

# The Aquarist

and Pondkeeper

MARCH, 1962



MONTHLY  
Vol. XXVI No. 12

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All about Tropical Fish (McIlreath)	72/-
Encyclopedia of Tropical Fishes (H. R. Axelrod and W. Voelckers)	62/6
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Founded in 1924 as "The Amateur Aquarist"



THE BUTTS, HALF ACRE, BRENTFORD,  
MIDDLESEX

Telephone: ISLeworth 6221

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The Editor accepts no responsibility for views expressed by contributors.

VOL. XXVI No. 12

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## Editorial

**A**QUARIUM lighting is a subject of such obvious importance to the aquarist that it is no wonder it is frequently discussed. Not only does the arrangement and type of lighting have a great influence on the appearance of the fishes seen beneath it but it is, of course, the major factor that determines success or failure with water plants. In the last 15 years or so fluorescent lighting has been tried by many aquarists with results that have been mainly disappointing ones, and it is probably true that most aquarists have come to believe that this is an unsatisfactory method of aquarium illumination. How much is this attitude justified?

In an article on the use of fluorescent lamps for aquaria in a booklet called *Plant Irradiation*, just issued by Philips of Holland, it is suggested that the poor results obtained have been due to failure to allow adequate time for the aquarium to accommodate itself to the effects of the change from incandescent to fluorescent lighting. Advantages of the fluorescent lighting are given as (1) a more favourable light spectrum for growth of plants, (2) a more uniform lighting because of the tubular shape of the lamp, (3) a threefold increase in output of light and (4) low output of heat. It is this last-mentioned factor that is said to be the cause of an initial regression in plant growth when a change from the heat-radiating ordinary lamps is made. An example is given of incandescent lamps of 75 watts being replaced by a 30 watts fluorescent lamp; whereas the former gives out about 50 watts as heat the latter produces only 8 watts, so that the top of the aquarium is heated less "and the biological balance is disturbed". This "sometimes may take some months" to be remedied, according to the booklet. We would like to know if comparison has been made of the effects of the two types of lighting on two newly set-up aquaria of otherwise identical content, arrangement and management. It would seem to be such a simple matter to decide which lighting produced the better plant growth in this way.

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## Notes on the keeping and breeding of *Rasbora heteromorpha*

by Dr. R. O. B. LIST

*Popular name:* Harlequin fish.  
*Natural habitat:* Malacca, Sumatra and Singapore.  
*Normal adult size:* 1½ inches (4.5 cm.).

**T**HIS very popular fish seems to be a fish of seasons. One often finds reasonably large quantities, and then again a scarcity. But it cannot be denied that the harlequin is a very colourful inmate for your aquaria. For ideal fish, one should look for those with a dorsal size of about 1 inch, with an anal fin of 1½ to 2 inches. The

lateral line should have a scale count of 26 to 27 scales. Colours are, however, important. The dark patch at the rear of the fish should be of a deep blue-black colour, with edges of the patch showing a clear gold shimmer. The rest of the body to be of a silver-grey colour with a red to violet matt shine. Dorsal and caudal fins should have a good showing of red, merging into a yellow gold. As a community fish, the harlequin is ideal and comparatively easy to sex. The males are said to show a golden edge to the triangular mark, but I do not find this infallible.



Photo:

Lawrence E. Perkins



as the golden edge is also to be found in pronounced females, but it is suggested by some authors that both sexes carry the golden edge and that it is more pronounced in the male. I prefer to differentiate by examining the abdominal bulge. It is deeper with the female than in the male and the lower forward point of the dark triangle is more sharply pronounced in the male than in the female. In the latter this point seems to be more dissolved. I would therefore suggest a careful examination of the various points before deciding on your sexes.

Having found a pair of fishes, we must now consider the breeding tank. The size of the tank must allow space for movement. It is often suggested that broad-leaved plants should be used, but my preference is for *Cryptocoryne* and/or *Hygrophila*. The water should be pH 6 to 6.5 for best results, with a temperature of 75°F (24°C), but temperature variations of 70° to 85°F (21°-29°C) are not considered harmful.

The eggs are usually laid on the underside of the plant leaves, and eggs usually hatch out in 24 to 28 hours. It is, however, important that the breeding pairs should be well matched and of good size, and should be conditioned with ample supplies of live foods. A 50/50 mixture of tap and distilled water can be used, but this should stand for a period of not less than 7 to 8 days. Care should also be taken in the selection of plants for the breeding aquarium. Having selected your plants, which should have good leaf surfaces, they should be carefully cleaned.

I have noted that some breeders wash their plants in an alum solution, but my personal preference is for potassium permanganate crystals dissolved in water, with an immersion of short duration and a thorough wash over with clear water to follow. As one does not use sand for breeding harlequins, there will, of course, be difficulty in anchoring your plants. Take some small stones, have them thoroughly washed and tie them with short lengths of nylon thread to the plants. The stones take up little space and will tether the plants quite successfully.

Having introduced the fish to the aquarium, it is quite often found that the male has very little interest, if any at all, in his partner. The female now becomes quite coquettish. She swims to the underside of a convenient leaf, and plays at being a butterfly by hanging upside down and moving her fins. The male still may take no notice. The female now swims to the male and again goes through her coquettish play. She then returns to the leaf and repeats the process. If you have the patience and, of course, the time, just count the number of times the female goes through this process. The result will surprise you, as I have myself counted up to 22 repeat performances, before the male realises that the exhibition is for his benefit and that he must do something about it.

The male then begins his chase of the female, all the time being guided by her to the selected leaf. He appears to press himself tightly against the female, and with his tail pressing against her hindparts, the spawning begins. This also may not happen immediately, but once the male has decided to follow the female, he does not give up until spawning does commence. By timing the process I have found that it can be anything from 1 to 1½ hours' duration. The eggs stick in tight clusters to the leaves and the pair should now be removed. Here is an important point. Do not remove the pair with any old net. Have one carefully sterilised and use that. It will pay dividends. Now cover the tank up to exclude light. Having tried both methods, I always advocate that a darkened tank gives better results. Having never heard of shy eggs, perhaps a reader can give a reasonable explanation.

With the memory of a lecture given some years ago by Commander Marsack from Singapore, I came to the conclusion that Nature's methods, as explained by him, should be of use. I thereupon used aeration with a filter stone.

Marsack described the spawning of harlequins in swiftly flowing water, with the males jostling the females in the swift currents and then pushing them into quieter waters for the spawning. This was the solution that I was looking for and the aerator did the trick. There were no losses in the spawning and in 24-28 hours I had the results: strong healthy fry, which in 4 to 5 days took readily the supplies of micro worms that I gave them.

The same pairs, if used again, will repeat their spawning in about 21 days, provided that they are well conditioned beforehand.

For feeding with micro worms, I recommend the use of a fine sieved feeding ring, as the young fry seem to prefer to rise to the top surface for their foods.

I also replace nearly three-quarters of the water content with fresh water each week, until 3 weeks have elapsed. As a sure guide for this period, it is usually on the third week that the first sign of the black triangle makes its appearance. If not visible at 3 weeks, continue with the water change until the characteristic mark does show.

At 6 weeks the fry are big enough to disperse and on a change to another aquarium you will notice that each fish has a collection of tiny air bubbles adhering to it. Dependent on the size of the bubble, these tend to drive the fish upwards, and I have found that the weekly water addition builds up a resistance in the fish which negates the upward surge caused by the minute air bubbles. A severe test is not to change part of the water each week, and you will find that on the 6-week dispersal period the fishes are unable to overcome the upward drive to the top surface and will accordingly perish.

Those of you who are able to consult foreign text-books on breeding various species will often notice that it is always considered important to dabble in what I term "Water Chemistry". Apart from simulating degrees of acidity or alkalinity (pH) I am inclined to keep away from such methods. I cannot, of course, deny their use, as I am often made aware of splendid spawnings with chemically controlled methods, but one very seldom hears of the failures. I prefer to try and keep to Nature's own methods, which would not know the difference between spirits of salt and, for example, acriflavin. Let us rather consider those things to be found in Nature than those which are the products of a laboratory.

## Increased Popularity of Canadian Aquarium

ATTENDANCE at the Vancouver Public Aquarium in 1961 was 310,647, as compared with 290,746 in 1960. Both of these figures represent mainly paid admissions and thus the income of the Aquarium was greater last year than the year before. By virtue of its great popularity it was able to be completely self-supporting without the necessity of utilising a civic grant—an unusual achievement for a public organisation.

However, last year, as in all other years, most visitors came to the Aquarium during the summer. In order to boost winter attendance and to promote the utilisation of the Aquarium by schools, the Board of Governors authorised the distribution of free passes (good for one student admittance until 15th March, 1962) to all elementary school children in Greater Vancouver. Each of the 80,000 passes distributed has a full colour picture of a local marine species together with its common name, scientific name and life history. There are four kinds: lingcod, copper rockfish, sunflower starfish and Pacific octopus. The cards resemble those that children sometimes get with sweets.

# Tropical Marine Aquarium-keeping Difficulties are over-rated

says MAX GIBBS

(The Goldfish Bowl, Oxford)

EARLY in 1961 I decided to start stocking marine tropical fishes. My decision was largely made as a result of my own desire to keep these beautiful creatures and learn more about them from personal experience.

With only a rather frightening abundance of "do's and don't's" gleaned from various articles and books on the subject, I launched into my first attempt, and purchased a very varied collection from a German supplier. The fishes arrived in perfect condition and they were placed in a couple of specially prepared tanks containing natural sea water. This water was newly collected from a stretch of the very beautiful Cornish coast.

The immediate interest shown by customers in the shop, both aquarists and others alike, signified a promising future for this fascinating branch of our hobby. The most significant element in the interest shown was the fact that something like 19 out of every 20 customers noticed the display, remarked on it, and asked questions about it. Such interest has never been shown in the freshwater displays by such a large percentage of the public. So it was that I resolved to develop this interest.

Soon after the fishes had been displayed in the shop I toured various wholesale establishments in Germany to see what the supply situation was like and to receive invaluable first-hand advice. I was amazed by the apparent indifference which these experienced people showed in their handling of these fishes. In nearly every case single-iron tanks were used as stock tanks. These tanks were deep and the water level was far below the top edge of the frame. In only one case (Tropischerum, Frankfurt) were special non-toxic asbestos and cement tanks used. Indeed, at one obscure Munich retail pet shop I saw a most beautiful marine set-up housed in a large angle-iron tank. The density of the water was much greater than that recommended, the one corner of the iron frame was completely rusted away, by the action of the salt water being sprayed against it by the filtration unit, the fishes were cramped in—and they looked to be in perfect health and exceedingly active.

In every one of these places it was out of the question to use natural sea water owing to the great distance of each of them from a suitable source. Every one used a prepared sea salt to be mixed with ordinary domestic water from the tap. One well-known wholesaler in Munich, Andreas Werner, makes his own salt water to a formula which he has used for some time now (was it my imagination, or did his fish really look a little less active than others seen on this trip?).

From each of the persons with whom I discussed the "problems" of keeping sea-water fish I gathered a common conclusion; that far too much humbug is made of marine fish-keeping by publications on the market to-day. The one exception was a chemist, again in Munich, who displayed the finest marine aquarium that I have ever seen anywhere, including many zoological establishments. In his shop he has a huge stainless-steel aquarium, filtered at a furious rate with an expensive sea-water pump in conjunction with a massive filter-tank, packed with special filtration media (but not ion-exchange media). The tank

was decorated with a fabulous collection of the most beautiful corals, and housed six huge scorpion fish and three very large blue fish, the size of a dinner plate. His recommendations for keeping marine fishes were even more meticulous than those featured in the many publications that I had read (change the nylon wool in the filter every day etc.).

However, I returned home weary, but resolved to make marine fish-keeping a reality here in England. But on arriving home I found that nearly all of my recently purchased fishes had mysteriously died while I had been away. I am still not really sure what the cause was, but I think that the newly collected sea water probably carried some form of disease which attacked the fishes and quickly killed them. Since then I have used artificial sea water and such a tragedy has not recurred.

Shortage of tank room during the busy time of the year for freshwater fishes forced me to change back my marine aquaria to freshwater and the collection of marines was finally housed in our 36 in. by 15 in. by 12 in. aquarium, in a store room at the back of the shop. In this same tank I have kept many different lots of marine tropicals and the water has been there since last June. It is still bright and clear, being filtered by two internal bottom filters in which the nylon wool has been changed only twice. At times there have been as many as 34 fishes in this body of water, including large clowns and butterfly, but at no time have they shown signs of distress due to overcrowding. The tank is angle iron, with the putty seams and top angle-iron rail treated with aquarium sealer, and the water level is within a couple of inches of the top iron rail, on to which the water splashes from the bubbles bursting from the two filters.

In fact, I have now had a clear run of trouble-free marine fish-keeping since my setting up of this one 36 in. by 15 in. by 12 in. aquarium back in June of last year—and by the look of it I am sitting pretty for a further trouble-free period.

I have kept together in this same aquarium: *Platanus*, five species of clowns (*Amphiprion*), three varieties of blue damselfish and three-spot damselfish. Apart from the warring and fin-nipping which the *Platanus* suffers in this mixed collection, the only trouble occurs amongst the others when there are more than about four of their own species together. Then they worry each other, but not other species. This is particularly so with the "blue damselfish", and three-spot damselfish, and the toemato clowns (*Amphiprion ephippium*). The common clown fish (*Amphiprion percula*) seems to settle down quickly and any bickering soon ceases. The *Nauticus* clowns seem to be quite peaceful and never take part in any domestic disputes.

All being well, I am hoping to extend my premises this year, which will enable me to re-house my stock cages of foreign birds and parrots so that I can build up a comprehensive section of marine tropicals in their place. Since my advertisements featuring marine tropicals in *The Aquarist* I have been inundated with enquiries and requests for advice from all over the country. I have



supplied quite a number of customers with fishes, mostly in the north of England (I wonder why?). However, unnecessarily long delays on the railways have resulted in several losses and for the time being I have been obliged to stop sending east orders where long delays are likely (delays of 36-48 hours from the time of despatch have not been uncommon). I hope that the situation will quickly improve and that deliveries will soon be possible again outside of the summer months, and once again we shall be able to send marine fishes to the north. Apart from requiring a reasonable water temperature, marine fishes are very demanding on oxygen and it is this requirement which makes the length of time for which they are to be packed so critical.

Many callers at my shop have asked about starting a marine aquarium, but as most of these were wanting to make their debut into fish-keeping in this way I have discouraged them and tried to convince them that they would be better advised to start with a freshwater tropical set-up to learn the principles of fish-keeping. However,

many of these enquirers have rejected the idea of the comparatively dull freshwater aquarium and, successfully discouraged from marine fish-keeping, have gone on their way, never to be seen again.

It is only during the past few weeks that I have eventually managed to persuade myself into thinking what has been obvious all along (but secluded by the technical knowledge gathered before the practical experience). That is that keeping marine fishes is simpler than keeping freshwater fishes successfully! There are basic points to observe, of course, but all are easily mastered, and they are fewer than the many encountered in freshwater fish-keeping. The most important are: (a) avoiding contact of metal and water; (b) continuous filtration; (c) maintenance of the correct water density (a check need only be made every few weeks); (d) highly judicious feeding with live foods.

One thing is assured: the owner of a well-furnished tropical marine aquarium will always receive favourable comments from onlookers, whether they are aquarists or not, so startling is the beauty in his aquarium.

## Barbus arulius

by JACK HEMS

**T**HIS comparatively new cyprinid—it was introduced to aquarists in this country and America about 8 years ago—is native to southern India and has proved an easy fish to keep in captivity. It will eat almost anything (including vegetable matter) and appears to be quite comfortable at a temperature range of 65° to 90°F.

Though good feeding and plenty of swimming space in a well-aerated aquarium will result in the fish attaining a length of about 6 in. in 2 years, it is reasonable to suppose that in the wild state it is capable of reaching an even larger size.

The basic colour of the species is silvery white, with a dusting of bluish green and gold on the large scales. Four black bars and a black spot just below the posterior base of the dorsal fin decorate the sides. A variable grey band, overcast here and there with iridescent green, extends along the middle of the body from the gill covers to the tail.

The sexes of young fish look very much alike, but at roughly 9 months to 1 year old, that is to say when they are about 2½-3 in. long, the rays of the male's dorsal fin develop black, streamer-like extensions. At about the same time, if not before, his caudal, anal and pelvic fins become suffused with red. The female's fins are clear.

Although *B. arulius* is peaceful by nature and spectacular in appearance, in its larger sizes it does not make a satisfactory occupant of a tastefully set up community tank. For one thing, it dashes about too wildly for the comfort and well-being of smaller or less robust companions. For another thing, its extremely boisterous movements do not permit stirred-up sediment to settle, and this results in permanently dirty water. Furthermore, the larger it grows the more demanding becomes its appetite for greenstuff (oh, how the tender-leaved plants suffer!).

Nevertheless, for all its failings, *B. arulius* makes an interesting fish to keep by itself, or among a collection of larger, non-aggressive species. For such a collection, the tank housing them should be as large as possible and



Pair of *Barbus arulius* (male, upper fish)

furnished with outcroppings of rock interspersed with places of well-grown giant *Sagittaria*.

Breeding is not difficult, but a tank measuring 24 in. by 12 in. by 12 in. or larger is required. If the floor of the tank is made of slate or frosted glass, or glass painted green or some earthy colour on the underside (a clear glass bottom has a disturbing effect on most fish), there is really no need to cover it with aquarium compost; bunched plants to trap the sticky eggs can be kept in position with stones or lead weights. The water should be absolutely clear and, if anything, not too old. A pH of 6.8 to 7.0 is about right.

As soon as the male intensifies his colours and the females assume fuller sides, the fish should be placed in the tank made ready for them. If extra warmth and a bright over-

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## Expedition—Y.B.G. by R. E. MACDONALD

It was on one of those rare Scottish days with the sun beating mercilessly down from a surprisingly cloudless sky that our party left the base camp at Dunoon to penetrate the rugged Highland westback of Argyll. The object of our expedition was to investigate a legend concerning the existence of a gigantic species of the carp family.

We had parleyed for some hours the previous night with the local natives (an act that called for the consumption of a vast quantity of illicit hooch that had been distilled, judging by the kick, somewhere high in the mountains of the Island of Islay), and had eventually learnt that our destination was to be the Younger Botanic Garden on the Benmore Estate.

Packed with stores and provisions, we left base just after high noon for the perilous 6 miles journey northwards along the A.815 road. Being a descendant of Donald (Grandson of Somerled, King of the Isles), I was duly installed as interpreter and guide, a position which also arose from having made many night escapades from England across the Scottish border into the dangerous Glaswegian territory.

Luck was with us and we covered the first stage of the journey without mishap and in good time, but on arrival at the outskirts of the Estate we were forced to dismount from our vehicle, which by necessity we had to leave in a prepared reservation, and proceed on foot. It was by this method of motivation that we entered the 85 acres woodland area of the Benmore Estate and the trek began in earnest!

The first part of our journey took us through an extremely impressive cathedral-like avenue of gigantic Californian redwood trees. These trees are approximately 120 feet in height and are nearly 100 years old. Keeping to the beaten track we passed on to enter dense shrubbery, which later broke into a neat clearing giving a wonderful view of the Forestry Commission offices (Benmore House) and Forestry School with its well-kept lawns that proved to be a fine example of Scots baronial architecture.

Leaving this behind, our last glimpse of civilisation, we entered the bush once more and started an extremely acute uphill climb through dense rhododendron vegetation. The going was hard and frequent rests were taken to ease our travel-worn bones while the sun bore ferociously on the rhododendron leaves—some a mere one-third of an inch in length, others a full 24 inches. Conifers, pine, spruce, fir, larch and monkey-puzzle trees were passed until the summit known as the 'View Point' was finally reached. What a breath-taking scene lay before us! The landscape in all its magnificence unrolled itself into the far distance, where etched across the scene lay the sparkling waters of the notoriously invaded Holy Loch.

After a much-earned rest, we left the summit and made our way down-hill towards our goal. Tension mounted as we passed once more through the dense undergrowth until eventually the Formal Garden with its roses and flowering cherries came into view. We were not so very far from our destination and after passing the water garden with a beautiful willow gentian in all its glory we had arrived!

To an aquarist with a love for natural settings, the sight that beheld us was indeed a picture of perfection. Amid all the wonder of the surrounding Scottish scenery lay a most superbly set-out piece of aquatic architecture. In an open area, there emerged from the still waters a most delicate fountain that gave forth glittering droplets of liquid colour



Photo: Home of the giant golden carp. R. E. Macdonald

when caught by the sun's rays, and which added an exquisite tinkling of sound to a most pronounced air of serenity. Towards one end of this most beautiful and natural pond arose an island made accessible by means of a rustic bridge. Nearby, a small stream emerged from the undergrowth and all around were splendid rhododendrons, primulas, Himalayan poppies, azaleas and fuchsias that gently covered the rich soil from which sprang *Lobelia fulgens*.

It was here that our search ended, for inhabiting the pond were the most gigantic golden carp that I have ever seen. Some of the specimens observed were every part of 15 inches in length! In this fine secluded spot, free from the ever-hungry beaks of heron and in an environment of clear and virtually parasite-free mountain water, they were enjoying a life almost completely unmolested.

The fish proved to be quite friendly and in response to some enticement, great gaping holes of mouths were thrust clear of the surface to provide onlookers with receptacles for spare food. After many gifts of this nature had been bestowed upon them, the fish obligingly glided through the water to provide us with the opportunity of photographing them. When our wants had been fulfilled, these impressive creatures majestically disappeared into the depths of the surrounding water like the ghosts of a lost tribe.

Our mission completed, we departed from the area with the feeling most prominent that we had observed something very rarely seen by human eyes. Then, after a short break for liquid refreshment, we returned to our base with absolute pleasure from the awe-inspiring creations of Nature that we had seen on that wonderful sun-drenched afternoon.

# The Outdoor Reptiliary

## (1) MAKING A START

by ROBERT BUSTARD, B.Sc.

EVERY keen collector has, as one of his major aims, the construction of an outdoor reptiliary where he can watch his animals in some semblance of their natural conditions. Indeed this is the only way in which many sun-loving lizards such as the green lizard (*Lacerta viridis*) can be kept alive and healthy for long periods. Indoors, with permanent artificial light, these lizards are apt to develop skin diseases that may prove fatal. The beginner will want to know what type of reptiliary he should build—and this is the purpose of this article. Although many of the writer's friends have their gardens dotted with reptiliaries and ponds, the average collector will be able to build only one reptiliary, and must therefore plan it most carefully. The first consideration is what type should be built?

The most popular type of outdoor reptiliary—at least in the South of England—consists basically of a moated island with a containing wall. An excellent reptiliary of this type is to be seen in the gardens of the Zoological Society of London, and is suitable for most of the European animals that the collector is likely to obtain. It occurred to the author, however, that there would be advantages in a reptiliary that was completely enclosed—in fact fly-proof.

The fact that it is roofed over would allow it to house many species that do not appreciate the amount of rain to which we are subjected, would ensure that it did not allow such born climbers as anolis lizards to escape, provided as they are with ridged lamellae on their feet so that they can climb a vertical sheet of glass, and, also worthy of consideration, would allow the feeding of large quantities of gentles that would not be lost whenever they turned into blue bottles. This type of reptiliary, with only minor modifications, can be made quite suitable for European amphibians (the provision of a gable roof to allow the rain to enter, instead of a glass roof as recommended for reptiles, and the addition of a larger pool, are the only changes that need be made).

The location of the reptiliary is the first important consideration. If for reptiles, then a sunny position should be chosen. The one in my garden shown in the accompanying photograph faced east, so that it received the early morning sun. Indeed it had the sun all day until late in the evening, when the lizard inmates would climb up to rest in the last rays of the setting sun. When it was constructed I had planned to extend it towards the left to enclose the lower portion of a wild plum tree and to make this shady

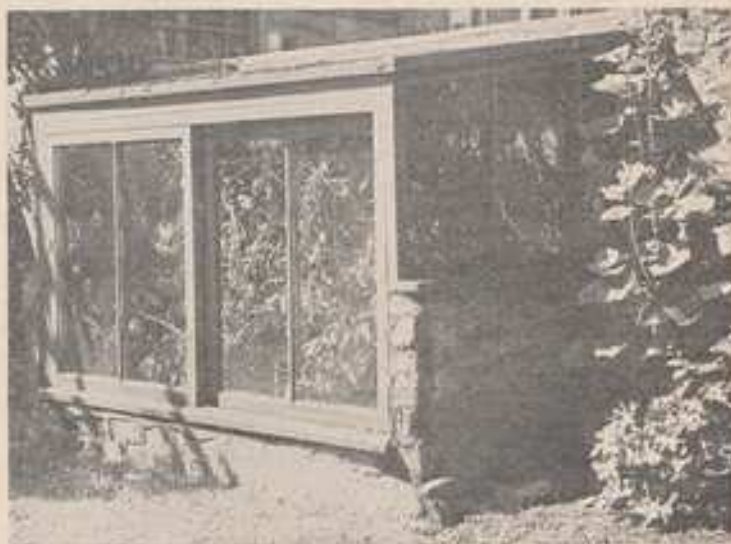


Photo:

R. Bustard

Greenhouse type of reptiliary used by the author to house many of the subjects described in his articles



corner into a home for European amphibians. The cement foot was laid, the pool constructed, but alas the work progressed no further as my interests turned more and more to tropical and bizarre amphibians that were not suited to a life out of doors.

Once the site is chosen and the size decided—this latter being largely governed by personal preference—then the cement foot can be laid. The reptiliary illustrated was 6 feet 6 inches long by just over 4 feet wide. The height at the back was 5 feet 6 inches, falling at the front to 4 feet 9 inches. The purpose of the foot is twofold: (a) to provide a sound foundation on which to build and (b) to prevent animals digging their way out. Despite this precaution slow-worms (*Anguis fragilis*) appeared in the garden quite often, having presumably burrowed their way out. The foot was laid to a depth of 9 inches and was 9 inches broad. It was constructed of 3 parts of ballast (gravel) to 2 of sand and 1 of cement.

After several days had passed and it had had a chance to set firm, the brick work was commenced. This involved building the two ends to a height of approximately 2 feet 6 inches and the front only two bricks high. For this purpose old bricks were used and the cement work was left rough on

purpose. This provided excellent climbing places for the lizards later on. The concrete was made from 4 parts of sand to 1 of cement. In this reptiliary a brick wall acted as the back of the enclosure. The remainder of the construction was of wood. The two ends were covered with perforated gauze of the type used in meat safes and the roof and front were glazed. The front consisted of two sliding doors for easy access and these were removable if required at any time.

In the construction of this reptiliary no floor was provided so that it was possible to plant the vegetation directly in the ground. A well-established plant of everlasting sweetpea was enclosed during the construction and provided excellent cover, and a small purple osier (willow) tree was planted the following spring. A small concrete pool had been provided, as in the author's opinion this natural-looking pool was preferable to a baking dish sunk into the ground. Some people indeed cover the bricks on the inside with pieces of bark. It is a good plan to plant some wall-growing ferns in small pockets of soil in the rough brickwork.

The reptiliary is now ready for use and late April is the best time to stock it. Suitable inmates will be considered in the next article.

## Who Judges the Judges?

**W**OULD you allow an untrained surgeon to remove your appendix? Trust the repair of your car to some unskilled mechanic? Of course you wouldn't—yet all over Britain fishkeepers in all good faith entrust the judging of their fishes to untrained judges.

Now don't get me wrong; I'm not criticising judges personally, but rather the system that throws them into the lion's den of show business without adequate training. There are exceptions to this, of course. The Fancy Guppy Association and the Federation of Guppy Breeder Societies (to mention but two), run excellent training schemes. Through these organisations aspiring judges can learn the necessary groundwork about the theory and practice of show judging, both backed by two excellent Standards Handbooks. It is the other systems, that choose their applicants by society proposal and committee selection, that are in need of overhauling.

Every single fishkeeper is a judge in the dictionary sense of the word: he exercises his selective powers with every brood of fish he rears or shows. But now let us examine the "official" meaning of the word and its implications.

A "judge" is usually a fishkeeper well versed in aquarium-keeping. He must display the right temperament (and thick skin), to travel about visiting shows to perform the thankless task of selecting winners. His remuneration is small, praise usually coming only from those "in the car". In fact, if it wasn't for his keenness he wouldn't do the job at all; to sum up judging is just plain hard work!

Most of the present-day fraternity consist largely of a core of old hands, who, having had little to guide them in the early days, have formed their own ideas on what constitutes a good fish. Mention has been made of the guppy followers being well catered for; so, too, are the coldwater followers. It is the balance that I am concerned about.

Much hard work has been done in the past by the aquatic Press and organisations like the F.N.A.S. and F.R.A.S. to formulate standards and guides for judges, but more can be done. What, for example, has been achieved to bring existing standards in line with the new fishes con-

by

JAMES L. KELLY



stantly appearing on the show bench? Where are the teachers or facilities to train aspiring, would-be judges? Where are the regulations that allow trainees to accompany experienced men or women?

Until something is done judges will go on being split into two schools of thought. The first state they have been asked to place the fishes before them in their order of merit. This they do according to their own personal preferences and opinions. On the other hand, the second group bear in mind fishes they have seen at other shows etc., and compare accordingly. These they judge to Federation Standards (where these exist), or to standards in their own imagination (where they do not). Is it not within the power of societies to get together with their governing bodies and formulate a plan of campaign?

Something will have to be done, and done quickly, to ease the burden of existing overworked judges, otherwise like "old soldiers" they will all fade away, and the word "judge" will be as outdated as the dodo.

When I posed this problem to that well-known northern judge, Mr. K. R. Owen, he replied: "Yes, that's all very well. But who judges the judges?"

Well? Who is going to answer his question?

### New Training Scheme

Since this article was received we have heard that the Federation of Northern Aquarium Societies has started to draft a scheme for member Societies to train intending judges. First experience will be given at table shows and later the novices will be able to assist at open shows. The F.N.A.S. Committee working on this project is headed by Mr. G. W. Cooke, show secretary of the Federation.



# The Garden Pond in March

by ASTILBES

THE garden pond will now be springing into life after the winter's rest. There will be many signs that life is awakening by the appearance of frogs and newts, to say nothing of the new growth among the water plants. This is always an interesting time for the pondkeeper, as hope springs eternal, with thoughts of the many fishes which will be bred during the coming season or of the gorgeous flowers on the new water lilies. These plants will always be the prime favourites among pondkeepers as no water plants can approach the water lily in beauty in the pond. Not only are the flowers handsome but the foliage on most of the species is also very attractive. The types *Nymphaea warhianae* are particularly handsome in leaf as the large shiny leaves have bronze markings on them which give added colour to the pond.

There are many colours in this strain and for the average sized pond few types of water lily can beat them for ease of culture and beauty of flower. April is usually the month for planting water lilies but planting can be done in March if the weather is fairly mild and the plants do not have to be left out of the water for long periods. If one is dividing an established plant then it will be quite easy to take outside off-sets that are already well rooted and which can be potted up to form new specimens. The old stock can become rather gnarled and worn and there is no doubt that young pieces taken from the outside of the clump will soon make splendid plants.

These off-sets should be treated with great care; the flower buds should be visible and as these are very tender they are easily broken off. Naturally, if most of these buds are broken there will be a dearth of flowers for the coming season. The roots are also rather tender and care must be taken when planting to see that as many as possible are saved. For any medium sized pond, say not larger than about 10ft. by 10 ft., it will be an advantage to plant the lilies in separate containers rather than in earth at the base of the pond. It may seem all right when first done but after 2 or 3 years the plants will have made such enormous growth that there will be a danger that their roots have taken charge of the whole base of the pond and other plants will be choked out. Nor is this the only trouble, as once the stage is reached when the lilies have taken too large a hold it is no easy task to get things back to normal. On the other hand, if the lilies are planted in pots or similar containers it will be a simple job to remove them from the pond for cleaning purposes or for repotting when necessary.

Special large pots with holes in the base of the sides can be obtained and if a mass of concrete is made on a sheet of paper the pot can be pushed down on to it so that when it sits the pot will be surrounded by it and will not fall over when in the pond. Another useful tip is to run some plastic cord round the rim of the pot and then over the top of the lily twice. This will prevent the lily from floating up out of the pot when there is a good head of leaves to the plant. Some growers recommend that some form of manure should be used, such as rotted cow manure or broken bones, but the use of any form of fertilisers can upset the water in the

Plant pot in concrete base.  
Plastic cord holds the newly potted lily down until the new roots have formed



pond and also there is usually no need to encourage the growth of a water lily.

Provided that the stock was a healthy one the new plant will grow apace, as it will never be short of water, as might a plant in the garden, and if fishes are present there will never be a shortage of droppings to give any necessary manure. Remember that one of the most important uses of the lily is as a form of scavenger. When growing healthily the plants will use up most of the waste matter in the pond and so assist in keeping the water pure. Another point is that their leaves will give a welcome shade for the fishes on hot days, and in fact on most days it will be seen that some of the fishes are always just below the leaves where they can watch for any food that may fall into the pond.

Having extolled the water lily so far one might imagine that their usefulness was ended, but such is not the case. The chief bugbear of the pondkeeper is green algae, which turn the pond water into a kind of green soup so that the fishes are invisible. As these algae will only thrive in water which receives plenty of sunlight it will be appreciated that the shade given by the lily leaves will help to keep down their growth considerably. When planting a pond for the first time one is often tempted to overdo the task. Great care must be taken when planting to see that there is little chance of the lily leaves covering the whole surface of the pond. Should this happen it will be proof that the pond has been over-planted. A balance must be kept between plants and water surface, as once the lilies become too rampant their leaves can cover the top of the water, and when unable to find space there they will grow up into the air. Not only will their beauty be lost but the inhabitants of the pond will not be seen.

Few other water plants can equal the lily but there are several very useful underwater plants that will perform a useful service. Although it is not so important to have a good crop of oxygenating plants in the open pond as it is in the tank, as plenty of oxygen will enter the water from the atmosphere, the presence of plenty of these types of plants will ensure that the green algae do not get a chance to become established. There are only a few of these plants readily available and suitable for this purpose. The best ones for the general pond are: *Egeria densa* (formerly *Elodea densa*), *Lagorhynchus major* (formerly *Elodea crispata*), *Elodea canadensis*, *Ceratophyllum demersum* and *Ranunculus aquatilis*.

It is not suggested that all these plants should be used in a medium sized pond. In a small pond any one would probably prove sufficient. As the season wears on so the growth of these plants becomes tremendous, and one

healthy piece of plant in early spring could almost cover the bottom of a medium pond by the autumn. *Lagorhynchus wagneri* is an exceptionally fine plant as it sends out many shoots, which can grow several feet in a few months and each side shoot can send out many more. The *Ceratophyllum demersum* does not make any roots but will become embedded in the mud at the bottom and make rapid growth. The fine tightly packed leaves form an excellent receptacle for holding the eggs of those fishes that lay adhesive eggs. *Ranunculus aquatilis*, or water-crowfoot, is often depreciated by some aquarists but it is one of the finest plants for the garden pond. The underwater leaves are very fine, and if the plant grows in fast running water these are the only type of leaves grown. In still water, however, the plants send out almost round shiny leaves to cover a large patch of the surface, and these are followed by pretty white flowers, with the shape of buttercups. A mass of these flowers makes a very pleasing sight and no other readily available water plant can equal this plant for

decorative value or as an oxygenating plant.

Do not neglect the floating water plants for the newly planted pond. A really good covering of duckweed, *Lemna gibba* or *Lemna minor*, can give shade to help choke out the green algae that might form in the new pond. This plant is also eaten by many types of fishes, including the goldfish. There is one point to watch, however, when using this plant, and that is if it is left alone for too long it may become too thick and a nuisance. It can soon be cleared from a medium sized pond by placing a hose on it and so driving it towards one side, where it can be raked out quite easily. The ivy-leaved duckweed (*Lemna trivelica*) is not of much use in the pond as it grows just below the surface, and is inclined to become very pale and weak and mass into an unsightly layer after a time.

When planting a new pond or re-making an old one always try to visualize what it will look like in a few months' time, and remember that most water plants make rapid growth if due care is taken when planting.

## BREEDING FANCY GOLDFISH

# Conditioning the Parent Fish by A. BOARDER

HAVING obtained a good stock of breeding fish the next important task will be to prepare them for breeding. The method to adopt will depend on whether breeding is to take place under cover in tanks or in an open pond. There are several differences of procedure and so the method for indoor work will be described first. It is usual for the sexes to be kept separately through the winter as when the fish are put together in the spring they generally take more interest in each other than if they had been together all the time. Before the introduction the fish should be fed very liberally. As long as they will clear it up food should be given two or three times a day.

Garden worms should be given every day if possible, with any other live food available. See that a fairly mixed diet is given; do not keep to one food only as no matter how good it might be there may be something lacking in it that the fish might miss. Each day the fish should have some vegetable matter, such as wheat germ or rolled oats. Then give a little dried shrimp and some dehydrated meat as used for cat or dog food. Make sure that the water in the tanks is kept pure, as once a slight fouling takes place the fish will go off food and what is given will only make matters worse. See that all food given is cleared up completely in about 5 minutes. As long as the temperature of the water is about 60°F (16°C), the fish will be able to digest their food quickly and so can be fed three times a day.

Do not be afraid to change some of the water in the tanks occasionally, say once a week. The idea that tank water should never be changed is an old-fashioned one that does not hold up to modern reasoning. A partial change, up to a third, of water each week tends to remove some of the excess of solids and supplies some fresh water that is appreciated by the fish. The difference in the appearance of fish in a tank that has just been correctly serviced will reward the aquarist for his trouble.

The treatment of fish that are to be bred in the open pond will vary slightly, as there is no need to feed as often. Although the prospective breeders must have plenty of good nourishing food it must be realized that they will not need as much food as the fish kept under cover. The colder water will slow down the digestive processes for one

thing, and it must be realized that the fish are likely to obtain plenty of natural food in the pond. Care should therefore be taken to ensure that no extra food is given. Try to feed at the same spot each time, where surplus food could be seen if it is not eaten soon after having been given. Watch the weather and the temperature of the water as the feeding of your fish is almost completely governed by these. On cold days no food should be given at all. Once the temperature of the water rises above 50°F (10°C), it is possible that the appetites of the fish will increase. This is the time gradually to increase the food so that the fish are in the very pink of condition before breeding time.

What is breeding time in the pond? Well, it can be any time from April to September. In odd seasons I have known a spawning in October (not that this is worth troubling over, as the fry are just a nuisance all through the winter). An early spawning, not later than the middle of June, will enable you to get the fry to a size of about 3 inches overall by the winter. This will make things much easier for you. It is quite a good plan to give all breeders a salt bath before the season is too far advanced. Do not put in too much salt, a tablespoonful to 1½ gallons will do. Examine the fish to see that there are no parasites such as fish lice on them. At the same time discard any fish that does not possess the characteristics required for your particular strain.

Now it is necessary to see that you have plenty of the right kinds of water plants for spawning. These are not always easy to procure early in the year, although later on they may be in such quantities as to be a nuisance in the pond. The fine-leaved plants are the best, as these give the eggs a good chance of adhering and also provide some cover from egg-eating parents. Hornwort (*Ceratophyllum demersum*) is very good and *Myriophyllum spicatum* is another suitable plant. *Elodea canadensis* is a useful plant and can often be obtained early in the year. This can make a dense mass which is favoured by spawning fish. Artificial material can be used if desired, and nylon mesh opened up make good receptacles for eggs and will not hold the pees often found on plants. The next article will deal with the actual spawning.



## The Butterfly Cichlid (*Apistogramma ramirezi*)

by T. ROLAN

**C**ICHLIDS! To many an amateur aquarist the word raises a picture of a rather large, striped, meat-eating fish, savage and aggressive. Certainly this is true of many cichlids, but they are nevertheless one of the most interesting of tropicals to keep, and among the dwarf cichlids can be found species that do not exhibit the pugnacious qualities of their larger kin and which are eminently suited to aquarium life.

Of these, many who have kept them would claim pride of place for *Apistogramma ramirezi* or butterfly cichlid, native to Venezuela. Like most cichlids, their colouring is acquired only just before spawning, but when they are in breeding trim their magnificent varied hues are intensely beautiful. Growing only to a length of 2 in., they are active and peaceful and behave themselves with other fishes. They breed easily, producing numerous young, and if it requires a little extra care to keep them in first-class condition this should present no particular problem if the basic principles of fish-keeping are followed.

A great deal has been written about their care, possibly to the confusion of the amateur fish-keeper, as the definitions of the best conditions under which to keep these fish seem to vary somewhat. This is doubtless due to the fact that, as for instance in the degree of hardness and the pH of the tank water, they have been kept under a variety of conditions. It would seem agreed, however, that the fish reach a peak of condition only in clear, soft, slightly acid water, kept at a temperature of about 80°F (26°C). Unlike the majority of cichlid species, in whose tanks rockwork must be the chief decorative feature, *A. ramirezi* like tanks planted with *Echinodorus rangeti*, Amazon swords or *Cryptocoryne*. Food should be as varied as possible, and since any live food will be taken, a selection of *Daphnia*, chopped earthworms, chopped *Tubifex* and white worms may be given.

The sexing of the young fish is almost impossible, but once they start mating the female is easily recognised by her plumpness of body and by the fact that on the eve of spawning her breeding tube can be clearly seen. Mating pairs withdraw themselves from their tank mates and the males defend their position in characteristic cichlid fashion with their dorsal fins held stiffly erect to frighten and drive off any enemy.

It is possible to treat butterfly cichlids as community breeders, and successes with this method have been recorded, but anything that is likely to disturb the parent fish increases the difficulties of hatching the fry and the likelihood of the eggs being eaten. The safest way is to

transfer the breeding pair into a specially prepared tank, temperature about 85°F (29°C). The floor of the tank should be covered with sand or gravel, which may now be pushed by the female fish into small troughs for spawning; it is much more likely, however, that the flat surface of a stone or of a broad-bladed leaf will be chosen, so the tank should contain both rockwork and a quantity of plants such as *Cryptocoryne*. In any case the chosen medium will be cleaned by the fish of algae and dirt and spawning will begin. Any number from 100 to 300 amber-coloured eggs will be laid in a neat round formation, which simplifies the removal of the eggs after spawning. This is recommended as parental care of the eggs is not always reliable. The ova should be placed in water similar to that in the breeding tank, to which has been added a little methylene blue (four drops of 5 per cent. methylene blue solution per gallon should be weak enough to prevent the eggs being spoilt and yet suffice to prevent fungus covering them). Steady aeration must be provided and hatching will take place from 36 hours later. During this process the temperature should not be less than 80°F (26°C), though some aquarists advocate a sharp increase to about 95°F (36°C) to speed the hatching process and thus lessen the time lag during which the eggs could become covered with fungus. In this case, once the fry have hatched the temperature must be slowly reduced. Some 4 to 6 days later the young fish make their first attempt to swim and, if they are well fed on newly hatched brine shrimps, will grow very quickly. After about 14 days they may be fed on sifted *Cyclops nauplii* and then micro worms and *Daphnia*, chopped *Tubifex* and, eventually, white worms and chopped earthworms.

Provided that the parent fish are being given a varied and liberal diet they will spawn again quite soon. An adult female will spawn at about 14 day intervals and not necessarily with her own breeding partner, but with males selected for her. Young fish are ready for breeding at about 6 months and produce fry for a further 5 or 6 months; but it has been noticed that when the parent fish reach the age of about 1 year a number of each hatching become very dark-coloured and do not grow with the customary speed; and the process of deterioration becomes more marked with each hatching.

Unlike many cichlid species, which live from 5 to 10 years, *Apistogramma ramirezi* have a life span only of about 2 years, but that will be sufficient time for the aquarist who possesses them to become convinced that these beautiful fish are in every way the ideal representatives of their family.

### Barbus arulius

continued from page 247

head light are now provided egg-laying follows almost in a matter of course.

The male is a hard driver, and he doesn't stop chasing the female until she is stripped of eggs. After mating is over, no time should be lost in transferring the couple to fresh quarters; for though spawned-out fish look wan and grey, it never takes them long to develop an avid appetite for their eggs.

At a temperature of 78° to 80°F the fry hatch out and

become free-swimming within the space of 6 days. For the first 3 weeks or so of their lives they require plenty of Infusoria; and though not a necessity, a cupful of green water (free-floating algae) introduced into the aquarium (at exactly the same temperature) every other day helps to promote healthy growth.

From this point onward, larger food should be given, and among the most suitable kinds are very small *Daphnia*, brine shrimps and micro worms. If powdered dried food is on the menu, it is important to see that any left un eaten is siphoned or dip-tubed from the bottom at the end of each day.



# House-Plants in the Fish House

THE INDIA RUBBER PLANT (*Ficus elastica decora*)

by BARRY R. JAMES

**T**HIS species is undoubtedly the most popular of the larger house-plants. In appearance the India rubber plant is quite striking, with large, glossy, ovate leaves which may reach up to a foot in length and some 6 inches in width. The leaves are arranged spirally on the stem and originate from an upright terminal shoot protected by a bright red sheath. Although specimens offered for sale are comparatively small, the type, *Ficus elastica*, will grow up to 100 feet tall in Southern Asia, its native habitat. A fine specimen some 15 feet in circumference can be seen in the Reptile House at the London Zoo.

Rubber plants appreciate a cool shady position and an average temperature of 60°-65°F (15°-18°C). Watering should be frequent during the growing season, which extends from the end of March to the end of September. Feeding either with liquid or solid fertilisers should be carried out regularly during this period; but no feeding and a minimum of water should be the rule during the colder months.

To keep rubber plants in sparkling condition, regular cleaning of the leaves is necessary, as they soon collect the dust, which if allowed to remain would be detrimental to the health of the plant, as well as its appearance. Occasionally the leaves should be gently wiped over with a solution of water and milk, to retain the glossy texture on the upper surface.

Propagation of these species is not practicable in the home, as a temperature of some 80°F (26°C) is necessary. Cuttings are normally taken in late spring and terminal cuttings, i.e. those containing the terminal shoot, are more

likely to be successful than cuttings from other parts of the plant. Hormone powders such as Scradix are used extensively by nurserymen these days and will ensure faster rooting.

Repotting when necessary should be done with John Innes potting compost no. 2 (J.I.P.2) or J.I.P.3 and a little leaf mould and well-rotted dung should be added to the mixture for the best results.

A beautiful variegated variety of this plant, *F. elastica* var. *Deescheri*, has been available for some years and differs from the type in having longer, narrower leaves, coloured light green and cream. It is rather more delicate than *F. elastica* and needs a warmer environment and a rather more delicately balanced watering schedule than its hardy cousin.

Troubles	Causes	Treatments
Rotting of leaves and stems.	Overwatering.	Cancel watering for at least a week and then water sparingly until the trouble clears up.
Yellowing of leaves.		Cut away diseased stems.
New leaves small and wrinkled.	Plant is pot-bound or requires additional feeding.	Repotting. Up to 3 ft. tall the plants will need a 5 in. pot. Up to 5 ft. a 6 in. pot is necessary. Apply fertilizer if in correct pot.
Sudden drooping of leaves.	Fluctuating temperature, drought or gas fumes.	Remove from source of trouble.
Leaves hang down instead of remaining upright.	Wilting due to insufficient water.	Increase watering.



Photo:

India rubber plant

B. R. James

## Book Notice

*Parasitology of Fishes* edited by V. A. Dogiel, G. K. Petrushevski and Y. I. Polyanaki. Oliver and Boyd Ltd., Edinburgh. 84s.

**A**N account of fish parasitology, marine and freshwater, based on the research of Russian biologists. Titles of sections in the book include "Ecology of the Parasites of Freshwater Fishes", "Relationships between Host Fishes and their Parasites", "Physiology of Fish Parasites", "Parasitic Diseases of Cultured Fishes and Methods of their Prevention and Treatment".

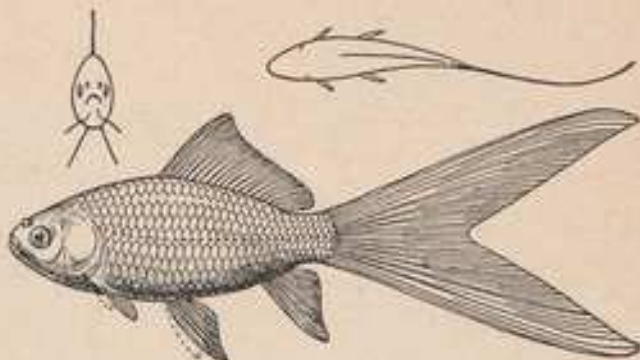
## Durognost Water Test Kit

Distributors of the Durognost water hardness test kit, Windmill Products (London, S.W.1), have asked us to give notice of the adjustment of price of this product it has been necessary to make. The new price is given in their advertisement in this issue.

THE GOLDFISH AND ITS VARIETIES

## No. 2 — Comet Goldfish

by A. BOARDER



Outlines of comet goldfish (illustration from the Federation of British Aquatic Societies "Show Standards")

THE comet goldfish is a very handsome variety but one which I consider to be essentially a pond fish. It can be kept in a tank but a tank under 3 ft. long would not be a safe home for any comet with a body length of 3 inches or more. This is because the fish is a very fast swimmer, and so it needs plenty of space if it is to remain healthy in a confined area. For the pond, however, this variety is ideal. It is such an active fish for the pond that I consider it to be one of the very best for inclusion there. Unfortunately the comet appears to be difficult to obtain these days. Some 20 years or so ago there were quite a few of these handsome fish about, but of recent years very few good specimens are to be seen. I tried many years ago to get more aquarists interested in the variety but was not very successful in my efforts.

### Streamlined Shape

The comet is a streamlined fish with a very long tail or caudal fin. This is the special feature which must always be present in a good fish. The body of the comet should be rather slim, with the depth less than half the length. The dorsal fin is rather high, more than half the depth of the body, and the pelvic and anal fins are of a similar size. The pectoral fins are small in comparison. The tail or caudal fin is very well developed, long and well forked with pointed ends. It should not be too well spread or flowing. The body of the fish should be covered with visible scales and not have the apparently scaleless body as seen in shubunkins. The colour can be all red, all silver or a combination of the two. I have noticed that most of the comets I have seen have a large proportion of silver on them. This is no set-back for exhibiting such a fish and as far as the pond is concerned it is such fish that show up very well and make a very attractive addition. Comets are sometimes found in a rich chrome yellow, and this colour

is also recognised by the Federation of British Aquatic Societies as suitable for showing.

For exhibition purposes the fish must have a body length of 3 inches, excluding the caudal fin. Such a fish will need a good-sized tank for exhibition purposes, as nothing looks worse than to see a fish which is unable to swim about in comparative comfort.

### Main Faults

The chief fault to be seen in many of the present-day comets is that they lack the long tail. This is the distinctive feature and so without it the fish is not a comet. I feel that one of the disturbing points about the development of the comet was the Standard issued by the Federation in 1947; this showed an illustration of the fish with a huge spreading tail. This is in direct contradiction to the necessity of keeping a strain of fish that were fast-swimming. The wide tail would have been an obstacle to fast-swimming and many aquarists thought also that such a fish would be very difficult to breed. When the Standards were revised the caudal was shown as being far narrower and was definitely more suited to a fast-swimming fish. It is to be hoped that breeders can now produce some exhibition fish somewhere near the present-day standards.

Another fault seen in some of the comets is that their bodies are too deep or stout. This heavy body does not go well with the desired streamlined general appearance of the fish, and so all such fish should be avoided in the breeding strain. To keep this fine fish healthy I suggest a fair-sized pond and plenty of garden worms in the diet, these being given at least twice each week. Too much starchy food should not be given and an almost entirely animal diet would be better if possible. The fish is quite hardy and rarely gives any trouble provided that the normal care is taken to see that the water in the pond remains pure.



# Can Fishes Hear?

by DAVID GUNSTON

**C**AN fishes hear? It is an interesting question, but because of the absence in fishes of ears of the human or mammal type, and the vast difference between sound in the air and sound under water, it is a controversial and complex matter, full of apparent contradictions and marked by a startling lack of real knowledge.

For a long time it was generally supposed that fishes were, to all intents and purposes, deaf. Then various anecdotes and experiments occurred which began to elucidate the question, and in recent times there have been many accurate scientific tests on the hearing of fishes of all kinds. The classic example of the inconclusive type of early experiment is that of the Benedictine monk who kept trout in a pool at Krems, in Austria. He had the notion of ringing a dinner-bell whenever he fed them. Standing on the edge of the water he had only to swing his bell a few times, and the fish would collect for their food. Then one day someone tried the trick without using a bell, merely swinging his arm up and down. The fish came just the same; it was the sight, and not the sound, that had attracted them.

Sounds, to most fishes, must be vibrations in the water, not vibrations in the air, which is what we ourselves hear. Not many fishes can hear aerial sounds to any extent unless they are accompanied by some vibration through the ground into the water. Fishes have no external ears, and, unlike human beings, no middle ears. They possess only the sensitive inner ear, embedded in the bones of the skull. This leaves them under no disadvantage, however, for human ears are designed to catch sounds from the air and the actual hearing mechanism is the delicate inner ear, a capsule surrounded by bone and filled with liquid. In the water, which is a far better conductor of sound waves than the air, the fish needs neither outer visible ear nor middle ear to transport the sounds. It needs only a simpler inner ear, without the liquid, for it is already in that transmitting liquid, the water.

But in human beings, the ultimate organ for turning actual heard sounds into nerve impulses, the spiral cochlea, is altogether missing in fishes. All it has is a small projection on the sacculus (the sac-like region surrounding the spiral cochlea, when it is present, as in human beings and mammals) called the lagena, which appears to be a far less delicate piece of mechanism. This fact seemed to indicate that, after all, fishes cannot hear. But missing cochlea apart, experiments have proved that fishes can hear, and hear well, so we must conclude that the lagena has as its function the actual registering of sounds on the brain.

The ears of various kinds of fishes, although conforming to that pattern, vary considerably. The simplest type of ear occurs in the bagfish, where a semicircular canal has a swelling at both ends which contains a jelly-like substance connected by fine hairs through sense cells and nerve fibres direct to the brain. Hearing is effected by oscillation of the jelly, which in turn moves the hairs and sends messages to the brain. In lampreys there is an additional canal

set at right angles to the original one, and with swellings only at one end. This gives a better sense of movement and balance, which are, of course, the other functions of ears. In the cartilaginous fishes there is a third canal covering the remaining space, and the more highly developed fishes have minute grains of chalk, or otoliths, suspended in the jelly to make it even more sensitive. There are also some variations in the way the ears are connected to the external surface of the fish. Some lead through ducts direct to the water, others to the swim bladder. In the latter cases, vibrations in the water are picked up by the swim bladder and transmitted to the ears.

Even when it became obvious that fishes could detect what we call sounds, some objectors put forward the explanation that such noises as tapping on a fish tank, or making a vibratory sound close to the water, were not really "heard" by the fish, but registered through the skin in much the same way that we can "hear" the sound when we place a hand on a piano being played.

But the experiments of Professor J. P. Frolov proved beyond any doubt the hearing capacities of fishes. Defining hearing in fish as "any disturbance that produces hearing in the human ear which calls forth response in fish if it acts through the ear and not simply through the skin or some other organ," he placed a telephone inside a small balloon, submerged it in water and directed sounds of varying pitch at goldfish. He found that normal goldfish responded to all vibrations from 43 to 2,752 per second. Human hearing is roughly from 30 to 30,000 vibrations per second, with middle C at 256. By tethering the fish with an electric wire loosely fastened so that they could swim easily, the telephone sound was emitted and a weak electric shock given to the tethered fish simultaneously. They reacted with violent movement in the water. After some 40 tests, the shock was omitted and the fish responded as before to the telephone sound.

Other tests have shown that fishes can be trained to come for food, or to move from one tank to another to get food, by making noises close by overhead. Tin whistles, organ pipes, guitar strings and tuning forks have all been used in this way with marked success, often as few as five or six trials only being needed to make the fishes understand. Minnows have actually been trained to react differently to two different sounds by feeding them when one is made and hitting them gently when they hear the other. Killifish responded to frequencies of only 90 when a violin string was stretched across the aquarium. Other fishes have been recorded as responding to much higher sound frequencies: the minnow to 7,000 vibrations per second and the catfish to 15,000. Frank Lane records meeting a lady who stated that her two pet carp actually "danced up and down" when dance music came over the radio near their aquarium.

The subsequent work of the two German investigators  
*Please turn to page 258*

## our readers



# write

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

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

### Crayfish—Information Wanted

FOR a long time we have been interested in the study of the life of crayfish (*Astacus fluviatilis*). Careful research has been made in our fresh waters and some scientific conclusions are nearing their end. As a result a scientific paper is being prepared for publication.

Our research covers not only the field of the crayfish's life and its habits but studies the preservation of its life as well. Industrialisation with its waste-waters, various diseases and parasites, uncontrolled and unplanned catches, all these factors, no doubt, are reducing considerably the number of crayfish.

To make our study as complete as possible we shall be greatly obliged to you if you could write to us about the life of crayfish in your country. Any publication, manufacturer's literature, articles in the press etc. will help us.

Mainly we are interested in the following questions:

- (1) What kind of crayfish is living in your waters? What are the animal's weights and measurements? What are the qualities of the respective waters?
- (2) Is the crayfish in your country artificially raised (crab-farming) or is it an item of your food industry?
- (3) What are the most important diseases or parasites?

ZDORNA BERNARZ,  
Anglická tr. no. 3,  
Prague 2-Nové mesto,  
Czechoslovakia.

### Plastic for Metals

THERE is now on the market a polythene powder sold under the name of Plasticone, for the plastic coating of metals. What a boon this would be to aquarists (especially marine aquarists), if some enterprising manufacturer would produce tank frames treated with this substance. The cost is quite reasonable (5s. treats 300 sq. in.).

I hope you can print this letter, and that it will catch the eye of an aquarium manufacturer.

F. DESSAY,

(Goole and District Aquarist Society).

Manufacturers of Plasticone are: Electro Chemical Products Ltd., High Street, Colnbrook, Bucks.

### Calling Cornwall

IN the near future I am going to live in Penzance (Cornwall). Can you give me any addresses of tropical-fish dealers or hobbyists near Penzance? I keep eight fairly large tanks, and I intend to move them down there; as



Large continental crayfish (see letter opposite)

you will understand, I would like to know somewhere to get my plants, fish and foods etc. from.

Just recently I visited Penzance, and, after asking at various places, I couldn't find any dealers at all.

R. CLARIDGE,  
74, Kingscliff Road,  
Small Heath, Birmingham 10.

Readers and dealers in Cornwall who can help Mr. Claridge are invited to correspond.—EDUCOR.



### Owls and Pond Fish

I DO not wish to be guilty of dragging up old scores, but I think that such a move may be justified when entirely fresh and relevant information comes to light. My article "Of Cats, Fishes and Bears" appeared in the *The Aquarist* for January, 1961. In the April issue, 1961, a letter by Mr. P. M. Fuller, in strong disagreement with my claim that owls might sometimes take goldfish, was printed. In rebuttal I was only able to state, at that time, that fish remains, not necessarily goldfish, had occasionally been found in the stomachs of owls.

I hope I may now be allowed to point out that in *Adventures Among Birds* by Hugh M. Halliday, a professional bird photographer, on pages 73 and 74, appears a clear statement that screech owls commonly catch fish, and fish remains are to be found in their pellets. Following this, the author gives an authentic account of a screech owl caught in the act of eating a freshly caught goldfish.

The screech owl (*Otus asio*), a very common small owl widespread in North America, almost certainly has a counterpart in Europe, though I do not know what common name it goes under.

R. GUPPE,  
Wellington, B.C., Canada.

### Hawaiian Mouthbreeders

MY pair of Hawaiian mouthbreeders have just spawned and hatched out 50 or more. I understand this is unusual, according to your December issue?

J. N. ROBINSON,  
Kenton, Harrow,  
Middlesex.

## Can Fish Hear?

continued from page 256

at the University of Munich, von Fritsch and Stetter, have shown that fish hearing is even better than was originally supposed. Minnows were blinded and when fed were taught to associate the appearance of food with a low sound made by a whistle or a tuning-fork. After 12 or 15 times a reaction was obtained, and the fish could actually hear sounds made 200 feet away. A man diving into a larger aquarium alongside that containing the minnows could not hear the sounds any better than they obviously did. The range of sounds heard was proved to be quite great, and the experimenters showed that sounds much higher or lower could also be heard, as well as sounds only very slightly different in pitch, provided that food-reactions were set up by practice. Some fish were even able to distinguish between a note and its minor third.

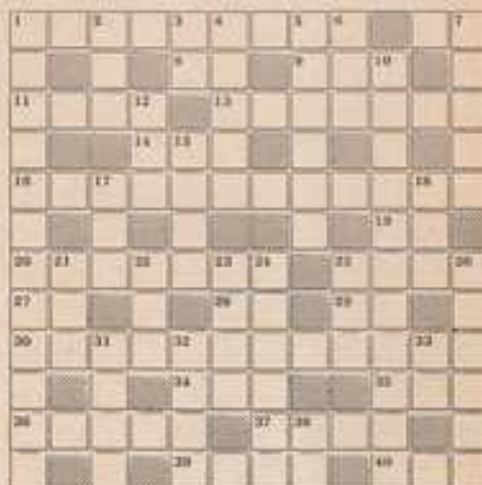
So therefore we have quite definite proof that a number of kinds of fishes, among them minnows, goldfish, cels, cutfish and weakfish, do hear, and there seems every reason to believe that tunny, tarpon, pike and many larger fishes hear likewise. Only the sharks and rays hear less well, it appears. Fishes in shallower waters hear as a means of avoiding approaching danger, and those in the deep sea, well, the ocean has now been proved to be a noisy, not a silent, place, and if its denizens make sounds as they quite definitely do, Nature obviously means them to be heard.

In next month's issue of *The Aquarist* will be included photographs of tropical fishes in full natural colours.

# The AQUARIST

## Crossword

Compiled by J. LAUGHLAND



### CLUES ACROSS

- Very large family of tropical fishes including tetras (9)
- Qualified accountant takes half the carp (1, 1)
- Object of the claret (3)
- The nutrient of the egg (4)
- Stalled animal or reptile (7)
- Founded in short and partly a nest (3)
- Microcypris, one of the great orders of fishes (7, 5)
- Fresh gold (2)
- *Tarboconus* or *maifida*, aquarium plants (7)
- Common amphibian you may get in the throat (3)
- Commissioned gentleman in charge (3, 1)
- Belonging to (2)
- Type of current (1, 1)
- Sounds like xanopary and of a weapon, *Xenopoma* (3, 9)
- Freshly brewed of the genus (3)
- Colour of *Xiphophorus helleri* (3)
- Effe (3)
- Pick at the fish (4)
- Cure (3)
- Male offspring (3)

### CLUES DOWN

- Aquarium plant with lance-shaped leaves (12)
- Sicken and die most of the sea (3)
- See 29 across (1, 1)
- Social division sounds like angler's cry (5)
- Barren chase (6)
- Style of a knight (3)
- Upper runs for fry that grow badly (3)
- The food's green turns up fishes; they sound you (6, 5)
- Carton in Scotland (3)
- Mixed wash it take (4)
- Eye of *Plumbeus* snail (3)
- Abbreviated but no answer (3)
- On-again love the date a penny (3)
- Operations to be held (3)
- River luxury (4)
- Land of the head fish and mouthbreeder (6)
- Adverse crowd (3)
- See 37. Goldfish (4, 4)
- Five feathers, especially from elderly ducks (4)
- Lure (4)
- This is that is (1, 1)
- Nearly all, Mr. Capote (2)

(Solution on page 263)

## News from AQUARISTS' SOCIETIES

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

**THE Welsh National A.S. election of officers resulted as follows:—Chairman, Mr. A. H. Hyatt; Vice-Chairman, Mr. J. Anwyl; Secretary, Mr. D. G. Smith, (23, Alfred St., South Park, Cardiff); Treasurer and Ass. Secretary, Mr. W. H. Harries; Librarian, Mr. J. Anwyl. A programme of table shows, talks, and film shows has been arranged for the coming year.**

The first of the table shows was held in February and was for *Guppies* only. There were some good fish on show and the results were:—1, Mr. Harries (Widall) 87 points; 2, Mr. G. Bean (Widall) 83 points; 3, Mr. G. Bean (Widall) 81 points. The judging was done by Mr. M. Hardy who gave an interesting talk on show points.

The Society welcomes new members and if they contact the Secretary, full details will be sent.

**THE seventh meeting of the Dundee A.S. was held in the Classroom and the results of the table show for the Scott Trophy were:—1, J. Hopkins, *Paratyphlus omaki* (black laced), 2, J. McGeachie, *Astronotus omaki* (orange), 3, J. Hopkins, *Paratyphlus omaki* (black laced), 4, A. Smith, *Paratyphlus omaki*.**

The points position is as follows:—A. Robertson, 10 points; P. N. Greening, 8 points; G. M. Gibson, 8 points; D. Arman, 4 points; J. Hopkins, 4 points; J. McGeachie, 3 points; A. Cross, 3 points; A. Fyfe, 3 points; A. Innes, 1 point. Forthcoming events include a table show, and permission has been obtained from the local authorities for the Society to run a prize draw. Arrangements to do so are in hand.

A sub-committee has been formed to organize a Bass Dinner, which it is intended to hold at Messrs. of Blyths, Elliot Road, Dundee on Saturday, 14th April from 7.30 p.m. to 11 p.m. Full details will be made available in the next future.

**THE annual meeting of the Camberidge and District A.S. was held recently when Mr. A. Aron was in the chair.**

Thirty members were present to hear the chairman's comment on a successful year of activities and was sure that the president could not be present to give the opening address.

The secretary gave his report on the year's activities and said how glad he was that the interest in the hobby seemed to be on the increase. The treasurer said on income of 13 members and one lifetime member was a good sign and that financially they had had a good year and hoped that it would continue.

The President's Trophy was presented to Mr. H. Aldridge who gained more points in shows held in the past year, the Home Tank Cup was won by Mr. Fleck who exhibited a beautifully furnished tank of tropical fish.

The following officers were elected at the meeting:—Chairman, Mr. A. Aron; Vice-Chairman, Mr. B. Elkerton; Secretary, Mr. W. Rogers; Treasurer, Mr. N. Radford; Assistant Secretary, Mr. E. Wright; Librarian, Mr. F. Driver; Publicity, Mr. R. Harman and Hon. Auditors, Mr. A. Fawcett and Mr. H. Garland; Committee, Messrs. D. Aldridge, F. Freeman, M. Bailey, Mrs. A. Fawcett and F. Driver.

Mr. Stan Wright was elected Hon. Vice-President.

**ONE Society in a happy position is the Bradford and District A.S. With an increased membership—higher than it has been for some years—enthusiastic support for the various events with quite a number of winners last year Bradford has once again looked forward to another fine season. An additional evening night has been arranged primarily for the new members, although of course this does not prevent the regulars from dropping in if they wish. An Open Table Show is to be held on the 27th May and another later in the year and at least four trips will take place. At least eight club table shows will be held and the Home Aquaria Competition which was so successful last year will once more be held. The Secretary is Mr. R. Marshall, "Greenfields", 13, Park Hill Drive, Bradford, E.**

**THE officers chosen for the coming year at the Reading and District A.S. were as follows:—Re-elected as President, Mr. Arthur Gray, Chairman, Mr. C. Masters; Hon. Secretary, Mr. D. Anderson, 22, Buteham Rd., Reading.**

The retiring Chairman reported on a quite successful year. Several new members being welcomed. Strange links with the Three Counties Group were forged, including an Inter-Club League table show. Visits were made to all the Group Societies, and also to the Hurdle Congress and to Portsmouth for their fish show.

Trophies for the year were presented by the President to: R. Luckwell, Best Fish of the year and the Best Fish Cup; H. Poon, Championship Cup; Laburnum, Barb and The Charbon Cup; J. Parsons, Novice Cup; T. Job, May Cup and The Cardiff Exhibit; G. Thompson, Lincolns Cup.

The Societies meetings will continue to be held on the 1st and 3rd Monday of each month at the Baginbun Arms, Baginbun Street, Reading at 7.45 p.m.

**A NEW club has been formed in Wiltshire and will be known as Trimbriidge and District Aquarists and Pondkeepers Club.**

Meetings will take place monthly at the club room, Capesmore Arms, Roundstone Street, Trimbriidge, on the 2nd Tuesday of the month at 7.30 p.m. The Hon. Secretary is Mr. M. Ward, 42c, Fawcett Farm, Hilberton, Trimbriidge, Wilts. and new members are invited to write to this address.

**THE speaker at the February meeting of Peatypool A.S. was Mr. J. D. Evans who gave an excellent lecture on Evolution in Vertebrates. There is no doubt that those present thoroughly enjoyed themselves and almost certainly enhanced their knowledge of the Theory of Evolution considerably. Mr. Evans surprised many of those present by falsifying the popular belief that lung fish gave rise to amphibians and that it was marine fish which gave rise to terrestrial animals.**

The Society has now acquired a good debating apparatus and it is planned to publish a monthly newsletter which will be sent free to every member.

A competition for the best kept home aquarium will take place in April. Plans are also being made to hold the 12th Annual Show in the local Town Hall in May. This will be followed by a large exhibition at a local firm in June. It is also hoped to organize at least one expedition to a place of aquatic interest this year.

Enquiries concerning the Society are welcome and should be addressed to Mr. F. Jephcott, 7, South Road, Corsham, Wilt.

**AT the recently held Annual General Meeting of the Walthamstow and District A.S. the following officers were elected for the coming year:—Chairman, Mr. H. R. Preece; Secretary, Mr. B. A. W. Bishop, 67, Maynard Rd., Leyton, E.17; Treasurer, Mr. D. Goldsworthy; Show Secretary, W. Patrick, 30, Browns Road, Walthamstow, E.17.**

Membership of the Society continues to remain at a constant level and again a highly successful year in outside show sanctioned aquaria classes ended with the club being awarded the Hackney Challenge Shield for the third year running.

**SOME changes took place in the administration of the Association of South London Aquarist Societies at the Annual General Meeting. Mr. G. H. O'Neill, was elected President and Chairman, Mr. A. J. Mayhew, 51, Pelham Road, S.W.19, was appointed Hon. Secretary and the Hon. Treasurer remains the same, Mr. J. Barnard-Jones. A vote of thanks was accorded Mr. Parsons for his long term as President and it was requested that his business commitments had caused him to give up the Presidency.**

**AT the February meeting of the Northampton and District Aquarist Society members took part in a "Quiz" organized by Mr. and Mrs. Upton. The table show winners for the month, for Guppies and Loaches, were: 1, R. Memory; 2, R. Shady; 3, R. Flynn. The Junior Section results were: 1, M. Gurney 2 and 3, R. Holliday.**

**THE most successful year since the formation of the Derby Region A.S. was reviewed at the Society's annual meeting in February. The retiring Chairman, Mr. F. Hawks) paid special tribute to the services of Mr. Frank Holloway, who judged most of the table shows during the year and helped in many other ways.**

Three cups, presented by Mr. W. Thompson, were awarded for the first time and secured keen competition. The Thompson Cup for the most points gained in a maximum of five table shows, went to Mr. G. Dyer, of Colverton, Notts; the Guppy Cup, for most points in three special shows, to Mr. J. Birch, who defeated Mr. H. P. Finch by one point; and the Novice Cup, for the competitor who gained most points without winning an award cup, to Mr. G. W. Ryan.

Many members of the Society were successful at the M.A.F.S. show at Birmingham, awards including a Best-in-show and other trophies. At the leading shows in the Midlands members of the Society secured awards.

Mr. J. P. Finch, a former Chairman of the Society, was unanimously elected President for the next five years in recognition of services to the Society and to fish-keeping generally. Officers appointed were: Chairman, Mr. F. Hawks; Treasurer, Mr. J. Derbyshire; Secretary, Mr. Wilford Thompson; Committee—Messrs. Dwyer, R. D. Muddocks, F. Fitzger, G. Watson, G. French, M. Salt and D. Fall.

**RECENTLY the Barnetford A.S. was formed and the office bearers were elected as follows:—President, Mr. Peter Harrison; Kirkcaldy; Vice-President, Mr. R. Williams, Barnetford; Secretary, Mr. Robert D. Vernon, 1, Whitehouse Avenue, Kirkcaldy; Treasurer, Mr. A. Ashton, Barnetford.**

**THE annual general meeting of the Leeds and District A.S. was held recently when the following officers were elected:—President, Mr.**



P. Reynolds, Vice-President, Mr. A. Bury, Secretary, Mr. G. Lowndes, Treasurer, Mrs. M. Byles, Show Secretary, Mr. D. Lees.

A successful and most entertaining evening was had by Society members at Belle Square Cinema. The Show Secretary Mr. D. Lees, has arrangements well in hand for a table show and a visit is being looked for the 29th April.

THE members of the High Wycombe A.S. recently enjoyed a very interesting talk on plants shown by Mr. F. C. Kourouky. The table show was for plants and the results—1. T. Wilkinson (Hilmesdon); 2. (Jed) R. Barrett (Wesley Water); and P. Watts (Crymch); 3. (Jed) A. South (Crymch) and E. Church (Hilmesdon); 4. R. Bennett (Astonish).

At the last meeting of February 14th, the annual dinner was held in the High Wycombe Public Library. A short talk on the methods used in the making of aquaria was given by a member, Mr. S. Payne. The table show was for children and amateurs and the results were: 1. Mr. and Mrs. Bennett (Jewell); 2. Mr. F. Watts (Astonish); 3. Mr. and Mrs. R. Bennett (Jewell); 4. (Jed) M. and Mrs. R. Bennett (Chesham Chisham) and Mrs. F. Watts (Kerthale Chisham).

AT the last meeting of the Alrethorough and District A.S. Mr. W. Roberts, presided. He introduced Mr. J. Skinner from Wakefield who went on to give a very interesting talk on the method of breeding fish by his tank method. This was followed by a discussion time, and Mr. Skinner was open to questions.

The main table show section was a Live-bearers class and the results as judged by Mr. Skinner were—1. Mr. Lawson (Gypsy); 2. Mr. Tansill (Gypsy); 3. Mr. Nlood (Gypsy Vampiro).

Master Lawson was presented with the Month's Medal for the first place.

In the A.O.V. section the highest score, 1. Mr. Tansill (Gypsy); 2. Mr. Wally (Blue Water); and prize certificates awarded. The Society has applied for affiliation with both the F.N.A.S. and the A.V.A.S. and is looking forward to a happy association with both these bodies. The annual coach trip for 1962 will be to the Belle Vue Aquatics Festival in October.

AT a show for Freshwater Aquaria organized by the Middlebrough and District A.S. and held in the Queen's Cinema, the results were as follows—L. Terrence; Mrs. K. Whittam; L. Collins; R. Heath; D. Brown.

The manager of the cinema Mr. Cook, presented the club with a magnificent cup, and Mr. W. Payer of Harrogate gave a second prize cup. Prizes were presented by the Chief Constable, Mr. B. Darman. The Annual Open Show will be held on April 27th and 28th in All Saints Hall, traders welcome.

AN Open Table show is being held by the Accrington A.S. on Sunday, 27th May. The Hon. Secretary of the society is Mr. T. H. Bannister, 63, Pleasanton Street, Accrington.

THE fourth inter society table show between Thorne A.S. and Goole and District A.S. was held in Goole recently. The result was a victory for Thorne by the narrow margin of six points, Thorne scoring 102 points to Goole 96.

The result of the Goole table show held the same evening was as follows—1. F. Marshall (Goyle); 2. F. Mackell (Black Moll); 3. R. Hunt (Black Moll). These results decided the close contest for the club shield in favour of F. Dumble (53) who defeated last year's winner J. N. Bards (52) by the narrow margin of one point. In the third place was B. Hunt with 47 points. The shield was presented to Mr. Dumble at the second annual dinner. Guests of honour at the dinner were Mr. and Mrs. J. Cradock and the presentation was made by Mr. Cradock.

At the annual general meeting the officers elected were as follows—Chairman, Mr. R.

Hart; Secretary, Mr. J. N. Bards; Vice-Chairman, Mr. F. Taylor; Asst. Secretary, Mrs. M. Mackell; Treasurer, Mr. K. Conlisk. Permission has been granted to place an exhibition stand in the public library in the near future.

AT the annual general meeting of the Brighton and Northway A.S. it was reported that membership had more than tripled during the year, which was the most successful in the club's history. Entries in shows were the highest ever, with many of the most unusual fish appearing for the first time. It was hoped to form a Junior Section this year. Other plans include the setting up of a tank in an old PVKY Club in Brighton. The following officers were elected for the coming year—Chairman, Mr. B. Shelton; Secretary, Mr. F. Harland-Swan; Kingston Bay House, Kingston Bay Road; Showman, Miss P. Carr; Competitor, Messrs. B. Worsing, J. Rad, C. Dowling and S. Archer; Show Secretary, Mr. R. Bennett; Librarian, Mr. K. Nelson; Equipment officer, Mr. S. Archer; Auctioneer, Mr. C. Dowling; Auditors, Messrs. R. Day and N. Golding.

THE month of February has been a very busy one for the members of the Broad and District A.S. starting with the monthly meeting on the first Tuesday with a talk on how to set fish at an early age by Mr. W. Gray. The meeting was well attended including two new members and visitors from the Chesham Society. A table show organized by Mrs. J. Hart was won by Mr. B. James of Chesham.

The main event of the month was the annual dinner and prize presentation. The function was attended by the Mayor and Members of Gloucester, and forty six members and friends. The Chairman Mr. E. Hewitt welcomed the visitors and remarked how good the past year had been and that it was hoped to continue the good will with other societies. Mr. B. James of Chesham replied on behalf of the visitors. The Mayor then presented the prizes for 1961. Best Cup, Repton, Mr. L. Gifford; The Ladies Cup, Mrs. M. Gifford; Outstanding Members Cup, Repton, Mrs. A. Huxford; Tropical Table Show award, Mr. R. James; Cold Water Table Show, Mr. T. Aron; Stock Cup for the best home species, Mr. A. Hart; Ladies Cup, Miss Y. Cooley; R.A.B. Cup and Replica, Mr. W. Gray.

The outstanding member of the year (this award remains a secret until the night of the dinner) was won by Mr. P. Dobby.

The following Sunday the Society with members of the Chesham Club visited the South-west Fisheries at the invitation of Mr. E. James. A very interesting morning was spent looking at trout from the egg stage right through various ages to 4 year olds.

A successful start has been made by the Leith Aquarist Club. This has been formed less than six months but already there are nearly sixty members all keen and enthusiastic. The membership includes about ten juniors. The meetings are held on Wednesdays in Rankin House, Winton Street, Edinburgh, at 7.30 p.m.

The results of the January show are as follows—Trophies: 1. Tiers Barb, H. Foster; 2. Cherry Barb, G. Wilson; 3. Australian Rainbow, H. Foster; Livebearers: 1. Black Mollie, W. Downer; 2. Virtual Guppy, D. McNeil; 3. Green Swallowtail, F. Jerkins; Joints: 1. Corydoras Aeneus, D. Duncan; 2. Japanese Fishers, J. Miller; 3. Oudine Guppy, G. McNeill; 3 equal, Roy Barb, J. Miller.

The other honours are Chairman, Mr. Nat Allen, F.R.Z.S.; Vice-Chairman, Mr. Don Bird; Treasurer, Mr. J. C. Backlow; Hon. Secretary, Mr. L. Edgar, 28, Borewell Quadrant, Edinburgh, 5.

RECENT activities of the Dewsbury and District A.S. have included the annual general meeting and the annual dinner and social evening.

At the annual general meeting the members voted Mr. G. Woodhouse, 4 Thorncliffe Estate, Strathfield, Hales as Secretary. Mr. J. Thompson

became President and Mr. A. Rose was elected Vice-President.

About fifty members, families and friends sat down to the Annual Dinner. The guest of honour was Mr. Howard Polesy of Huddersfield, and the event was extremely enjoyable. Activities already arranged for 1962 include a visit to the York Horticulture at Pickering and a further visit to Chester Zoo, the date to be fixed later.

AT the January meeting of the Walsingham and District A.S. Messrs. Williams, Stokes and Boech gave a short series of lectures on new imports and unusual specimens (fish). Each gave an account of his personal experience of the habits and requirements of the fish on show. The lecture for 1962 was President, Mr. H. G. Heath; Chairman, Mr. P. Stokes; Hon. Secretary, Mr. M. E. Boech, 37, Westcroft Avenue, Quainton Road, Walsingham; Treasurer, Mr. A. Hixson.

THE following changes have been reported from the Basingstoke and District A.S. Chairman, Mr. A. C. Welby; Secretary, Mrs. W. Vinyard, 47 Buckland Ave., Basingstoke. The Club Room has been changed to the Victoria Inn, Victoria Sq., Basingstoke. During the last six months the Club has lost two of their founder and widely known members, namely 302 Lock-Sowers and D. L. Edmunds.

THE monthly bulletin from the Nottingham and District A.S. gives the result of the first of this year's table shows. The placings were Nipper and Tiger Barb, 1 and 2; Mr. G. Wood, 3; Miss M. Lindsay, A.O.V. Barb, 1 and 2; Mr. Halliwell, 3; Mr. G. Wood, 3. Votes have been received from the members on the possibility of a one day open table show in Nottingham. The annual general meeting is to be held on Tuesday the 27th March.

AT the February meeting of the Bedford and District A.S. a talk on setting up an Aquarium was given by the Society's Chairman, Mr. Banks, after which members put forward their own ideas, using a dry tank as a model.

Mr. Marshall then gave a lecture on the subject of wiring, and also introduced to the Society the porous black hydraulic nozzle.

#### SECRETARY CHANGES

BRIGHTON and Southern A.S. (Mr. P. Harland-Swan, Kingston Bay House, Kingston Bay Road, Southham); Barton and District A.S. (Mr. T. Huxford, 56, High Street, Newbold, Barton-on-Ure, South); Basingstoke and District A.S. (Mrs. W. Vinyard, 47 Buckland Avenue, Basingstoke); Kingston and District A.S. (Mr. C. E. Joyce, 74 Ellingham Road, Long Ditton, Norfolk, Surrey); Reading and District A.S. (Mr. W. Anderson, 92 Brisbane Road, Reading); Walsingham and District A.S. (Mr. H. A. W. Bishop, 67 Maynard Road, London, E.17).

#### Crossword Solution

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

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Parrotfish	24 to 74
4" Nympha	10-
Green Tetra	3- & 4-
Large Goldfish 7"-8"	10-
Small Gold	2 1/2
7" Catfish 10 weeks	12-
Miniature Goldfish	5- to 7 1/2
Small Goldfish & Shiner	1- to 2 1/2

ALL POND PLANTS STOCKED

**THERMOSTATS**

Procter	36-
Constant Dialread	31-
Constant New External Type QK	32-
LSM	
Dial-Adj.	15-
Int. Adj.	15-
Int. Adj. "Popular"	19-
"Popular" with room indicator	12 1/2
"Ee-ee" Sumner	26 1/2

**AERATORS**

Beko	27 1/2
Zeebeke Total	75-
Zeebeke Junior	45-
Minnow Maker	24-
Minnow Maker	21-
"Buddy" Fairy	27 1/2
Procter	69-
"Buddy" Model D	67-
Dynas Mk. I A.C./D.C.	49 1/2 0
Dynas Mk. D A.C. only	49 1/2 0

**PISTON PUMPS**

Hy-Bo Junior	107 1/2
Hy-Bo "A"	130-
Hy-Bo "B"	143-
Hy-Bo "C"	156-
Leak Model I	117 1/2

**Thermometers**

Mercury	4-
Blue Gem	4 1/2
Mercury Gem 5"	6 1/2
Drump	6 1/2

**Filters**

Carrier	4 1/2
Onuda	18 1/2
Windmill Hand	15-
Windmill Air	10-
Green	18 1/2
Premier Bio	25 1/2
General Filter	12 1/2, 15-
Sedim	9-
Wan Bottom	18-
Slam Jam	17 1/2
Klar King	22 1/2
Bottom Filter	8 1/2
Rock Filter	17 1/2

**TROPICALS**

Large Nerps, 6 for \$1, 3 1/2 each

Bicolor	5 1/2
Angels	2 1/2 & 3 1/2
White Cloud	2 1/2
Minnows	2 1/2
Platies	2 1/2
Beacons	2 1/2
Black Widows	2 1/2
Plates, various	from 2 1/2
Swordtails	various, from 3-
Schubert's harks	3-
Sciencicals	3-
Guppies (var)	1 1/2, 3-
Hairpins	3-
Cherry harks	3-
Nigger harks	3-
Cherry harks	3-
Red Eyed Tetras	3 1/2
Red Nosed Tetras	11 1/2
Pezomachus	10 1/2, 12 1/2, 15-

Brown & Blue Axons 2", thick lip 3 1/2, dwarf or tree 2 1/2, Kissing 4", Opaline 3 1/2, German.

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16 x 12 x 15	138 18 0
Standard Bow Case	118 10 111 5 0

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Sagittaria	64, each	5-
Valis. Terza	64	5-
Valis. Spiralis	64	5-
Arifolia	64	5-
Lodjalia	64	5-
Negropeltis	64	5-
Cryptocoryne	2- and 3-	5-
Wisteria	1 1/2	2-
Giant Hydrophila	1 1/2	2-

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E.S. Standard	7 1/2
Wised	8 1/2

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7"-8" Silver Sharks	70-
Pelamichthys Kribia	12- each
Elmest New Fish	40- & 20- each
Black Vindal Guppy	15- per
Green Harts (1) inch	4 1/2 each
Synodontis Cate	10 1/2
Parangona Cate	10-
Red Tamed Sharks	20-
Red Tamed Sharks	10-
Knife Fish	15- to 25-
Green Loach	12 1/2 & 13-
Scads from	7 1/2 to 20-
Malayan Angelfish	7 1/2 to 13-
Rainbow	8-
Weather Loach	5-
Blacksharks	15-
Firemouth	4-
Blind Cave Fish	8 1/2

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12 x 8 x 6	18-	24 x 12 x 15	52 1/2
12 x 8 x 6	14-	30 x 12 x 15	70-
18 x 6 x 6	15 1/2	36 x 12 x 15	82 1/2
18 x 10 x 10	21-	48 x 12 x 15	115-

**COVERS**

18 x 10	14 1/2
24 x 12	21-
30 x 12	28-
36 x 12	35-

**STANDS**

18 x 10 x 36	32-
24 x 12 x 36	48-
30 x 12 x 36	45-
36 x 12 x 36	58-

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Hydro Flakes	1 1/2
Bream	1 1/2 & 2 1/2
Bream	4 1/2 & 1 1/2
Shrimp	6 1/2 & 1 1/2
Dry Daphnia	6 1/2 to 2 1/2
Liquidly	2 1/2
Infant	2 1/2
Filter	2- & 4 1/2
Hobby	2- & 7 1/2
McLaren's	1 1/2, 2 1/2, 6 1/2, 17 1/2
Bone Shrimp	2- & 2 1/2, 15-
Mets & Yeast	1- each
Barnum's	1 1/2 & 2 1/2
Wardley's	8-, 4 1/2, 2 1/2, 1 1/2

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Author of *Exotic Fishkeeping*

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26 WESTBURY LANE, BUCKHURST HILL, ESSEX Telephone: BUCKHURST 4708

It is quite easy to get to Buckhurst Hill. By tube train on the Central Line thirty-five minutes from the West End, and we are some minutes from Buckhurst Hill Station. Or by bus routes 20, 28A, 167 to Bald Faced Stag, five minutes walk from there. There is always someone in attendance at the Hatchery so you can inspect at any time including week days. Over 120 different species of fish for sale. Fully varieties of plants available, collected from our hundreds of tanks for each order and sent direct to you. They cannot fail to grow.

We sell, buy, or exchange fish of any kind. We also purchase second hand tanks or complete 'set-ups'.

E. Radians .. .. .	each	10/-
Collyphane Sword plant .. .. .	"	" 10/-
Broad Leaf Amazon .. .. .	"	" 8/6
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Red Ludwigia Tetanica .. .. .	"	" 6/-
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Red Stem Myriophyllum .. .. .	"	" 6/-
Sagittaria Noveboracensis .. .. .	"	" 4/6

No fish by rail during bad weather. 120 species for sale, 6 species of cichlid in stock.

Cheapest Tanks in the Country. All sizes in stock for sale, only. Some second hand also.

We are now booking dates for Club Visits.

Our 18/- parcel of 30 mixed plants & varieties is the finest on offer. Half parcel discounted until May. Malayan snails 3/- doz, mixed snails 3/6 doz.

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Everything we sell is the best on offer. We supply everything for the Aquarist in the way of equipment and post free. Our offer of a Thermometer, Heater and Thermometer at 20/- post paid is still open.

### PLEASE NOTE

The books written by Thos. H. Marshall, 'Breeding the Egg-layers', 'Breeding the Livebearers', 'Breeding the Labryrinths', 'Breeding the Cichlids', 'Aquarium Management and Fish Farming', 'Aquarium Plants and Snails', are all available from here at 8/- per volume, post free, or a complete set for 42/6 post paid.

We are always prepared to give advice on all phases of fish keeping and typical breeding tanks set up for many different species of fish can be seen in our Hatchery. We are pleased to welcome Club visits, see previous advert.

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

### BERKSHIRE

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

### CHESHIRE

**Grassby, Joe., F.R.H.S.**  
"The Glen" Fisheries, Mobblerley, Nr. Knutsford  
Tel.: Mobblerley 3272 W. C.T.P.A.A. R.&A.  
**Robert Jackson (Naturalists) Ltd.**  
Holly Bank Nurseries, Grove Lane, Hale  
Telephone: Ringway 3301  
WR. C.T.P.A.A. R.&A.

### DURHAM

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

**Powell, M.C.**  
The Honey Pot,  
Claypath, Durham City  
Telephone: Durham 2100  
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

**The Fish Bowl**  
Laura Street, Sunderland  
Telephone: Sunderland 69192  
E.C.D. Monday. R. C.T.P.A.A. R.&A.

### ESSEX

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

**Skilton, G. J.**  
"Ridgeway", 139, Galleywood Road,  
Chelmsford  
Telephone: Chelmsford 56878. WR. C.T.P.A.A.

### HAMPSHIRE

**Arundel Aviaries & Fisheries**  
241-243, Arundel Street, Portsmouth  
E.C.D. Wednesday. WR. C.T.P.A.A. R.&A.

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

### HERTFORDSHIRE

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

**Wat-Pet Organisation Ltd.**  
66-68, London Road, St. Albans  
Telephone: St. Albans 54409-55507  
E.C.D. Thursday. WR. C.T.P.A.A.

### KENT

**Kingsfisheries Aquarium**  
138, Croydon Road, Beckenham  
Telephone: Beckenham 3716  
E.C.D. Wednesday (all day). R. C.T.P.A.A.

### LANCASHIRE

**Horaby's**  
Trafford Bar, Old Trafford,  
Manchester, 16  
Telephone: Trafford Park 2689  
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

**Letty Kremmer**  
13, King Edward's Building,  
Cheetham Hill Village,  
(opp. Woolworths, Manchester)  
Telephone: Cheetham Hill 3246  
E.C.D. Wednesday. WR. C.T.P.A.A. R.&A.

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

### LONDON (North)

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

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

### LONDON (South)

**Aquatic Suppliers**  
7, David's Road, Forest Hill, S.E.23  
Telephone: Forest Hill 3816  
(Open every afternoon and all day Saturday).  
WR. C.T.P.A.A.

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

**"Our Corner"**  
310, Lee High Road,  
Lewisham, S.E.13  
E.C.D. All day Thursday. R. C.T.P.A.A.

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

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

### LONDON (West)

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

### NORTHAMPTONSHIRE

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

**The Pet Shop**  
120, Kersting Road,  
Northampton  
Telephone: Northampton 841  
E.C.D. Thursday. R.C.T.P.A.A.

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

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

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

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

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

**WARWICKSHIRE**  
**The Coventry Aquarist (Prop. W. Dymond)**  
43, Melbourn Road, Earlsdon, Coventry  
Telephone: Coventry 72772  
E.C.D. Thursday. WR. C.T.P.A.A.

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

**WORCESTERSHIRE**  
**The City Aquaria, Bird and Pet Supplies**  
(Proprietor: Mrs. M. Hemming)  
34, Friar Street (opposite Union Street), Worcester  
Telephone: Worcester 22005  
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

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

**SCOTLAND**  
**Aquarists' Rendezvous**  
164/166, Albert Drive, Pollokshields, Glasgow, S.1  
Telephone: South 4258  
E.C.D. Tuesday (1 p.m.) WR. C.T.P.A.A.  
**Forbes, James L. (Prop. P. R. Greening)**  
176, Blackness Road, Dundee, Co. Angus  
Telephone: Dundee 66409  
E.C.D. Wednesday. R. C.T.P.A.A.

**NORTHERN IRELAND**  
**Ulster Aquatics**  
15, Montgomery Street, Belfast  
Telephone: Belfast 27144  
E.C.D. Wednesday. WR. C.T.P.A.A. R.&A.

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