15 years),  
Sittingbourne, Kent.

#### Skill in Breeding

**HYPERBOLIC** is exaggeration for effect. My exaggeration certainly had an effect! Here I sit, shot down in flames. This time, I will try to be less light-hearted, and express myself rather better.



I have just had a glance across at my community tank. The male *rusacis* looks great, the *N. aequidens* is a beautiful thing, the *P. irubens* is in magnificent fertile and the *A. californicus* has just drifted majestically by. I had great fun and not a little difficulty in breeding the last two. The red-tailed shark looks ready for a mate. Were I to get one, and then manage to persuade them to rear a family, I would be over the moon.

You see Mr. Lewis (*The Aquarist*, August), I keep them, I like them and take my hat off to anyone who can breed things like pompadours. The point I tried to make, not very well I fear, was this: given the time, the equipment, the will, the experience and a slice of luck, I believe that it is only a matter of time before someone comes up with a brood of silver sharks. Is it not well within living memory that angels were very nearly impossible? Now breeding them seems to me to be fairly commonplace.

The appeal of the guppy is quite different. Clearly the difficulty of producing a brood is not to be compared with the fishes you mention. The skill involved is a different one when one breeds to a standard shape. A knowledge of

the genetical make-up of one's fish is necessary. Is this or that feature carried on the X or the Y chromosome, or has it crossed over? Very often I just don't know, but it is most interesting trying to find out.

The satisfaction of producing a line of standard fish is tremendous. The thrill that would come from breeding silver sharks might be even greater and might require a terrific amount of skill, but it would be a different kind of skill. Once you knew all the answers, the interest would be gone for the purist, unconcerned with financial gain.

The regal qualities of the guppy, bred to standards, lie in the continued challenge which provides something for the aquarist to get his teeth into. I would sooner back the most experienced aquarist we could find to produce silver sharks, or one of the other "impossible" types, than guppies to F.G.B.S. standards starting with wild stock.

Incidentally, I have seen guppies like Alley veils, to mention one, which compare very favourably with the American types. We'll still sign you up one day!

DAVID PORTER,  
Nottingham.

## HOUSE-PLANTS IN THE FISH HOUSE

# The Peperomias

by BARRY R. JAMES

**B**ELONGING to the same family as the pepper plant of commerce, the peperomias contain some 400 species. All of the ones grown as house-plants have their origin in Central and South America, where they are often found at considerable altitudes. Consequently they appreciate cooler conditions and seem to thrive between 55° and 75°F (13-24°C).

Many peperomias possess thick, fleshy stems and leaves which have an incredible ability to resist drought. Although not advising that these plants be treated as cacti, watering should be kept to a minimum, especially during the winter months.

The flowers of the genus *Peperomia* are grouped together on a spike, usually white or yellowish in colour. Although grown principally for their dainty foliage these flower spikes often provide an attractive contrast to the darker shades of the leaves.

Being woodland plants, peperomias should be given a good friable compost containing at least 40 per cent. of peat and leaf mould. Re-potting should be carried out very occasionally as the rooting system of plants of this genus is not very extensive.

*Peperomia caperata*. This tiny plant seldom exceeds 3 in. in height. The small wrinkled leaves are dark green in colour. Disliking direct sunlight, *P. caperata* does well in shady positions, provided that it is not over-watered.

*Peperomia hederaefolia*. Slightly larger than the previous species, this plant appreciates a warm moist environment. The leaves are a metallic grey with green veins. Although not completely smooth they do not have the serrated effect of the previous species.

*Peperomia magnoliifolia*. A very attractive *Peperomia* of shrub-like habit, this species reaches about 10 in. in height with broad ovate leaves some 2½ in. in length and 2 in. wide. The stems have a reddish tinge and the leaves



*Peperomia* species. Back row: left, *P. magnoliifolia*; centre, *P. caperata*; right, *P. sandersii*. Front: *P. hederaefolia*.

are mottled in green and cream. A favourite with many of my customers, this plant is rapidly gaining in popularity owing to the ability of the thick glossy leaves to stand up to central heating.

*Peperomia sandersii*. A very striking house-plant; the almost circular leaves are thick, smooth and beautifully marked in silver and dark-green bands, which arise from the point where the leaf meets the stem. A relatively easy plant to cultivate; it dislikes draughts and cold, damp conditions.

*Peperomia scandens*. A trailing plant, *P. scandens* resembles another house-plant, *Physalodendron scandens*, which has similar though larger heart-shaped leaves and trailing habit. However, here the resemblance ends, for this *Peperomia* has attractive variegated leaves, which at their largest are only an inch or two in length as opposed to the *Physalodendron*, the leaves of which may reach 3 in. or more. Although a hardy plant when of a good size, smaller specimens are liable to sudden leaf drop, which is sometimes fatal, if they are exposed to a dry atmosphere.

Peperomias are excellent subjects for mixed bowls, where their similar requirements and quaint and attractive foliage lend themselves well to this kind of arrangement.





## 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.

At the last meeting of the Yeckford Section of the Fancy Guppy Association, an enthusiastic address on the subject of "Inbreeding" was given by Mr. J. Kelly, of the Lancashire section, which touched on genetics, characteristics of tanks, feeding and water. A second guest was Mr. F. Whitman, secretary of the Lancashire section.

A table showing the following results: 1st, Mr. K. Robing, 73 pts.; 2, Mr. R. Belling, 68 pts.; 3, Mr. Harrison, 67 pts.; 4, Mr. P. Jones, 66 pts.; 5, Mr. K. Riding, 73 pts. (after stay); 6, Mr. Harrison, 70 pts.; 7, Mr. Harrison, 68 pts. The membership is steadily increasing and seems interested in having should contact Mr. J. Jackson, (No. 1), 49, First Street, Wesley House, Low Moor, Bradford.

At the Aquarist Club Assembly of the Great, East & Northfields Pond and Aquarium Society a call on each corner was given by a well-known local aquarist and breeder, Mr. Williams of the Wolverhampton Society. This proved to be very interesting. Mr. Williams dealt mainly with the general ways of keeping the fish and their spawning methods. Two lots of their spawners were passed round for the members to study. After dealing with the members' questions, Mr. Williams was very warmly thanked by the Chairman, Mr. Lewis, for one of his best and most interesting talks the Society had received.

The results of the 5th annual show of the North Eastern Federation of Aquarist Societies were as follows: Trophy winners—T.A.S. Imperial Cup for the Club gaining most points at the show; Tyneside A.S.; Laidston Club—Individual exhibitor gaining the most points; F. W. Dunn (Sunderland A.S.); Thompson Cup—Club Presented Aquaria Club Newcastle Guppy Club; F. W. Dunn Cup—"Best Fish in the Show"; Mr. J. Hood (Tyneside A.S.); N.E.F.A.S. Cup—Individual Presented Aquaria; Mr. Hood; Favourite Cup—Best Character; F. W. Dunn; N.E.F.A.S. Trophy—"Best Breeder's Class"; entry; 1, Thompson; Best Club Stand; 1, Tyneside A.S.; 2, Sunderland A.S.; 3, Favourite A.S. Intra-Club Presented Aquaria; 1, Newcastle Guppy Club; Individual Presented Aquaria; 1, J. R. Hood (T.S.); 2, A. Bailey (T.S.); 3, R. Bunting (T.S.); Aquarist Favourite Aquaria; 1, T. Preston (T.S.); 2, A. Guyer; 1, G. Cummings (N.G.C.); 3, R. Kettle (T.S.); 4, L. Thompson (T.S.); 5, F. W. Dunn (S.); 2 and 3, R. Scoble (S.); 4, S. Moller; 1 and 2, A. Goodchild (P.S.); 3, A. Goussin (S.); A.V. Seaward; 1, Mrs. S. Whittier (M.); 2, D. G. Bell (T.); 3, G. Olive (T.); 4, V. Charcut (Hemmeringham); 5, 1 and 3, F. Dawson (S.); 2, R. Werten (T.S.O.V. Classics); 1, 2 and 3, F. W. Dunn (S.); 4, A. S. Moller; 1 and 2, A. Goodchild (P.S.); 3, E. Weston (T.S.); A.V. Goodchild (P.S.); A.O.V. Laidston; 1, D. Corfield (T.); 2, T. Preston (S.); 3, A. Goodchild (P.S.); A.V. Dwarf Goldfish; 1, G. Hunt (T.); 2, B. Tiverton (M.); 3, J. Hunt (T.S.); A.O.V. Goldfish; 1, J. Herring (T.S.); 2, Mrs. S. Whittier (M.); 3, D. Baine (P.S.); 4, S. W. Hall; 1, D. G. Bell (T.); 2, G. Hunt (T.S.); 3, S. W. Hall; 4, A.V. Goldfish; 1, F. W. Dunn (S.); 2, J. Herring (P.S.); A.A. Goussin (S.); A.V. Fishes of Dunbar; 1, J. Bate (T.); 2, R. Meadows (T.); 3, F. W. Dunn (S.); A.O.V. Tropical Egg-layers; 1 and 3, F. W. Dunn (S.);

2, E. G. Hunt (T.S.); A.V. Goldwater Fish; 1, 2 and 3, J. H. Hood (T.S.); Breeder's Class (Scales); 1 and 3, J. H. Hood (T.S.); 2, R. Weston (T.S.); Breeder's Class (Livebearers); 1, J. Thompson (T.); 2 and 3, G. Cummings (T.S.); A.V. Breeding Pair; 1, J. H. Hood (T.S.); 2, F. W. Dunn (S.); 3, D. Corfield (T.S.).

Clubs entering were Tyneside A.S., Sunderland A.S., Preston A.S., Newcastle Guppy Club and Middleton A.S.

THE British Ichthyological Society are interested in forming and expanding a London Branch. The activities of the Society are of great interest to aquarists, and the Society possesses a special zoological section, with services to members. The Secretary would be pleased to receive any enquiries about the Society with a view to membership. All enquiries are invited for and these will be gladly to interest all.

Any reader who is interested, should write to Mr. David Marchington, 98, Stonefields Lane, Edgware, Middlesex.

RECENTLY the Dewsbury and District A.S. had a very interesting lecture on "Live Foods" by Mr. Falke, a society member. The speaker dealt with several kinds of home-produced foods plus pond-bred varieties. The talk was made more interesting by the specimens which Mr. Falke brought along for inspection.

OWING to unexpected difficulties the September meeting of the Lancashire Section of the Fancy Guppy Association could not be held at the usual Manchester venue. By courtesy of the Pennine Section a joint meeting was held at their Burnley Headquarters and a very interesting afternoon was enjoyed. The Table Show attracted some forty entries and the high quality of the exhibits made the judges' task an unenviable one. Several Silver Year Awards were gained.

AT the September meeting of the Bedford and District A.S. a table show was held. The results were: A.V. Cyprinoids; 1, Mr. R. Smith (Sunderland); 91 pts.; 2, Mr. R. Thompson (Bury); 80 pts.; 3, Mrs. D. Bell (Black Bank); 80 pts.; 4, Mrs. D. Bell (Preston); 78 pts.; A.V. Cyprinoids; 1, Mr. R. Smith (Preston); 87 pts.; 2, Mr. R. Harrison (Preston); 86 pts.; 3, Mr. R. Thompson (Sunderland); 85 pts.; 4, Mr. R. Harrison (Preston); 84 pts.; A.V. Catfish and loach; 1, Mr. R. Thompson (Lancaster); 89 pts.; 2, Mr. R. Thompson (Lancaster); 88 pts.; 3, Mrs. Hall (Preston); 87 pts.; 4, Mrs. D. Bell (Preston); 84 pts. The cup for the highest number of points was awarded to Mr. R. Thompson. The judge was Mrs. Meadows.

AT a recent meeting of the Northampton and District A.S. members heard a talk on Reproductive and Amphibia of the World, illustrated by slides and living specimens, by Mr. K. Blackwell. Table show results for Characins were: 1, Mr.

L. Price; 2, Mr. R. Sheehy; 3, Mr. B. Jolly. Intra Section; 1, Miss L. Memory; 2, Mr. L. Roberts.

### AN APPEAL

A REQUEST has been received from The Auxiliary Secretary of St. Philip's Hospital, Blenheim Street, London, W.C.2, for advice and assistance in the installation and maintenance of an aquarium in the children's ward. Would any society or aquarist please help this most worthy effort.

THE annual general meeting of the Preshwold and Bury A.S. was held recently and the following officers were elected for the new year: Chairman, Mr. T. White; vice-chairman, Mr. A. Wadley; secretary, Mr. F. Jennings; treasurer, Mr. W. Keating; publicity officer, Mr. H. Campbell. The Annual Open Show is to be held at The Church House, The Wolds, Bury (behind the Parish Church) on the 13th November. Schedules are available from Mr. F. Jennings, 11, Burwood Avenue, Bury.

ONE of the speakers at this year's Bendon and District A.S. Congress will be Mr. De Graaf, Curator of the Artis Aquarium, Amsterdam. The Congress will be held on Saturday, 1st December at the usual venue of Whitefield Secondary Modern School, Hendon, N.W.2 and starts at 8 p.m. Mr. De Graaf will also be showing a movie film on archive fish and small skippers together with slides taken on an expedition to Cayen. Representatives of societies wishing to obtain further details are invited to write to the Secretary of the Hendon A.S.; Mr. K. Partridge, 3, Hildon Way, Staines, Middlesex.

THE results at the second open show held by the Bristol Tropical Fish Club were as follows: Fishes; 1 and 2, F. Brown; 3, M. J. Brown; A.O.V. Laidston; 1, D. Livingston; 2, W. D. Soughart; 3, E. Jones; Birds; 1 and 2, F. Brown; 3, D. R. Cronin; Hummingbird and Hymenoptera; 1, J. R. Wheeler; 2, R. Owen; 3, J. T. L. Mason; A.O.V. Characins; 1 and 2, F. Brown; 3, M. J. Brown; Anguils; 1, F. Brown; 2, D. A. Wilson; 3, E. Jones; Dwarf Goldfish; 1, G. S. Stone; 2, F. Brown; 3, D. A. Wilson; A.O.V. Goldfish; 1, T. A. Armit; 2 and 3, F. Brown; Corydoras; 1, G. S. Stone; 2 and 3, D. F. C. Kinnwood; A.O.V. Cichlids; 1, G. S. Stone; 2 and 3, J. H. Brown; A.O.V. Epiplatys; 1, J. T. L. Mason; 2, G. S. Stone; 3, W. Holland; Molluscs; 1, D. R. Cronin; 2, M. Nightingale; 3, J. T. L. Mason; Guppies—Long Tail; 1, E. Jones; 2 and 3, R. Farrer; Short Tail; 1, 2 and 3, J. R. Wheeler; Puffers; 1, L. I. Chidley; 2 and 3, R. Farrer; Succinea; 1 and 3, F. Brown; 2, L. Linton; Planis; 1, M. Nightingale; 2, F. Brown; 3, L. Linton; Breeder's Egg-layers; 1 and 3, J. T. L. Mason; 2, D. A. Wilson; Breeder's Livebearers; 1 and 2, L. Linton; 3, D. C. F. Kinnwood; Tropical Plants; 1 and 2, J. R. Wheeler; 3, M. Nightingale; Furnished Aquaria (Intra-Club); 1, Bristol Tropical Fish Club; 2, Stroud and District A.S.; Parrotfish Aquaria (Individual); 1, Mrs. I. Stone; 2, D. A. Wilson; 3, W. Gray; Best Exhibit in Show; 1, T. L. Mason; Highest Individual Points; F. Brown.

THE North West London Group of Aquarist Societies held their Favourite Aquaria and Goldwater Classes at the Willesden Borough Show recently. All entries were judged separately from the Willesden Borough entries, and the results were as follows:

Common Goldfish; 1, F. Tindley (Independent); 2, F. Stone (Hampton); 3, E. R. S. London (Willesden); 4, F. Stone (Hampton); Shubunkins; 1, R. Essex (Willesden); 2, S. Wingrove (Willesden); 3, Mrs. A. Wingrove (Willesden); 4, H. White (Hendon); British Native Foreign Goldwater; 1, S. Wingrove (Willesden); 2 and 3, J. Kettle (Independent); 4, R. Wingrove (Willesden); Fancy Goldfish; 1, A. Nelson (Hendon); 2, S. Wingrove (Willesden); 3, R. Jones (Willesden); 4, F. Stone

(Hampstead, 1st; 2nd in N.W.L.O.A.S. series; A. Yarns (Hertford); Postal Goldfish, Full body bonus points; Wilkesley and Hampstead; Challenge Class bonus points; Wilkesley; Fernhurst Aquaria Club; 1, Wilkesley; 2, Hendon; 3, Hampstead; 4, Independent; Wilkesley will hold the London Challenge Cup for one year; Pts. Gained; Wilkesley, 44; Hendon, 16; Hampstead, 13; Independent, 11. List: Pts.: Wilkesley, 66; Riverside, 34; Hendon, 20; Independent, 18; Hampstead, 14.

A REPORT in the August issue commented with the following wording: "At the recent table show of the Bradford section of the F.O.A. the results were as follows: 'This should have read: "At the Scarborough A.S. Open, the results of the Guppy section, run by the Yorks section F.O.A. were as follows:"

THE paintings for the second Table Show of the Association of South London Aquarist Societies were as follows: Labyrinth (W. J. Morris (Chelsea) 77 pts.; 2, J. E. Cobden (Canford) 74 pts.; 3, R. Luff (Surrey) 73 pts.; Clarias (1, W. J. Morris (Chelsea) 82 pts.; 2, C. A. Stevens (Clapham) 76 pts.); 3, W. J. Morris (Chelsea) 78 pts.; A.V. Barb (1, J. E. Cobden (Chelsea) 80 pts.; 2, R. Luff (Surrey) 79 pts.); 3, C. R. Parlow (Surrey) 78 pts.; Dwarf Cichlid: 1, C. A. Stevens (Clapham) 78 pts.; 2, C. A. Stevens (Clapham) 75 pts.; 3, R. Luff (Surrey) 73 pts.; Cichlid: 1, W. J. Morris (Chelsea) 85 pts.; 2, S. Shield (Freston) 80 pts.; 3, J. E. Cobden (Canford) 78 pts.; Minnow and Barb: 1, J. E. Cobden (Canford); 2, J. E. Cobden; 3, E. Dickson (Clapham); Egg-laying Tooth-carp: 1, S. Shield (Freston); 2, C. A. Stevens (Clapham); 3, D. Jones (Freston); A.O.V. Egg-layers (except Catfish and Lander): 1, W. J. Morris; 2, C. A. Stevens; 3, R. G. Fowler (Surrey); The position of the table in the Championship painting is as follows: Clapham 28, Chelsea 27, Freston 16, Canford 11, Surrey A.C. 10, Kingston 10, Croydon 1. The third show will be held at the Adult School, Breshall Road, Sutton, on Saturday, 27th October.

ONE of the highlights in the Nottingham and District A.S. programme for this month is a lecture by Mr. Edwards, President of the B.A.S.A. He is due to speak on the 20th October. The Home Aquaria competition resulted in a win for Mrs. Perry, Mr. A. Lindley being second and Mr. G. Wood was third. Miss Lindley won the Powell Cup for Juniors. In the Pond Competition, Mr. A. Adcock was first with Mr. C. Hill second.

THE results of the Coventry Pool and Aquarium Society Home Aquaria competition were as follows: 1, Miss Barrett, 78 pts.; 2, Mrs. Freyboth, 75 pts.; 3, Mr. Ryan, 74 pts. The Garden Pond Competitions resulted in the following places: 1, Mr. Staring; 2, Mr. Randall; 3, Mr. Court. Recently the Society were entertained by a team of experts from the Federation of Guppy Breeders Societies consisting of Dr. Cole, Mr. Davin and Mr. Field.

NEWS from Dundee Aquarium Society gives the previous Scott Trophy placings which are as follows: P. N. Gearing, 12 pts.; J. Cockburn and F. McNaughton, 8 pts.; J. McGeachie, 3 pts.; A. Cross and W. Lewden, 1 pts.; K. D. Smith and A. Booth, 2 pts. The last table show was for Barbours (winner W. Cockburn) and Davin and Tropical Minnow (winner J. McGeachie). The leader in the Member of the Year Trophy is W. S. Russell with 15 points.

AT the August meeting of the Bradford and District A.S. the monthly table show was won by Mr. P. Bentley with a Spotted Gobie, Mr. G. Hobson being second with a Kiddy Fish and the third place going to Mr. P. Moorhouse with a Spiny Eel. A fatal has been launched to



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obtain a trophy for the late Mr. Arthur Thorpeley and it has been suggested that this takes the form of a Rose Bowl. Meetings of the Society are held on the first Wednesday of each month at Little Hill, Rawson Square, Brentford.

THE Cambridge and District A.S. held its monthly meeting recently when Mr. Katriusz, a member of the Federation of British Aquarists, gave a very interesting talk on aquarism and household plants, giving advice on the more suitable ones for increasing and for maintaining a proper balance for fish in an aquarium. Mr. Katriusz mentioned over a hundred different varieties of plants and named his favorites with his knowledge of their English and botanical names. He gave the club some plants, which he had grown, to be sold for club funds. The Chairman (Mr. Amey) thanked them off and thanked the speaker.

During the business part of the meeting, Mr. Amey said how sorry he was to learn of the death of Mr. H. G. Baker, a very enthusiastic member of the society.

THE results of the annual show of the Midland Aquarium and Pond Society, which was held at Ringley Hall, Birmingham, were as follows: Goldfish and Guppies: 1 and 2, H. T. Jago; 3, L. W. Mole. Breeding class (Star Fish, Two-tails: 1, 2 and 3, P. R. Close. Breeding class (razz fish, Scapulars: 1, W. Hicke; 2, G. Harper; 3, R. A. Mason. Galaxi Voltin: 1, 2 and 3, P. R. Close. Breeding Showbushkins (maximum four entries): 1, H. T. Jago; 2 and 3, H. J. Whiting. Awarded Volant: 1, H. T. Jago; 2, G. V. Keating; 3, E. A. Mason. Galaxi Voltin: (best male): 1 and 3, P. R. Close; 2, G. V. Keating. Breeding Showbushkins (coupled pairs): 1 and 2, W. Hicke; 3, R. A. Mason. Oranoida, Tetraodon (other than Moor), Liliabada, Crustacea, Bivalvia, etc.: 1, G. V. Keating; 2 and 3, C. H. Raven. Moor: 1 and 2, T. L. Dodger; 3, G. H. Raven. Breeding Showbushkins (7 to 10 body length): 1, W. Hicke; 2 and 3, P. R. Close. Calicut Freshwater and Galaxi Voltin: 1, L. W. Mole; 2, R. F. Biddle; 3, R. A. Mason. Scuba Freshwater: 1, H. T. Jago; 2, Y. Roberts; 3, Y. E. Condit. A.V. Pond or Street Fish: 1, J. D. Berridge; 2, A. May; 3, G. H. Maddox. Indiscriminate Collector Aquar-

ium: 1, T. H. Lofton. Intra-Society Collector Aquarism: 1, Barrett and District A.S.; 2, Smeethwick and District A.S.; 3, North Warwickshire A.S. Breeding Showbushkins (Novice): 1 and 2, M. Ward; 3, A. Richardson. Sealed and Galaxi Voltin (Novice): 1, R. F. Biddle. Tropical Classes: Barb, Tinaya, Otocinclus and Common (Open pair): 1, W. Davison; 2 and 3, J. Denton. Barb, Tinayona, Nigrofasciatus, Tinfo and Goldfish (Novice): 1, D. Thomson; 2, J. D. Smith; 3, Mrs. B. M. Smith. A.O. Barb: 1, L. R. Smith; 2, Y. F. Jerram; 3, W. H. Williams. Dario, Brachydanio and White Cloud Mountain Minnow: 1, B. Parry; 2, P. C. Randall; 3, A. E. Allsup. Any Barb: 1, J. Denton; 2, J. G. Dym. Characin: 1, Hypostomus, Helostomatium and Cardinal: 1, W. Davison; 2, Mrs. M. Orton; 3, A. T. Smith. A.O. Characin: 1, A. T. Smith; 2, W. H. Williams; 3, J. Denton. Male Fishes: 1, T. F. Jerram; 2 and 3, W. Davison. A.O.V. Male Anabantid: 1, L. W. Mole; 2, R. Hinde; 3, A. T. Smith. Cichlid, Angila: 1 and 2, J. Green; 3, D. Thomson. Dwarf Cichlid: 1, Miss P. W. Inke; 2, P. Filmer; 3, L. W. Mole. A.G. Cichlid: 1, M. E. Smith; 2, J. G. Dym; 3, P. Dandy. A.V. Male Guppy: 1, P. W. Inke; 2, P. Dandy; 3, A. G. C. A.V. Males (over): 1, S. Frowell; 2, P. Filmer; 3, W. H. Williams. A.V. Pteris: 1, S. Frowell; 2, W. H. Williams; 3, J. Denton. A.V. Sessile: 1, D. Thomson; 2, W. H. Williams; 3, J. Denton. A.O.V. Trochil: 1, M. E. Smith; 2, P. Filmer; 3, E. R. Fenton. Breeding Class (six fish), Egg-layers: 1, M. Davin; 2, L. W. Mole; 3, S. Swadlow. Breeding class (six fish), Livebearers: 1, and 2, D. Thomson; 3, P. Dandy. Any Catfish: 1, W. Davison; 2, A. E. Allsup; 3, E. Flavel. Any Characin (novice): 1, J. Nelson; 2, Mrs. D. Burch; 3, Mrs. B. Filmer. Any Dario, Brachydanio or White Cloud Mountain Minnow (novice): 1, Mrs. B. Filmer; 2, Mrs. D. Burch. Any Barb (novice): 1 and 2, J. E. Wilson; 3, J. Green. Any Livebearer (novice): 1, R. G. Quaters; 2, J. Denton; 3, Mrs. M. P. Somersworth. Any Male Anabantid (novice): 1, J. R. Borch; 2, S. E. Wood; 3, A. H. Fawcett. Individual Tropical Aquarism: 1, D. Thomson; 2, D. W. G. Frowell; 3, P. W. Inke. Intra-Society Tropical Aquarism: 1, Smeethwick and District A.S.; 2, Smeethwick and District A.S.; 3, North Warwickshire A.S. Intra-Society Competitive Display: 1, North Warwickshire; 2, Midland Aquarium and Pond Society; 3, Federation of Guppy Breeders (South Midland Section). Plant Class: 1 and 2, P. W. Inke; 3, S. E. Wood. Special Awards—Championship Cup: P. R. Close, 82 points. M.A.S.E. Trophy: Smeethwick and District A.S. "Waste Life" Cup: D. Thomson.

### AQUARIST'S CALENDAR

**11th-12th October:** Scottish A.S. Annual show at McLeish Galleries, Glasgow. Delegates from Mr. K. L. Brown, 21, Sandale Avenue, Clarkston, Glasgow.

**20th-21st October:** British Aquarist Festival, Belle Vue Zoological Gardens, Manchester. Schedules available from Hon. Show Secretary, Mr. Geo. W. Goske, "Spring Grove," Fieldhill, Batley, Yorks.

**13th November:** Fitzwilliam and Bury A.S. Annual Open Show, Church House, The White, Bury. Schedules from Mr. P. Jennings, 11, Burwood Avenue, Bury.

**1st December:** Hendon and District A.S. Annual Convention at Whitefield Secondary Modern School, Clarendon Road, Hendon, London, N.W.1.

**26th November:** Backwell and District A.S. Intra-Society Open Table Show at The Oakley Community Centre, Church Road, Backwell. Schedules from Mr. K. Phillips, 10, Panchmore Road, Easthampton, Backwell, Berks.

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