

The Aquarist

and Pondkeeper

MARCH 1964



MONTHLY
Vol. XXVIII No. 12

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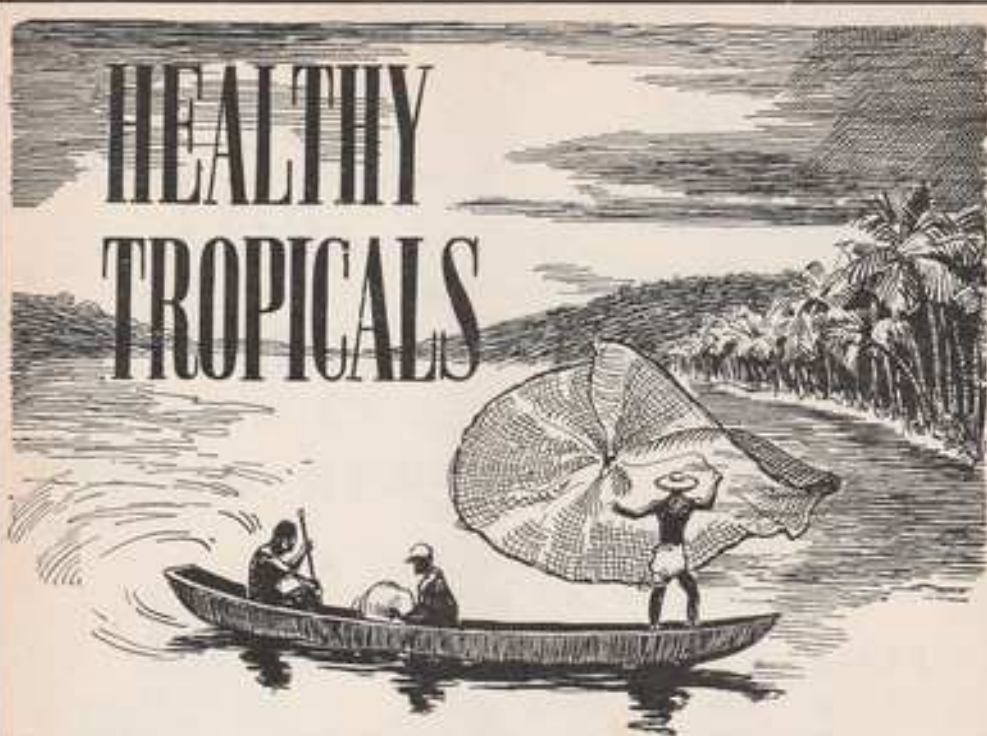
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The AQUARIST AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"



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1964

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PUBLISHED MONTHLY

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This Solution is a Problem

AQUARISTS vary in their attitude towards the most important constituent they use in their aquaria. To a good many water is water and what's good enough for the Water Board to pump through pipes is good enough for their fishes. Others have been known to develop such phobias about it all that they have spent much energy, time and money in transporting great barrels of water, from their specially chosen locality, miles across country back home to their fish houses. Yet others doctor their piped water in various (and often highly secret) ways before adding it to their tanks and then regard it with such special reverence after it has been there for a while that it hurts them to have to throw a single drop away.

It is, of course, what is, or might be, dissolved in the water that gives cause for concern. Water quite fit for human use domestically can contain small quantities of substances highly poisonous to some fishes; in addition, fishes, and more especially their eggs, are sensitive to the total amount of any substances in solution in water, not merely to the kind of substances. In this last respect most adult fishes show a marked degree of adaptability, fortunately, and can accustom themselves to a change of water conditions if this takes place gently. It is certainly as well to know whether one has a 'hard water' supply, for then if fishes are going to be obtained from a source some distance away, and therefore possibly from a 'soft water' area, some troubles may be avoided by allowing them the luxury of some softer water during their quarantine period after arrival. Fishes obtained from a local supplier are, of course, more likely to have had to learn to love the available water.

Those aquarists living in areas with 'soft water' supplies will not have these worries, although there is the possibility that their water will be prone to dissolve salts of metals from pipes it has passed through. However, although adult fishes may become acclimatised to the local water conditions it is by no means certain that their eggs will show the same tolerance, so that here again in areas of hard water, and where difficulties have been experienced in previous breeding attempts, the use of a softer water is worth the trial.

How can hard water be made softer? This is a question that is often asked, and the only practical method for the

Continued at the foot of the next page



The Silver Tetra

by JAS. STOTT

A NATIVE of Guiana, the silver tetra (*Ctenopoma muriei*) has been given a popular name that is very descriptive. It is, as the name suggests, a silver fish, and like silver, the tiny scales are highly reflective, quickly picking out the colour or tint of nearby objects such as plants and rockwork as the fish swims by, thus producing what almost seems to be a metallic sheen.

While some aquarists accuse the fish of being fin-nippers when in mixed company, others say they have experienced no such trouble and declare them ideal fish for the community tank. From my experience I would say it depends, to a great extent, on the kind of fish they are with. If there are species in the tank which are considerably smaller, then they may develop a tendency to bully these smaller fishes, but if kept with species about their own size and a little larger they remain perfectly peaceful. Aquarium specimens reared under healthy conditions usually attain a size of around 3 inches when fully grown, so this is a size which leaves plenty of choice for selecting other species to go with them in a mixed community. Certainly the silver tetra looks well when in company with species that have plenty of gold and red in their colour make-up.

There is little difference in the sexes but a close inspection

will reveal that the female is slightly larger than the male, and that usually the male has a pale red tint in the anal fin which is absent with the female. They can be kept well and healthy in a temperature of 70-75°F (21-24°C) but for breeding and conditioning to breeding form the temperature should be raised to 80°F (26°C). For conditioning the pair should be separated and fed on a diet of live foods in variety, preferably with chopped earthworm playing a prominent part in the diet. The standard 24 in. by 12 in. by 12 in. tank is ideal for a breeding pair and should be set up so that one-half of the tank is planted with bunches of clean, snail-free *Myriophyllum*, or clumps of sterilised willow root or spawning nylon mops can be used. The other half of the tank should be left clear to provide room for the breeding pair to indulge in the extremely active chasing and courtship display which generally takes place with the species. Soft, slightly acid water seems to be the best and gentle aeration is undoubtedly helpful, although not, I think, absolutely necessary. I think that even after spawning is completed both the eggs and fry benefit from the effects of steady aeration and where possible I recommend its use.

As soon as spawning is completed the pair should be removed from the breeding tank because they are extremely fond of their own eggs. The eggs hatch out in about 2 days' time at the temperature suggested, and the fry become free-swimming after a further 48 hours, when Infusoria feeding must be commenced and kept going until the fry are large enough to take brine shrimps and sifted *Daphnia*. Once this stage is reached they are well on their way and the main thing from then onwards is to make sure they receive adequate feeding to develop a sound foundation for strong, healthy fish. Watch out for overcrowding; this can interfere with development and if this is suspected thin out immediately. Plenty of swimming space is needed for maximum growth besides good feeding. Reared under healthy conditions, maturity in this fish is generally reached in about 7 months.

This Solution is a Problem

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average aquarist is for him to dilute the hard water (preferably after boiling it) with clean rain water or distilled water. A water softener that replaces lime salts by others can produce domestically useful 'soft water' but not a water that will solve the fish-keeper's problems because it has still a high content of dissolved solids. A water mixture of one-quarter to one-third of mains supply with three-

quarters to two-thirds of rain or distilled water is likely to achieve sufficient dilution of the solids present in the hard water to remedy troubles these might cause in higher concentrations.

Such adjustments as these are more likely to be required than those often advocated to change the water's degree of acidity or alkalinity (that is, its 'pH value' or 'reaction'). Changes in reaction are difficult to bring about, in hard water especially, and if the method that is used adds appreciably to the content of the water's dissolved solids, then once again we should not be too surprised if our fishes refuse to act as if we had done them a favour.



A deep well-planted aquarium housing a shoal of adult tiger barbs

Barbs in Variety

by A. W. SKINNER

ONE of the most pleasing sights to me is our 'barb tank', situated in an alcove in our sitting room. I have so much enjoyment from these barbs that I cannot recommend anyone, who has the space, to set up a tank just for barbs. They really are lovely, being so colorful and lively and a fine contrast to our other show tank which houses the angels and several gouramis.

The barbs we have at present are cherry, chequer, sunset, Schubert's, Cumming's, ticto and, to me one of the best, the tiger barbs. What gives me an added glow is the realization that most of these fishes started life in our own fish house, and for anyone who is interested in breeding, I will describe the method used for *Barbus tetrazona* (the tiger barb). In fact, I find this same method successful with almost all the barbs I have managed to breed.

First, separate males and females in two tanks (I use two 24 in. by 12 in. by 12 in. tanks, keeping all the males in one tank and the females in the other, so that there are always about seven or eight different types of fishes being conditioned together) and feed the fish quite heavily with as varied a diet as possible, e.g. *Daphnia*, white worm, roe, peas, liver, spinach, shrimps and a good quality dried food etc. Choose breeding stock of good size and colour and try to get unrelated males and females.

After fish have been conditioned for 2 weeks, I prepare the breeding tank. I use 18 in. by 10 in. by 10 in. tanks and clean them out well with salt water, finishing off with a good rinse under the tap. Fill the tank with 3 parts of fresh tap water and one part of mature water (this I take from one of the tanks used for growing up young fishes).

Sterilise (by boiling) enough gravel to cover the bottom of the tank. Sprinkle this in, then use bunches of nylon wool and a few floating plants as spawning medium. The tank is provided with a heater, the thermostat is set at 80°F (26°C) and the tank is left to stand for 2 days.

Late in the evening introduce the pair of fish into the tank, cover it with sheet of glass and, after making sure the fish are all right, switch off the lights. If all goes well for you, the fish will commence spawning early next morning, but quite often I have had no success on the first day, and then found them happily spawning on the second day, so contrary to some suggested procedures I always leave the fish in the tank if I know they definitely haven't spawned.

There is no mistaking the spawning action. The male swims round the female, coaxing her into the plants, and they will then tremble side by side while the female expels a few eggs. This goes on for about 2 hours, after which it is time to remove your fish and put them back into the

various conditioning tanks. You can see the eggs hanging on the wool and plants. I then cover the breeding tank with paper and after about 2 days the baby fish are clearly visible, hanging on to the plants. In another 2 days the fry are free-swimming and I remove the paper, letting the light into the tank. I feed with egg yolk for 3 days, and by this time they are ready for brine shrimp and moin worms; as soon as they are big enough I feed with *Grainia* worm, sifted *Daphnia* and fine dried food.

When the young fish are about 3 weeks old, I transfer them to another tank (36 in. by 15 in. by 15 in.) and with the kind co-operation of my wife they are fed six to eight times a day with as much food as they will take. We find that during these first few weeks you just can't satisfy them! They really do grow in leaps and bounds and it is a great sight to see 150-200 young tiger barbs swimming around together.

So if you would like colourful, active type of fishes both to watch and breed—don't forget the barbs.

Blind Fishes Available to the Aquarist

by P. M. FULLER

AMONG the various curiosities available to the aquarist are a number of species which, by reason of their environment and the effect of evolution, have lost the power of normal vision. Certain characteristics are common to all fishes showing this unusual feature: lack of light in their environment prevents the normal development of pigment, and they are consequently either white or pink in colour; the loss of one sense results in the supernatural development of another, that of touch or taste; the somber habitat which they invariably frequent produces in the fish an aversion to strong sunlight.

Blind Cave Fish

The most commonly seen in dealers' tanks is the familiar "blind" cave fish (*Anoptichthys jordani*). In only one area in the world does it occur naturally: the cave-district in northern Mexico, in the region of San Luis Potosi. In appearance the fish is scarcely spectacular; attaining a size of about 3 inches, it is typically pale pink in colour. It is of peculiar interest to the scientist because it can be shown to have originated from a sub-species of *Astyanax fasciatus*, *Astyanax fasciatus mexicanus*, thus forming an important example of evolution in action.

Hans Frey has pointed out that in captivity the evolutionary process takes place in reverse; that is, the gradual re-development of the eye is clearly indicated in successive generations bred in the aquarium. The young of the species possess small, but apparently functional, optical organs, which become merely vestiges, overgrown by skin, as growth continues.

As an aquarium fish it makes few demands. The range of temperatures which it will tolerate is incredibly large; spawnings have been reported in the low states (°F), and during the summer months my own specimens thrive at 80°F (27°C). As for pH and hardness values, though diverging figures are quoted, within limits it will tolerate anything, preferring slightly acidic and medium hard water (pH 7.5; DH 8.5).

Breeding of the blind cave fish is not uncommon in the aquarium, actual spawning taking place only in complete darkness; the pair rise to the surface together and establish mutual contact. The fry hatch in 3 or 4 days and achieve maturity within 4 months.

Less often seen is the blind barb (*Gambusia goodei*). Attaining the same length as the above species and being of the same pinkish colour, it differs somewhat in shape, being elongated with two prominent barbels. It, too, is peculiar to one particular area, the underground waters in the lower Congo. In their *Encyclopedia of Tropical Fish*, H. Axelrod and W. Voederwinkler give it only brief mention as a 'mystery fish', one of those increasingly diminishing exclusives whose breeding habits have not, as yet, been fathomed. Like the blind cave fish it is a restless fish, always on the move, and is easily frightened by sudden or excessive light.

Rarer Species

Amblyopsis spelans and *Choleogaster cornutus* are two further American species, the former from the Ohio region and the latter a surface-water fish from the southern States. Little is known of their breeding habits though it has been maintained that they are live-bearing. Even less frequently seen than the above species, they are more discriminating in their requirements and perhaps more difficult to keep in captivity. Elongated in appearance, they attain a length of 4 inches. Colouring is typically pink, tinged with yellow.

Many other blind fishes exist. For example, in his recently translated book *Freshwater Fishes of the World*, Gunther Sterba quotes *Typhlichthys subterranea*, again from North America, a species which is not yet available to aquarists outside the States.

In all, the blind fishes of the world form an interesting group: fascinating to keep and to breed or at least to endeavour to breed. Information about most of the above species is still sparse, and the mysterious breeding habits of many of them present a challenge to all aquarists.

FOODS FOR COLDWATER FISHES

General Feeding Methods

by A. BOARDER

Photographs by LAURENCE E. PERKINS

HAVING dealt with the feeding of all types of goldfish, both in the outdoor pond and in tanks, in previous issues, I will now describe methods for feeding other species of coldwater fishes. Many of the foods recommended for goldfish can be used quite well for some of the British coldwater fishes, the exception being for those fishes which are carnivorous.

The ligoi carp is a fish very similar in habits and feeding to the ordinary goldfish. They grow much larger, however, and are rather slow in action. All the foods as used for goldfish can be given, but it is as well to see that no small pieces of food are offered as these fish can take quite large pieces and often the small pieces are not touched, thereby causing unnecessary pollution of the water. The ligoi will take pieces of brown bread crust from the surface and they are fond of pieces of cheese, especially the soft types. In warm weather they can eat quite large quantities of food but most have hardly any artificial food at all during the winter months.

The common carp (*Cyprinus carpio*), the crucian carp (*Carassius auratus*) and mirror carp will all take the same kinds of food. Carp are omnivorous and their natural food consists of worms, insects and their larvae, besides vegetable matter in the form of soft or partially decaying vegetation. No trouble should be encountered in feeding the carp, but remember that water which is warm will encourage the fish to eat well, as long as it does not exceed 70°F (21°C), when because of lack of oxygen in the water the fishes are not inclined to feed much.

Golden orfe (*Idus idus* var. *orfeus*) are interesting fish for the open pond and are very quick growing if they are given sufficient food. In good clear water, orfe are hearty feeders as long as the oxygen content is high. All kinds of food will be taken by these fish and it is a fine sight to watch them snatch a bluebottle or wasp from the top of the water. Although orfe prefer live food, they are not



Golden orfe

averse to taking almost any of the usual goldfish foods. Garden worms are a favourite food, as are maggots. No live foods used by the pondkeeper will be refused by orfe. Large specimens have huge appetites and I have seen them tearing up and eating the entrails of chickens. Live food can consist of worms, *Tubifex*, white worms, maggots, wasps and their grubs, ant pupae, frog tadpoles, beetle larvae and water snails (if crushed). They will also take dry bread, bread paste, oatmeal, Bemax and packet foods as given to goldfish.

Tench (*Tinca tinca*), both the green and the golden variety, are great favourites in the pond. They are a most inoffensive fish and will not interfere in any way with varieties of goldfish, not even very small ones. In nature tench are very fond of all types of molluscs, and so should



Rudd



Tench

be given water snails when procurable. The large ones can be crushed, but it is amazing how a tench will suck the snail's body from a shell. The garden worm is again a great favourite with tench, and they will also take any of the live foods mentioned above. Small pieces of meat will be taken readily, as will dehydrated meat as sold for cat food. Most of the usual dried foods can also be used and in warm weather tench will take dry bread from the surface. In nature they mostly feed at night, but in the pond will accompany the goldfish on searches for food at any time of the day. During the winter months they become rather torpid, not exactly hibernating, but remaining very quiet, often well down in the bottom among weeds or mud. Tench fry can be raised with the usual fry feeding methods as used by breeders of goldfish, and as yearlings they are very attractive fish, looking as handsome as many tropicals.

Rudd (*Scardinius erythrophthalmus*) is a good feeder in the pond and should give little trouble. Both the golden and silver varieties will take most types of food given to omnivorous fish in the pond. Rudd are fond of taking flies from the surface and will also take worms readily as well as the usual live foods described above. In addition they will feed on most dried foods, and will soon become used to all the usual goldfish foods.

The roach (*Rutilus rutilus*) is not so often kept as the rudd, which it rather resembles, but in a fair sized pond they may be kept quite successfully. They are more apt to develop fungus than the rudd, but in clean ponds they can be quite an attraction. Their food consists of small insects, their larvae, worms and caddis fly larvae. Young water snails are also a favourite food for roach, and it is likely that the success anglers have at catching roach with boiled hemp seed is that it greatly resembles small water snails. Roach are rather faddy feeders at times and it is a fact that those foods which are readily taken in some waters are refused in others. I remember that many years ago when I used to fish for the roach at Tring, those in the canal would take small pieces of cheese on the hook, but in the reservoir close by, which actually fed the canal, you would never get a bite with cheese but only with boiled wheat. On the other hand the roach would not take boiled wheat in the canal.

Minnows

The minnow (*Phoxinus phoxinus*) is a grand little fish that thrives well in an outdoor pond which is served by either a fountain or a small waterfall. As these fish prefer a clear, gravel-bottomed stream, it can be realised that they are not likely to do well in the garden pond which is always in a murky state. In the wild their food consists mainly of water lice (*Asellus aquaticus*), water shrimps (*Gammarus pulex*), *Daphnia* (water fleas), flies and other insects which drop on the water, and larvae of water creatures. They will also take most of the usual dried foods and present no difficulties over their food.

The gudgeon (*Gobio gobio*) is another fish that prefers running water, but it can often be found in canals as well. In the pond they are inclined to keep to the bottom, being bottom feeders, but in clear water will swim around and take most of the kinds of food described for the minnow. The gudgeon is a good scavenger, as indicated by its two barbels, and so it is well suited for clearing up any uneaten food on the bottom of the pond. It must be remembered that if the gudgeon is expected to scavenge then it should not be fed too much food that it likes.

The bream (*Abraamis brama*) is not a favourite fish for the pondkeeper as it is slow moving, prefers the lower depths of the pond and is rather colourless in the water. It is mainly a bottom feeder and in its ordinary habitat eats crustaceans, molluscs and worms. In captivity bream will eat many other foods, including many dried ones. Bread paste will be taken and I remember seeing one

caught in Tring reservoir some years ago that weighed 11 lb. 9 oz., on bread paste (I say caught, but actually the angler had gone to his lodgings for breakfast and the fish hooked itself whilst he was away!).

Another river fish that seems, however, to prefer slow running rivers and streams is the bleak (*Alburnus lucidus*). It is quite an active fish for the pond and eats many of the usual live foods such as worms, crustaceans, insects and their larvae and the larvae of the caddis fly. In the pond bleak will take a few kinds of dried food and can be accustomed to take packet foods.

Dace and Chub

The dace (*Leuciscus leuciscus*), a fine fast swimming fish which prefers rather fast running rivers and streams with clear water, is mainly carnivorous. However, it will eat some soft vegetation at times and, in captivity, some dried food. In nature it will take many flies etc., from the surface and also likes small crustaceans, worms and the larvae of insects; the water louse and freshwater shrimp are also eaten by dace. A good clear water is essential for this fine fish to be kept for long in a pond, and unless this is provided the dace is not likely to feed well and thrive.

Rather similar to the dace is the chub (*Leuciscus cephalus*), but it grows much larger, reaching a weight of 7-8 lb., whereas the dace is considered a specimen at 1-1½ lb. It is a river fish and during the warmer months likes to spend most of the time near the surface. It is omnivorous in its diet and will eat young fish, frogs, worms, insects of many kinds and their larvae. It will also eat vegetable matter such as shoots of water plants and seeds etc. One of the favourite baits for catching the chub was a cherry. It appears that as the fish matures it prefers a diet of live food to vegetation. In captivity the chub will take most of the usual live foods and also many kinds of artificial foods as fed to most pond fishes.

The stickleback (*Gasterosteus aculeatus*) is more likely to be kept in a tank than the garden pond. It will eat mostly small live foods, such as *Daphnia*, white worms, Tubificæ and shredded garden worms. It will also take some dried foods and so presents no difficulties as far as feeding is concerned.

The bitterling (*Rhodeus amarus*) is also a fish more often kept in the indoor tank than in the pond, but it will eat most foods small enough for it to take, both live and dried.

Percy (*Perca fluviatilis*) are mostly carnivorous, preferring small fishes and worms for their diet. These fish should not be kept with other fishes small enough for the perch



Pike

to get into its huge mouth. Either a separate pond should house them or a partition must be inserted to keep them by themselves. Any small fishes will be eaten, even sticklebacks. I remember catching perch that had their stomachs filled with sticklebacks; the spines did not appear to inconvenience the perch in any way. In captivity perch will devour our garden worms, but, of course, will take any kind of live food offered. A healthy one could dispose of many worms at a feed and so the keeping of these fish should not be undertaken unless one has a good supply of live food available.

The pike (*Esox lucius*) is another fish that must not be kept with smaller fishes. For all that, it is a very interesting fish to keep provided that one has an almost unlimited supply of small fishes to offer as food. Small pike can be fed on garden worms and will take shrimps and pieces of meat. However, they prefer their food to be alive and moving. It would not be easy to keep a pike to a good age as they can grow to well over 30 lb. in weight. Small specimens, up to 2 lb., make interesting charges and can be tamed fairly easily, but over this size they would require so much live food to present a problem for the aquarist.

HOUSE PLANTS FOR THE FISH HOUSE



African Violets

by BARRY R. JAMES

time on a single plant, making it literally a mass of flowers. Coupled with the perennial nature of this species the result has been an ever-growing popularity, especially in the United States, where with coupled central heating and air conditioning, ideal conditions for *Saintpaulia*, even the novice housewife with no knowledge of the care of growing plants has been able to rear them successfully.

In this country with our cold draughty houses, however, winter usually terminates the lifespan of most specimens prematurely, with the result that it is usually treated as an annual. The aquarist with a heated fish house, or with a row of tanks constantly giving off warm humid air by evaporation, should have the same success as our American friends.

Generally speaking the needs of *Saintpaulias* are few: a fairly constant temperature which remains above 55°F (13°C), a draught-free position out of direct sunlight, a moist soil and feeding once a week. Dead flowers should be removed to prevent the plant looking untidy and no moisture should be allowed to remain on the leaves or become stagnant around the base of the stems, or they will become attacked by fungus and rot away.

Propagation is by seed or leaf cuttings, generally the latter. To strike leaf cuttings they should be severed with a razor blade as close to the main stem as possible and the veins should be slit at intervals along their length. Hormone powder dusted liberally on the underside of the leaf and stem will produce faster rooting. The leaf should then be placed in a flower pot (or a seed tray if a number of cuttings are taken) and laid face up on the surface of the soil. They should then be pegged down with tiny wire stakes so that even contact is made with the ground. The soil should then be well damped and the container covered with a sheet of glass. If it is placed in a warm sunny position roots should be produced liberally within a few weeks, along with the first leaves of the baby plants. When of sufficient size they need to be potted up separately in 3½ in. pots. The soil should be the usual John Innes potting compost no. 2 with a liberal amount of extra leaf mould added to increase the humus content.

AFRICAN violets are indigenous to the Tanganyika province of East Africa. Here, only 8 degrees from the equator, the climate is truly tropical with heavy thunderstorms alternating with blazing sunshine to produce a hot humid atmosphere. The temperature varies only slightly between day and night and from hot to warm seasons in the valleys which are the home of African vultures. The plants tend to grow on the rocky ledges on the lower slopes of the Usambara mountains, but may be found up to 6,000 feet.

The leaves of the various species (for there are more than one) grow from a central stubby stem. Generally speaking, they are oval with a slightly pointed end and grey-green in colour. Both upper and lower surfaces are covered with fine hairs and the edges are often toothed or wavy. Many varieties are now in cultivation, some with monstrously twisted leaves and multi-petalled flowers, but I shall content myself with the varieties commercially grown, and which may be obtained quite readily through local nurseries and florists' shops.

The charm of this little plant lies in the multitude of flowers which it produces at intervals, several times a year. These may be light blue, dark blue, purple, pink and white, often with yellow centres. Double-flowered species are also quite common and in the same range of colours. The flower spikes arise from the central stem and produce a dozen or so flowers on a single head. In addition there may be half a dozen or more spikes in bloom at the same

Combtails (*Belontia signata*)

by Dr. R. O. B. LIST

Habitat: Ceylon and Java.
Family: Anabantidae.
Size: 3½ to 5 in. (12 to 13 cm.).
Temperature: 80° to 84°F (27° to 29°C).

THIS species likes a heavily planted aquarium and is inclined to be extremely shy. They show a preference to hide away as much as possible. An unhappy propensity of the males is that they usually kill any females unless they are kept in a large aquarium.

Combtails are not usually referred to as colourful fish, but are nevertheless interesting inmates to have, and will give many pleasant hours of contemplation. The males are a greenish brown, veering to a dirty red. There is a black spot at the base of the dorsal fin and the scales show a dark border. The underside of the male is inclined to be whitish, and older specimens have a fine red shimmer; the dorsal fin is red with green. The female combtail is similar to the male but slightly less colourful, the body colour usually being olive-brown.

The popular name of the species is derived from the fine hair-like filaments in the caudal fin. These filaments are usually black and are most attractive as they can and do extend a full inch.

For those who are compelled to use nothing but dry foods, the keeping of the combtail will present some difficulties, as they prefer live foods and do not take readily to dry foods unless it is given them when very young.

On the matter of spawning, the species is not a bubble-nester as such, but the eggs will float on the surface among floating plants which should be provided. Spawning usually takes place at 80°F (27°C) and eggs will hatch out at 82° to 84°F (28° to 29°C) in about 3 days.

The fry are free-swimming in about 2 days after hatching out and should reach the size of ½ in. to ¾ in. in 6 weeks. The depth of the water should not be more than 4 to 6 in.

It is considered good practice to remove the female from



Fish:

Lawrence J. Perkins

the aquarium after spawning and it is most important that a regular temperature should always be maintained. Aquariums should also be kept covered to counteract draughts.

The pairs of fish when put together for the first time will not always successfully pair off, and I have found that they seem rather more fastidious than most fishes when selecting a partner. I have, however, not found what makes a successful partnership and have always had to try several partners before a pair will successfully spawn.

This again is a species that presents certain difficulties in breeding for the average aquarist, but for those who like to test their mettle the combtail will amply reward them.

Disorders of the Fish's Swim-Bladder

SWIM-BLADDER disorders, often called 'shimmies' when certain circumstances prevail, can be fatal if the conditions causing this complaint are not corrected. A fish showing this disorder loses its power of equilibrium and will tumble around in the tank as though in a state of intoxication. It may be seen floating near the surface of the water or resting for long periods at the bottom of the tank making quivering motions with its fins.

Swim-bladder disorders can be caused either through pressure on the swim bladder by other internal organs that are swollen (e.g. as in constipation), or by inflammation of the bladder wall caused by a chill induced by a sudden fall in the temperature of the water (this produces the condition known as shimmies). When the swim bladder is prevented from operating correctly the fish is unable to vary its own



Typical form of the swim-bladder

specific gravity to correspond with that of the surrounding water at a given depth.

If the cause is a simple one, a good recovery can be expected after raising the temperature of the water by about 5° to 10°F (3-5°C) and feeding the fish with a good varied diet or by treating the fish for constipation, if this is diagnosed.

R. E. Macdonald

THE AQUARIST

Platys in all their Variety

by L. B. KATTERNS

PLATYS are members of the family Poeciliidae (live-bearing mouth carps) and first became available to aquarists in this country during the early twenties. They very quickly became popular as one of the ideal fishes to keep and breed in the aquarium. They were then known as *Platycoelichthys maculatus*, and all the specimens available were of the grey type, some with dark markings near the tail, and some with no other colouring whatsoever. Nearly all these fish were wild specimens that had been collected from their native habitat in Mexico, where they are to be found in vast quantities. The platy has since been named *Xiphophorus maculatus*, which puts it in the same genus as the swordtail.

These present the aquarist with few problems, for they are not fussy regarding water, will take almost any food

My own method of saving as many fry as possible is to remove any female which is obviously near to having her young to a separate tank, which has been loosely filled with well-washed blanket weed and has a water depth of only a few inches.

The fish when born will sink to the bottom or on to any plant that may be below the female, where they rest for a period and then struggle to the surface; having done this they are able to become free-swimming and thus avoid the parent fish to some degree. There are many methods that can be adopted to save the youngsters, but I think that suggested above will give the most satisfactory results.

For breeding purposes, one male is sufficient for up to six females. These, once fertilised, have several broods from each fertilisation, the broods being from one or two



Photo

Platy varieties (*Xiphophorus maculatus*)

L. C. Wardwell

in a live or prepared) and will stand a large temperature range. The belief that platys need a high temperature is more wrong, and my experience is that one is more likely to have losses through excessive warmth than through low temperature. I have at the moment a tankful of half-grown fish which have never been above 50°F (10°C) and which have been as low as 43°F (7°C). This is exceptional, I think, and I mention it only to prove my point; naturally growth is very slow under such unfavourable conditions. However, around the 70°F (21°C) mark is satisfactory for growth and breeding. If at least a little live food can be included in the diet it helps to maintain good health and

The main difficulty in breeding these fish is to prevent the parents from eating the newly born fry. As platys are livebearers there are no spawning problems, and the unborn fry can be seen quite clearly through the scales and skin of the parent. In the early stages of development they appear as a dark patch on the lower part of the body just above the anal fin; this becomes larger and darker as the young develop and in some of the lighter coloured fish the eyes of the young are faintly visible.

fish up to several dozen. The size of the brood I think is hereditary, as I have found by observing these fish for a number of years that fish from certain strains consistently throw broods of approximately the same size.

In the early days a platy occasionally appeared that showed traces of red in the dorsal fin or on the top of the body, and it was from such fish that aquarists of the day set about producing colour varieties. Within quite a short time they had succeeded in producing what are now known as the red platy and the gold platy. These were self-coloured fish with transparent fins, and although they bred about 75 per cent true to type there were all sorts of fish among the remaining 25 per cent, some of them showing black markings on the body and fins.

From these marked fish the moon platy and the wagtail platy were produced, the former being a self-coloured fish with a crescent-shaped marking at the base of the tail and the latter a fish with a self-coloured body and black fins. In building up strains of wagtails and moon platys, aquarists found that they were getting a few fish which were showing black markings on the body, and this led to attempts to produce an all-black fish. In my opinion this

PRIMULAS

variety is the most difficult of all; in point of fact I have never seen an all-black platy. The result generally obtained when trying to get the all-black fish was a coloured body with a wide black band running from the back of the head to the base of the tail; these fish have more recently been given the name of tuxedo platy and are very popular to-day.

In attempts to produce black fish a number of specimens with a number of shiny blue or green scales along the side of the body appeared, and it was from fish such as these that our present-day blue and green platy have been built up. Here again, one seldom sees a really good example of a perfect fish and there is still scope for further work on these varieties.

In addition to those I have mentioned quite a few new varieties have come along during the past 2 years, and as some of the large commercial establishments in the U.S.A. are devoting much of their time to these fish we are likely to see quite a number of new ones in the future.

Probably the most striking of recently introduced platy varieties is the marigold platy, a really beautiful fish; the head is red and this fades through various shades of orange to a yellow tail.

Platys, no matter how good the strain, do occasionally throw back, and one gets an odd fish here and there which is identical with the original wild type; these should never be used for breeding, otherwise there is a possibility of the whole strain reverting. Such reversion is particularly common in spotted fish.

It is an easy matter to cross platys with swordtails, and with some of the other livebearers; many of our present-day swordtails are the results of such crosses. There are some extraordinary fish now available in the U.S.A. based on various crosses, including *Xiphophorus variatus*, and the outstanding features of these fish are the various forms of fin development. In some cases the dorsal fin is almost as large as the body of the fish, and, what is more amazing, this large fin characteristic is not confined to the males; the females show it but in a very modified degree.

There is no doubt that some of these fish will become available in this country in the near future but I fear they will be somewhat costly at the start. In view of the great advances in the production of new fish during the last few years one cannot but wonder what we are likely to see in the years ahead.



Xiphophorus variatus

A GROUP of plants capable of providing a brilliant display of colour at the pondsides over a prolonged period of time are the primula species. The various species have, over the years, been developed into a wide range of varieties and hybrids so that the size and colour range is extremely large. Among this range are a considerable number of plants which, without any special treatment of the soil or site, are most useful to the pond-keeper with an informal lay-out having the usual bog and rock surround.

Those species and their varieties which collectively are known as bog primulas like a site where they can obtain rich feeding and where the soil remains really moist but not covered in water as in the marshy area. It must be true, spongy bog for the best results. One of the most well known is *Primula florindae*, a species producing attractive sulphur-yellow flowers on 2 feet-long stems in June and early July. Where space is well on the limited side, however, and choice is restricted to a small number of plants, I would prefer *P. pulverulenta* colour varieties of the Bartlett strain, among which are plants bearing flame-red, bright pink and apricot-coloured flowers on stems around 20 inches high, which flower about the same time as *P. florindae*.

A most attractive white with a delicate pink eye is the Postford White variety of the *P. japonica*. It is a candid-

are Attractive at the Pondsides

by JAS. STOTT

type with the flowers growing in whorls up the 2-foot stems. This species looks well when in company with the variety Brockhurst Crimson, another candelabra type with lovely bright red flowers.

A Chinese primula which is extremely attractive with its leaf and orange flowers is *P. bulleyana*. This does not grow as tall as those already mentioned and makes a good subject for planting in the front of the taller growing species. As with many other species some lovely hybrids have been developed from *P. bulleyana* and they have increased the colour range to shades of yellow, apricot, rose and deep orange.

Producing lovely rose-carmine flowers from June to July is *P. boissiana*, with stems 2 feet tall. Although not long lived it is well worth trying. Where space permits, for a tall-growing species, rich golden-yellow flowers are offered by *P. helodoxa*, and it looks well when fronted with the smaller growing *P. bulleyana* Asthor hybrid in pastel shades.

For the higher reaches of the bog, where conditions offer a somewhat drier site, a March to April display can be obtained by the use of *P. denticulata* with its dense globular heads of lilac-coloured flowers. Several varieties are available, two of which can be highly recommended: Purple Beauty and Bengal Rose. For deep, ruby-red bloom on 18 inch stems the free-flowering *P. maltoni* is well worth a place on the bog edge.

Some primulas are happy in drier conditions and therefore are suitable for the lower areas of the rock surround with the informal pond. Undoubtedly, for early bloom the first of these to be mentioned must be the dwarf *P. sinensis*, with its vivid magenta flowers on 2 inch stems and its hybrids with the common primrose, which are known collectively as *P. juliana* hybrids. Of these Wanda is more than well known but two that can be recommended for the pondkeeper's rockery are Snow Cushion (white) and the gem-red Pam.

Still for a similar position is a species from West China, *P. stewartii*, which bears tiered umbels of fragrant white flowers growing to a height of 18 inches. To go with this, *P. andersoniana*, also from West China, offers an attractive contrast with its bright, orange-red bloom.

The higher levels of the rock surround the *P. garrardii* hybrid primroses, which are of Irish origin, form useful subjects, for they are a distinct improvement on some of the *P. juliana* hybrids, the flower heads being of greater diameter. The stem height is 8 inches and they bloom from March to June. *P. garrardii* Enid is a rose-pink with an orange eye; *P. garrardii* Galahad is a frilled white and Enid is a purple-red. There are other *P. garrardii* hybrids but I think these are the most outstanding.

Two of the earliest flowering species are *P. scopigera* and *P. snowii*, but of the two *snowii* is superior both in colour and style. The fringed, rose-lavender flowers will frequently brighten up some shaded corner of the rock surround during the early days of January. The flowers have a central orange eye surrounded by a ring of pure white and grow on stems about 4 inches tall. Should the rock area have a scree in the lay-out then an ideal position is available for *P. nicotensis* to provide its large magenta

flowers on 3 inch stems in June. The same conditions are appreciated by *P. sinensis*, with its fragrant lavender-violet flowers on 18 inch stems. It does, however, require a little shade from the mid-day sun but this can be provided by a suitably placed rock.

Some of the smallest primulas can be grown in the rockery and look well in pockets here and there. Liberal top dressing with good leaf mould and a little peat each autumn usually supplies their needs. *P. integrifolia*, a native of the Alps, bears lilac-purple flowers on 2 inch stems. The plant forms a mat of oval uncinus leaves, small and dainty. *P. modesta* from Japan is quite attractive, easy to grow and hardy, has rose-pink flowers with a yellow eye. The stems are about 3 inches in height. Another is *P. allioni*, from the Maritime Alps, with rose-pink bloom on very short stems. This primula appreciates a little lime in the soil and a sunny position completely open and free of shade at all times.

There are, of course, many more *Primula* species, with their varieties and hybrids, for it is a large race of plants, but the selection offered can provide plants which will more than do their share of producing colour at the pondsides.



Primula helodoxa growing by a rock pool

Frog Spawn, Tadpoles

by LAURENCE

Photography



The male frog's grip on the female's abdomen is shown clearly in this ventral view of a pair in amplexus with noses at the water surface

I SUPPOSE that tadpoles are about the first pets that children keep, and so few people have a real dislike of frogs that most parents will readily submit to the introduction of a jam-jar of frog spawn to the household when junior proudly brings home his first self-caught sample of wild life. Even though we have all been through the infant stage of watching spawn hatch out and the tadpoles develop into frogs, the fascination always remains, and the ease with which a complete metamorphosis can be witnessed in the frog recommends the operation to anyone interested in living things.

When asked recently to provide a complete photographic record of the various stages involved I was delighted to be offered the excuse for donning the mantle of early youth once more and setting out, jam-jar in hand, for a likely frog pond. It came as a bit of a surprise to discover that the unerring knowledge of the exact locality which is inherent in every boy had deserted me, and the assistance of the younger generation had to be enlisted. The youngsters whose aid I sought were more than willing to show the greenhorn the whereabouts of the best pond and to demonstrate the niceties of obtaining a jam-jar full of the freshest and most fertile spawn.

Once safely indoors the spawn can be placed in a roomy aquarium simply furnished with gravel and some plants and there left to develop. Initial development is quite rapid and within a week of the spawn being first laid the black nucleus of each egg has elongated and within 2 more days it is recognisable as an embryo. With the passing of another week the little tadpoles have wriggled free of their gelatinous envelopes and are clinging to the jelly-mass in



1



2



3

Tadpoles and Frogs

E. PERKINS



Frog spawn about 7 days after being laid

large numbers. Each day now shows some marked change until the tadpoles are free-swimming, from which time, apart from a quite rapid increase in size, no outward changes occur for about 7 weeks, by when the rear legs have appeared. During this period dead garden worms or raw meat provide ideal nourishment and the tadpoles feed voraciously. Any food which does not appear to attract the tadpoles should, however, be quickly removed before the water is fouled.

Within a further 2 weeks the tail has shrunk and perfect frogs, considerably smaller than the chubby tadpoles, will

Continued over page



Side view of a tadpole 5 weeks after hatching showing mouth and hind leg 'buds' above anal passage



Hind legs are conspicuous in this tadpole at the end of the seventh week



1



2

Left: photographs 1 to 5 show progressive development in single tadpoles (2 to 5) from the embryos first escaped from the gelatinous envelopes (1), through the stages of external gill development (2 to 4) until at the fifth week the gills are no longer visible outside the tadpole (5)

be struggling for release from their water-bound quarters, in which they will soon drown if not provided with means of climbing clear. The best plan is to sort out all the specimens with abbreviated tails as they appear and to release them in the garden or some suitable spot. They will not appreciate being put into the garden pond, for theirs will be a terrestrial existence more than an aquatic one for some years, until they have attained maturity and seek the water for mating.

Many forms of wild life have suffered tremendous losses during recent years as the result of man's advance in various fields of development and the common frog has possibly suffered the greatest depletions of any. In rearing a few dozen frogs from a portion of spawn one may derive, in addition to the pleasure and interest afforded by the exercise, a certain satisfaction from the knowledge that a small contribution has been made towards swelling the depleted ranks of this attractive, harmless and very useful little amphibian.



At 9 weeks the hind limbs are fully developed



All four limbs are developed at 11 weeks



Rapid shortening of the tail occurs in the twelfth (above) and thirteenth (below) weeks



Plastic Brine Shrimp Hatcher

A SIMPLE brine shrimp hatcher can be made from a plastic food dish (obtainable at most large stores). These dishes usually have a lid, and a piece should be cut from the lid so that it fits inside one end of the dish and forms a vertical partition about 2 in. from the end. Fit it so that it is about $\frac{1}{4}$ in. from the bottom. A tube of clear Bostik or any clear adhesive is used liberally where the division is to be made. Leave it for 10 to 15 minutes and then fit in the partition; if necessary apply more adhesive to the joint between partition and dish. The partitioned end of the dish where the eggs are put can be shaded by fixing black plastic sheet on the outside of dish. The hatched brine shrimps appear in the larger section, from which they can easily be recovered without contamination by the egg cases.

G. W. Hardwick

THE AQUARIST

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

I would be most grateful for some information about a fish called *Cinchomiza petros*.

G. petros, one of the so-called elephant-nosed fishes, comes from the slow-moving fresh waters of the Congo. It is happiest in a well-planted aquarium maintained at a temperature range of 72-78°F (22-28°C). It is constantly on the look-out for small live food such as tiny worms, *Daphnia* and the like. Other things such as meat and dried food are sometimes taken. The species does not chase or snap at other fishes and should, itself, be placed (if introduced into a community tank) with mild-mannered companions. Once the elephant-nosed fish has got used to its surroundings it usually does very well.

How many species of sharks (*Labeo*) are known to aquarists, and what are their requirements in the way of food and temperature, their attitude towards other fishes sharing a tank with them, and their breeding habits?

About five species of *Labeo* are known to aquarists. They eat almost anything, but should always have some algae or a substitute green food such as cooked spinach or beets or cooked lettuce included in their diet. A temperature range of 72°F (22°C) to 78°F (26°C) suits them very well. They fight quite a lot among themselves, but normally leave other species alone. Little is known about their breeding habits, for up to the present writing only one rather sketchy account of an unsuccessful spawning of the red-finned black shark has appeared in the aquarium press. This spawning took place in America.

I have just set up my first tropical tank and stocked it with barbs, platys and angel fish. But in a book I have just read the author states that the angel fish is a carnivorous species. Should I therefore feed my specimens on tiny living creatures instead of dried food from a packet?

Very few tropical freshwater fishes kept in captivity need live food exclusively. The angel fish is certainly not one of them. All the same, to keep angel fish in a healthy condition it is recommended to supplement their diet with pieces of meat, and occasional feeds of *Daphnia* and such tin-bits as chopped earthworms.

I have been keeping tropic fish for more than 2 years with only moderate success. My 24 in. tank is in the hall, and is illuminated for about 5 hours every day by two 25 watt electric lamps. I have noticed that the fishes always go flat-chested and die within a few months after purchase. As for the plants, I am always having to renew them. Where am I going wrong?

Your aquarium is not getting (in duration and intensity) enough light. If you give the tank at least 75 watts for about 7 hours every day we believe you will soon find a great improvement in the appearance of your plants and fishes. And make sure that the latter are getting enough nourishing food.

How can I encourage my neon tetras to spawn?

For most hobbyists the neon tetra remains a reluctant spawner, but you cannot do better than give your fish soft, acid water (pH 6.5 to 6.8), scrupulously clean conditions, plenty of live food, a rather soft light and a temperature in the neighbourhood of 75°F (24°C).

My local dealer has some fish called *Heronia marginata* for sale. Please tell me something about this fish.

Heronia marginata is native to fresh waters in the vicinity of Rio de Janeiro. It is commonly called the copper tetra. It attains about 2 in. in length, and the body, particularly in the male of the species, is suffused with coppery tints. It is reputed to be easy to spawn in a few gallons of soft water, and flourishes best at a temperature in the neighbourhood of 75°F (24°C). It does well on a mixed diet of live and dried foods.

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

I have just purchased a 24 in. by 12 in. by 12 in. tank and am thinking of illuminating it by a single 100 watt lamp. Will this wattage prove sufficient for the plants and fishes?

If force of circumstances dictates that the aquarium must be placed some distance from a window, or in a dark alcove, then a lamp of 100 watts switched on for 7 to 10 hours every day will be about right. Should an excessive growth of algae develop, use a lamp of lower wattage, or introduce additional plants such as *Cryptocoryne* spp., *Eloidea densa* or *Sagittaria natans*.

About a year ago I bought a well-grown Jack Dempsey fish and gave it a 24 in. tank to itself. Two weeks ago the fish became, and still is, rather moopy, and assumed almost black markings on a grey-shin-toned ground. It is also growing noticeably thinner towards the tail. What is wrong?

Seemingly your cichlid is showing all the signs of old age. The only way you can combat a really rapid decline is to give it plenty of bulky live food (chopped earthworms, for instance), and provide artificial aeration. If artificial aeration is not available a partial change of water every now and again should be made.

I shall be spending my annual holiday in Spain and wonder whether there are any fishes to be found there suitable for the home aquarium?

Two cyprinodonts or tooth-carp that you might come across in woody, shallow streams and ponds in the less frequented parts of the country are *Aphanius biwa* and *Valencia hispanica*. The first is a 2 in. fish with about 15 bluish bars on olivaceous sides. The fins are blackish to blue spotted with greyish ivory to white. *V. hispanica* grows somewhat larger and is greenish, with some dark bars on the sides and a dark spot behind the gill-covers. The dark-spotted fins are yellow to orange. Both species need well-aerated water maintained at comfortable room temperature.

About a week ago I introduced two veiltail angel fish into my community tank. A day or two later both angels showed frayed and nibbled-down dorsal and anal fins. The other occupants of the tank are platys, tetra fish, neon tetras, Malayan angel fish, harlequin fish and *Corydoras aeneus*. Which species do you think can be blamed for the damage?

Without question the Malayan angel fish. This species is of a very inquisitive nature, and very quick in its movements. Presumably the long fins of the angel fish tempted it to investigate, and then take snapping bites. Aquarium plants such as *Valisneria* invariably come in for the same treatment.

Will the fishes suffer if a solution of potassium permanganate is introduced into their aquarium to clear it of free-swimming algae?

A weak (pink) solution of potassium permanganate will not harm the fishes. But after the water in the aquarium has assumed a brownish tint, stir the compost with a stick and siphon all the dirt and precipitated algae away to guard against an excess of decaying matter leading to a sudden depletion of oxygen. Avoid repeated dosing of the water with permanganate, however, for poisonous concentrations of manganese salts can accumulate.

Small flakes of rusty iron often break away from the top of my old aquarium and drop into the water. Will these rusty fragments prove harmful to the plants and/or fishes?

A few tiny pieces of rusty iron in the water will have no toxic effect on the plants or fishes. But it is inadvisable to leave the rusty fragments in large amounts in the aquarium indefinitely.

I am seeking your advice before taking up the hobby of fish-keeping. A friend of mine insists that goldfish and native coldwater species need more looking after, and are not so easy to keep as tropical species. Is my friend merely stating his own personal opinion, or is what he says a recognized fact?

Judge for yourself. Even one medium-sized goldfish needs about 4 or 5 gallons of water maintained at a temperature range of, say, 55°F (13°C) to 65°F (18°C), with plenty of surface area exposed to the air. Furthermore,

goldfish and other coldwater fishes are heavy eaters, and soon dirty the floor of their aquarium with their frequent droppings. They also stir up the compost and cloud the water in their continual search for food. On the other hand, a tank measuring no more than 18 in. by 10 in. by 10 in. and kept at a temperature of 75°F (24°C) by a thermostatically controlled electric heater, would house three or four pairs of small tropicals in comfort. Their cleaner habits and delicate movements would lead to no muddying of the water and, properly fed, the fish should not need a full change of water for years. About the only attraction a tank of tropicals needs is a fortnightly cleaning of the front glass and, perhaps, an extra 10 minutes spent in removing waste matter with a dip-tube. A further point in a tropical tank's favour is that it enables the interested aquarist to grow a large variety of beautiful underwater plants.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have a pair of goldfish in my pond and I have found a few dead youngsters also. Can you explain the following: on two occasions I have seen the fish trying to swallow what looks like roe; it is about 2 inches long and 1 inch wide. I have seen the fish slowly trying to swallow it, and taking over so long to do it. Is it fish roe they are eating?

Goldfish eggs are laid singly and are like small transparent beads of jelly. I do not think the matter being eaten by your fish is anything else but garden worms which have fallen into the pond and have died. They then turn white and float to the top of the water. If the worms are large and the fish are not very big it is possible for them to take a long time to swallow them. I have even seen a young fish choked by trying to swallow a worm too large for it.

How can I keep moors in good condition, as I seem unable to do so for long?

Moors are just another variety of fancy goldfish and need almost the same attention and foods. The veiled moor needs a slightly higher temperature, say about 60°F (15°C) to keep its flowing finnage in good condition. The fantail moor is more hardy and would be quite safe in a temperature of about 50°F (10°C). The tank should be large enough to give ample swimming space and the limit of 1 inch of fish to each 24 square inches of surface area should not be exceeded.

I have a golden orfe which has a curved spine; is there anything I can do about it?

I do not think that you have any hope of curing the orfe with a curved spine. It is possible for a fish to get such an injury by a sudden twist in the water, but it may be a deformation it has developed from hatching.

My orandas seem to have fluke trouble, but the Dettol bath does not seem to have cured them. I had a strong solution in the tank and washed it out; what else can I do?

Just because your fish dash about it does not mean that they must have flukes. Other parasites will cause the fish to rub themselves against rocks. Dettol is not a cure for all pests, although for some it is excellent. By the description of the tails of your fish they would appear to have been attacked by fin-rot or a form of fungus. It may be that the general conditions in your tank are unhygienic. Give everything a good overhaul and then feed with live food only for a time. This may help to put the fish right.

A few of the fish in my pond appear to be in ill-health. They are goldfish and their bodies seem to be very thin, indeed giving the impression that they have huge heads. They swim about fairly well but have their fins closed. They have been like this for some months. What is the reason?

It sounds as if your goldfish are suffering from a wasting

disease similar to tuberculosis. If this is so it is not easy to cure, and I would be inclined to destroy them before the other fish become affected. This trouble often arises through bad conditions in the pond. Where water is impure or fouled by constant feeding with too much dried food, the fish will soon fall in health. In any case I recommend that the affected fish are removed from the pond and fed exclusively on broken worms for a time. If they then show no signs of any improvement, destroy them. It is a very short-sighted policy to try to patch up ailing fish, especially common goldfish, which can be replaced so easily. In nature all ailing fish are soon destroyed by predators.

My husband has had the same four goldfish in a 4 ft. indoor tank for about 11 years. In January we noticed many small goldfish hiding in the plants. We have survived and are now growing well. Is this unusual and when do they change colour?

It is quite possible to breed goldfish in a tank of such good proportions as yours. The fish may have spawned in previous years but this was not noticed. The trouble is that usually the parent fish will eat the eggs or fry soon after they are laid or hatched. The tank must have had plenty of fine-leaved water plants to give adequate cover for the eggs and then for the fry. It is probable that the fish spawned in the late autumn but you did not notice the eggs, and the fry were too small to be seen easily until this year. However, it is strange that you did not notice anything unusual going on in the tank, as when they are spawning the males chase and nudge the females vigorously, and you would immediately recognise that something very unusual was happening. There is no set time for young goldfish to change colour from their original bronze to red. A lot depends on the strain and the conditions under which they are growing. The change can come at any time between 6 months and 3 years. In fact, some never change at all but remain brooze all their lives. These latter should not be used for breeding.

I have been told that my pond needs 18 oxygenating plants for it to keep crystal clear. Some of the plants are sold per portions and some per bundle. Does this mean that I would need 18 portions or bundles for my garden pond?

The number of plants required depends on the size of the pond. Single portions or cuttings would take some time to make reasonable sized plants in a pond and would be better grown on in containers for a time. Once water plants are established in a pond they soon spread in warm weather. Four small bunches of plants in a pond not more than 8 feet by 8 feet would be enough.

Leopard Danios

by JACK HEMS



IN common with its congeners, this tiny cyprinid from south-east Asia haunts the upper levels of the water (except after dark, when it appears to prefer the bottom to sleep), is quick in its movements and extremely active. It will take any food, alive or dried, small enough to be swallowed, and is uninterested in the 'goings on' of other fishes. In short, it minds its own business and is therefore ideally suited to life in a community tank stocked with equally well-mannered companions. Furthermore, it flourishes at the usual tropical aquarium temperatures.

Its popular name of leopard danio (it was given its technical name and declared to be a new species early in 1963 by Hermann Meiniken, the German ichthyologist) fits it like a glove; for its pinkish golden body is almost completely covered with countless irregular-sized dark spots. In some lights these spots shine blue; in others they appear to have a greyish cast.

From about the middle of each side of the body to the base of the tail the spots resolve themselves into two or more distinct horizontal lines. The fins are streaked and dotted with blue, except the pectorals, which are clear. A blue shimmer shimmers on the gill covers and over the flanks. Metallic blue rims encircle the black eyes.

In fairly well-grown fish (maximum length appears to be in the region of 1½ in.) sexing is easy; for whereas the male's body is narrow-bellied and beautifully streamlined, the female's body is full on the abdomen and well padded on the sides.

B. frankei is as easy and as ready to mate—after suitable conditioning—as other *Brachydanio* species. But like them, it is an arid eater of its own eggs. So the prospective breeder is recommended to spawn a pair or trio in shallow water over a layer of well-washed granite chippings (into which the eggs will fall), or a couple or more of tanned-out nylon scouring pads can be spread over the base of the aquarium and kept in position with stones.

As soon as spawning is finished, the fish must be removed to another tank. At a temperature of 80°F (27°C) the eggs hatch out and the fry become free-swimming within the space of 4 or 5 days. Growth is rapid and is helped along by cupfuls of green water (heated to the same temperature as the aquarium), flour-fine dried food and the usual small live food such as micro worms, brine shrimps or sifted *Daphnia*.

The Growth of Healthy Aquarium Plants

by BILLY WHITESIDE

FOR the 'balanced' tropical aquarium, healthy plants are a necessity. Not everyone has success in this field. The following provisions have given good results.

The first essential for strong plants is a supply of dissolved substances to provide food material. The supply of this can be amplified by a 'biological' sub-gravel filter. Such a filter will collect all suspended matter in the aquarium and deposit it where it is needed most—at the roots of the plants. Excess of food not eaten by the fishes, excreta from fishes and snails and decomposing plant material all supply food.

When these materials are sucked into the gravel by the filter, they are acted upon by bacteria. Aerobic bacteria flourish in the gravel which is aerated by the filter. These bacteria help in the breakdown of solid waste materials into soluble plant foods. These, being released at the roots, are soon made use of and promote healthy growth.

Another asset to the planted aquarium is the Malayan mud snail. These pretty snails do a lot to keep the gravel aerated and sediment-free. They live on excess of fish food and other matter that finds its way on to or into the gravel. After dark they leave the sand and travel round the tank looking for food. Food eaten by the snails is converted into excreta which is broken down further by

the bacteria in the gravel. The plants now have two useful sources of foods.

Also essential for plant growth is light of a certain intensity and for a certain duration. (A useful article on this appeared in *The Aquarist*, April 1963, page 8.)

The *Cryptocoryne* genus provides a host of useful and decorative plants which thrive under these conditions. If left to themselves they produce thickets of small plants. If large plants are required the small ones should be removed. The adult plant can then devote all its energies to growing larger, while the small plants can be grown on.

Many other plants do equally well under the same conditions. These include *Bacopa*, dwarf Amazon swords, *Vallisneria*, *Sagittaria* etc. The larger Amazon sword seems to resent water movement round its roots during the period when the lights are on, so that with this plant it seems better to have the sub-gravel filter operating only during periods of darkness. The process of photosynthesis by the plant's leaves can be carried on when the lights are on and the filter is not working.

In this set-up the plants have adequate supplies of all the essentials for growth. The result is a balanced, crystal-clear aquarium, with healthy, beautiful fishes and plants.

our readers

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



write

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

A Show Mourned

WITH reference to Mr. T. H. Marshall's letter in the January issue of *The Aquarist*, our Society agrees that an open show on the National scale is missing from the hobby. We would be glad to support such a show if one was held on the lines suggested by Mr. Marshall. We appreciate that the financing of a show in Central London is a big problem. To hire a suitable hall would probably cost in the region of £100 per day. However, 800 entries at half a crown a go would cover this. Exhibitors could supply their own tanks 10 in. by 8 in. by 6 in. (this is a preferred size, which is manufactured by several concerns). The cost of a tank this size could be as low as 5 shillings, as there would be an almost guaranteed market if the idea of a National-style show caught on. The higher than usual entry fee would ensure that only top-class fishes would be entered and that the prize winners would be really good fishes. The small tanks would be useful between shows for isolating sick fishes etc. (naturally one would sterilise the tank before using it in a show).

A. E. STEVENS,
Secretary, Hendon and District
Aquatic Society.

AT a council meeting of this Federation I was asked to comment on the letter "A Show Mourned", from Mr. T. H. Marshall. By implication, Mr. Marshall would have us believe that only a London show is a national one and also that the British Aquarists Festival (now in its fourteenth year) is not truly representative.

The B.A.F. is a show open to any member of any Society throughout the world. Hundreds of schedules are annually distributed by me to societies throughout Great Britain, and wide advertising is also employed. The size of the Exhibition Hall is extensible and this year was approximately 440 ft. by 78 ft. Large tanks are available.

For the same reasons which would apply were the Show to be held in London or elsewhere the experience is that the greatest number of entries come from competitors living within a 50 mile radius of Belle Vue, though we do get a smattering from up to 250 miles away. The number of visitors also varies in similar proportion with the distance of travel.

This is my thirteenth year as honorary show secretary and every year I invite judges from every corner of these Isles to judge and to help keep the Show "truly representative". At all out-of-pocket expenses are paid only the

difficulty of "time off from the job" keeps many from being at the B.A.F.

Of course, the wider spread the competitors are from the venue the less will the representation be as "truly National" as the organisers would wish, wherever the venue may be.

In spite of what I have written I invite all who, with Mr. Marshall, want an even better National Show, to invade Belle Vue in 1964!

G. W. COOPER,
Show Secretary, Federation of
Northern Aquarium Societies.

Why not a Class for Marine Aquaria?

AT the end of the second world war, when everyone was looking for some relaxing interest after the worries and nerve-stretching situations of air raids etc., it was not un-natural that the relaxing effect of the aquarium hobby should draw a large army of newcomers. As a result the hobby achieved a new record level in popularity. But like the flourish that it experienced so came the gradual wane, particularly at shows. We now have half the fish shows that we had 10 years ago and fewer clubs are prepared to venture with the now heavier expenses involved.

I am not saying that entries are down; this is a point open to argument, but what I do say is that the number of entrants is far less, and only the 'regulars' seem now to take the majority of prizes. Obviously, as with the decreasing crowds at football matches, some new incentive must be introduced.

This is where I think the answer can be found for our hobby, and it is simply marine aquaria. Why not at a show include a class for, say, sea anemones or rag-worms or even mussels and winkles? It may all sound very amusing to a hardened tropical fish keeper or coldwater show specialist, but think of the extra number of people that could be brought in to an exhibition. They would be well satisfied to say they had witnessed an anemone catch and devour a shrimp or small fish, or for that matter just to see a shrimp in its natural state and not curled up on a fishmonger's slab, browned off and wondering whether its next rove would be into a pint or halfpint measure.

This is, I'm sure, worth a debate at any club meeting. But one word here to club secretaries. Drum out any one who starts off by saying "It's all very well for that chap in *The Aquarist* to talk, but where does any one inland get the exhibits and sea water from?" It's a good point to make but these difficulties can quite easily be overcome.

You can obtain sea water in three ways: (1) Send to a marine biological station. (2) Arrange to collect or have it sent from the coast. (3) This, perhaps, not quite so easy for a beginner, but you can buy chemicals and make up your own water. For this ask at your nearest aquarium shop, who will give you all the details.

Remember the old maxim—nothing ventured nothing gained. Surely it will not take another world war to boost the sale of aquaria and goldfish?

R. S. BARNES,
Southend-on-Sea, Essex.

Postal Tubifex

I ORDERED a portion of *Tubifex* advertised by a dealer offering to send the worms through the post. Much to my horror, on arrival they were dead and they smelt most terrible. This was probably due to the fact that they were wrapped only in brown paper with worms hanging from the ends of the parcel.

Probably people had their letters delivered to them with *Tubifex* on while my fishes went without! Surely it would be much better if they were put in small plastic bags, both for the customer and the postman.

J. JEFFRIES,
Swindon, Wilts.

There are Post Office regulations governing the way in which material likely to affect other mail can be sent through the post, and it is clear that reader Jeffries' package hardly complied with these!—EDITOR.

Marine Tropicals

IN answer to Mr. Peter L. Lee's letter (*The Aquarist*, November, 1963) I would say that most marine tropicals are just as easy and hardy as most freshwater tropicals. Furthermore, the tropical marine aquarium is extremely easy to maintain, requiring no more attention than its freshwater counterpart, and probably less.

The two unicorn blennies probably died as the result of a change of address, always a hazardous and vexing business.

J. BOURSOT,
El Salvador, C.A.

Digestive Disorder

IN his article "Digestive Disorder", in the February issue of *The Aquarist*, R. E. Macdonald states that a diet entirely of white worms can cause constipation in fishes. I am not convinced that fishes do suffer from constipation, but in any case I would be most interested to know what experiments R. E. Macdonald has carried out in proof of his statement. What fishes have been used and for how long a period has he fed them exclusively on white worms?

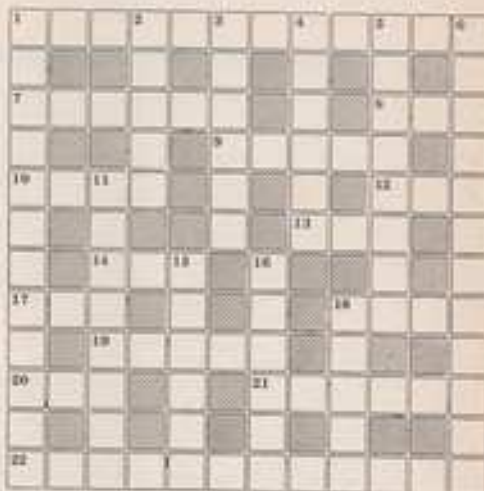
I have two tanks of fantails in my living room. One contains youngsters bred in 1963 and the other one youngsters of 1962. For the past 8 months these fish have been fed by me exclusively on white worms and I have never seen fish in better condition. They have also grown well and have shown no signs of ill-health at any time. I have fed quite heavily with the worms, so that it often takes the fish 2 whole days to clear up those given. I have given no other food, but, of course, I realise that there is plenty of soft filamentous algae present on the plants and rocks that the fish can eat.

I have also seen it written that white worms are fattening. I do not agree with this statement either.

A. BOARDER,
Rushlip, Middlesex.

The AQUARIST Crossword

Compiled by M. W. SAUNDERS



CLUES ACROSS

- Common name for *Macropodus opercularis* (8, 4).
- Are these fishes fish? (4).
- Sounds like the clovered side of a snail (3).
- Re-its, a little more than normal (7).
- Not the habitat of most fishes (4).
- Food for the spines fish (3).
- Might be used to get the masses of a fish (3).
- Common name for *Macropodus opercularis* (8, 4).
- Run round with the vase (3).
- Take a firm hold on the outside (4).
- If this sinks, the angler may be sunk (3).
- My French friend (3).
- A member of the floating plant family (4).
- Descriptive of a fish in water (2, 3, 7).

CLUES DOWN

- Common name for *Trichoptera larva* (5, 7).
- Correct (3).
- A delicacy to a hermit fish (4).
- Has connections with cabbins, ducks and eggs (6).
- Your truly makes malicious remarks about a Mahina (6).
- Swells the pride of every true aquarist's tank (7, 5).
- Common name for *Hypophthalmichthys molitrix* (8, 4).
- Collectively these are also known as flying baths (6).
- Settle land on people in succession (5).
- Result of overfeeding for the aquarist and for the view (3).

Solution on page 223



from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 15th of the month preceding the month of publication.

THE recent programme of the Nottingham and District A.S. consisted of four films, the first, "The Capricious River" dealt with the construction of a dam and subsequent release of wild animals trapped by the rising waters held back by the dam. The second film, entitled "Fishes of the Paradise," referred to the attractions of the Carabian-Pacific rivers to the keen angler. The third film was a special report (from entitled "Goldfish"). This film is of Chinese origin, and it introduced many varieties of fancy goldfish. Sub-titles replaced commentary, but this in no way detracted from the enjoyment of the most interesting picture. To all exhibitors fair fare, this film should be a "must". Finally, a film "Wild Fishes of Australia," showing unusual birds and reptiles in Australia, completed the evening's entertainment.

AT the February meeting of the Leeds and District A.S. an interesting talk was given by Mr. P. Reynolds on the setting up of aquaria for both the home and for showing. Great interest was shown by all present particularly by the newer members.

The results of the table show were as follows: catfish and loach: 1 and 2, Mr. J. Moss; 3, Mr. D. Lee. Guppies: 1 and 3, Mr. E. Benn; 2, Mr. J. Moss.

The result for the star show is Eden Hall, Ostwood Lane (No. 88 bus for Foundry Lane from Mississippa Bus Station, get off at stop before the terraces) and the date is Sunday, 19th May.

SINCE its formation in September last year the Tyne-side Aquarists' Group, Newcastle's new aquatic society, has continued to attract progressive interest in this area. The club formed by the enthusiastic efforts of its six founder members now has 21 members.

Future events to be held at the fortnightly meetings at the club's own private premises include the following: 1. A tape-recorded discussion on the spawning of orange chromides. 2. Photography of aquarium fishes. 3. Bi-annual show for all classes for the award of the "Founder's Trophy" Cup.

Outdoor activities include trips to moss, breeding establishments and weekly field parties for collection of Daphnia, live food and aquatic studies. Further details of membership which includes provision of a key to allow access to the club-room at any time may be obtained from the secretary, J. A. King, 7 Victoria Avenue, Hadden-on-the-Wall, Newcastle-upon-Tyne, 5.

THE second annual general meeting of the Newport A.S. was held recently and two meetings were necessary to complete the business, a draft of the society's new constitution being presented for approval before the meeting began.

Reports by the secretary, treasurer and show secretary indicated that the society had enjoyed a very successful inaugural year and had become, if only in numbers, one of the strongest in the area. The election of officers for the coming year resulted as follows: Chairman, Mr. Ralph Harris; secretary, Mr. T. G. Wall; 3, Waverne Road, Newport; treasurer, Mrs. A. James; show secretary, Mr. G. James; treasurer, Messrs. C. Salzman, C. Lewis, J. Hugwin and junior representative, Michael Peary.

THE annual general meeting of the Workshop Aquarist and Zoological Society was held at headquarters when the following officers were elected: President, J. Thomas; vice-presidents, P. Porter, chairman, L. E. P. vice-chairman, P. Hanson; hon. sec., E. Waddington, 82, Byre Street, Goswell, W. Walslow, Notts.; hon. treasurer, Y. Galsbury; show secretary, Mr. Hartley; committee, A. Mawson, B. Butts, G. Sibson, Miss Derrin, Mrs. Harrison.

The treasurer and secretary reported a successful year and the president, Mr. V. Galsbury in his address urged members to make 1964 even more successful.

The first open show of the society will be held on 3rd May and all interested aquarists should contact Mr. Hartley, 31, Ashley Road, Workshop, Notts.

AT the January meeting of the Balke Van (Manchester) A.S. which was held at 7.45 p.m. in the Felix Curry Restaurant, Balke Van Gardens, Manchester, the main item on the agenda was a lecture, given by Mr. J. L. Kelly and entitled "Homewaters over the Rainbow". This dealt mainly with colour in fishes. The next meeting will be on 4th March at the above mentioned place and time when a lecture will be given by Mr. Leggs, society president. No table show will be held.

RECENTLY the Lebridge and District A.S. held the annual general meeting when plaques were awarded to members with the most points gained, over the previous year, in their respective classes. These were as follows: Mr. Kibley, max. total points; Mr. Elberd, freshwater; Mr. Welson, egglayers.

In his address, the chairman, Mr. Moores, thanked all members who had contributed to many different ways towards making the year such a success. It was gratifying, he said, that the Society had continued to grow at a steady rate. Membership had now increased four-fold during the last two years or so and as a result, a second annual plaque had been gained. Appreciation extended to members had been well received and it was now intended to set up a mural aid scheme for members who may suffer loss or setback in the pursuit of the hobby.

Anticipating the year ahead, Mr. Moores referred to the more ambitious programme envisaged. An invitation table show was to be held on the 27th June at the Parish Hall, when six clubs would compete. It was expected that about 200 fishes would be brought and that three judges would be engaged to judge entries. Some members were hoping to start a coldwater section in the coming year. A speaker had been invited to address the club on the subject and if enough interest was aroused, a start would be made. Election of the committee then took place and resulted as follows: Chairman, Mr. Moore; vice-chairman, Mr. Smith; secretary, Mr. Bell; treasurer, Mr. Peters; Mr. Fisher, Mr. Baker.

The club meets alternate Wednesdays. Further details may be obtained from Mr. Bell, 75, Hetherington Road, Rensby Manor.

THE main business at the annual general meeting of the Leamington and District A.S. was the election of the committee. The programmes for the month ahead are now being planned and anyone interested in joining this society will be greatly welcome. Meetings

are held on the third Wednesday in every month at the Old-Glens Rooms, Warwick Street, Leamington Spa, at 7.45 p.m. The secretary is Mrs. M. Harris, 88, Leam Terrace, Leamington Spa.

AT the Thorne A.S. monthly meeting 33 members attended and new members were welcomed by the club chairman, Mr. G. Swainson. The evening was spent watching film taken by Mr. E. Brant and Mr. N. Sanders on the club activities over the last three years. Mrs. E. Brant operated the tape recorder which had been set to the film.

The table show was for amateurs and was won by Mr. A. Badgford with a central section won by Mr. N. Gifford (combined) and third Mr. J. Gray (Nightingale).

THE February meeting of the South Wales and Monmouthshire Characin Society took the form of a general discussion on characins, and was supported with a table show for mini and central tanks, in conjunction with a knockout competition. The results of the main show of the evening, judged by the chairman, Mr. Dennis Johns, was: 1, Mr. and Mrs. G. James; 2, Mr. and Mrs. J. Burgess; 3, Mr. E. Harris; 4, Mr. D. Amis. Mr. D. Amis won the knockout competition with a beautiful hypostomus nanaeus.

A proposal that pencil and handkerchief fish should be recognised as characins was put forward, and it was resolved, even though there is disagreement on this point by leading ichthyologists, that for the society's purposes they be recognised under this heading. Three new members were enrolled, and visitors and prospective members can be assured of a warm welcome at the meetings, which are held on the third Saturday of each month at the "Old Arcade Inn," Church Street, Cardiff, commencing at 7.30 p.m. All enquiries and correspondence should be addressed to the hon. secretary, Mr. M. J. Parry, 43, Waverne Drive, Gwynfa, Cardiff. Tel. Cardiff 88773.

NEW SOCIETY

A NEW club has been formed recently in Hougham-in-Spring, called the Hougham and District A.S. All communications should be sent to Mr. R. W. Hays, secretary, 31, Balmer Street, Hougham-in-Spring, Co. Durham.

RECENT activities of the Yeovil and District A.S. included a demonstration by Mr. Dennis Silver on setting up an aquarium, showing the members what plants to use and how to arrange them. There has been a talk also by Mr. N. Stainton entitled "Our Hobby" which gave a wider outlook to new aquarists on the general principles of good fishkeeping.

THE annual general meeting of the Sheffield and District A.S. was held recently at which the following officers were elected: President, Mr. W. Taaffe; vice-presidents, Mr. K. Collins, Mr. D. Slater; hon. secretary, Mr. J. E. Galloway; asst. secretary, Mr. A. A. Peering; treasurer, Mr. J. Hudson; show secretary, Mr. E. Pennington; committee members, Mr. F. R. Nye, Mr. E. Townsend and Librarian, Mrs. L. Prew.

The president, outlining the activities of the previous year, mentioned that the society had been fortunate to win some major prizes at various shows, especially the R.A.F., from which members and the society alike had benefited. The social activities and society meetings had also had a successful year.

At the recent annual dinner attended by 54 members, awards for monthly table shows and competitions were presented by the president. Porcory Cup—best individual fish, Mr. H. Crossland; Culture Cup—Saguaro, Mr. J. Blakely; Champion Cup—chub, Mr. J. Midgland; Hudson Cup—guppies, Mr. R. E. Galloway; Townsend Cup—broccoli, Mr. W. Taaffe; Brookes Trophy—A.S. coldwater, Mr. E. Pennington; Brookes Trophy—A.S. award pair, Mr. R. E. Galloway; plaques for members getting highest total number of points in table

shows: 1. Mr. B. E. Galloway; 2. Mr. J. Hudson; 3. Mr. D. Carver. Beaver Cap-borne furnished aquatic competition, Mr. D. Carver. Competition for member gaining highest number of awards at open shows, Mr. B. E. Galloway.

The fourth annual open show will be held in the Maresbrook Ventry Hall, Maresbrook Park Road, Sheffield, S. on 26th April, 1964. Schedules are available from the show secretary, Mr. E. Farnsworth, 88, Handsworth Grange Road, Sheffield, 13. The society holds fortnightly meetings in the Hall of Arundel and Berry Hall, 128, Queen Road, Sheffield, 2. New members and visitors are welcome. Further details are available from the hon. secretary, Mr. H. E. Galloway, 71, East Lanes Ave., Rotherham.

THE officers of the Oldham and District A.S. are as follows: Chairman, Mr. A. Worwick; treasurer, Mrs. E. J. Brown; vice-chairman, Mr. C. Kelly; secretary, Mr. C. Walker, 93, Springwood Hall Road, Fiscoe Hill, Oldham; show secretary, Mr. E. Coope; F.N.A.S. delegates, Mr. C. Walker, Mr. Holford.

The February meeting was very successful, and five new members were enrolled. The meetings are held at 133, Yorkshire Street, Oldham, on the first Wednesday of each month at 8 p.m., and new and old members are always welcome.

AT the January meeting of the Bedford and District A.S. the main part of the programme was an hour to set up an aquarium and a talk on live foods. This was of great help to new members. February monthly meeting consisted of two slide shows presented by Mr. Derek Ward and shown by Mr. B. Taylor on recording the bubble timer and the breeding of tubifex.

The society meets at the Guild House, Harper Street, Bedford, on the second Thursday of every month and the secretary, Mr. F. Satterthwaite, 24, Rowland Drive, Bedford, would be pleased to hear from new members.

The home furnished aquarium competition is on 30th May.

THE executive of The Association of South London Aquarist Societies for 1964 is as follows: President, Mr. G. H. L. O'Neill (local A.S.); chairman, Mr. Glenn (Clapham A.S.); secretary, Mr. D. G. Arnold; 1, Royal Mason, Hampton Court, East Molesey, Surrey (Chelsea A.S.); treasurer, Mr. Shield (Frodoan); committee members, Mr. Ellis (Kingston A.S.), Mr. Forrest (Chelsea A.S.), Mr. Jones (Frodoan), Mr. Stevens (Clapham A.S.). Clubs interested in the Association should write for details to the secretary at the above address. The Association's table show this year will be held on Saturday, 6th June, at St. Peter's Hall, Prospect Place, Clapham.

AT the annual general meeting of the Brighton and Southern A.S. held at the Fairlight School, Faversham Road, Brighton, the following officers were elected for 1964: Hon. secretary, Mr. A. J. Pellham; chairman, Mr. E. Sheldon; treasurer, Miss P. Cary; show secretary, Mr. E. Browning. Mr. P. Perry, Mr. J. Coleman, and Mr. N. Peery were elected to the committee. The retiring members were thanked for their services over the past year.

The club secretary and chairman reported that 1963 had been quite a successful year, and attendance very consistent. A four-way show was arranged between Purness, Crawley, Beshill and Hastings, which proved very successful and the Brighton Club came out on top on aggregate points. At the club's prize-giving the following members received trophies: The Nicholls Challenge Cup for highest aggregate of points, Mr. E. Browning; the Ladies Trophy, Mrs. E. Coleman; Class A (Specialist home aquaria), Mr. J. Goodman; Class B (General home aquaria), Miss I. Ward.

All new members will be made welcome. For full details write to the hon. secretary, Mr. A. J. Pellham, 79, Vale Road, Purness, Sussex, or come along to the meetings every other Wednesday at 8 p.m.

A VERY popular feature at the fortnightly meetings of the Hove and District A.S. is the table show held at each meeting. At a recent show for fish of "any other variety" Mr. Webb and Mr. Scurry tied for first show with a red tail black shark and a porcellanid grazer, both 93 points. Second was Mr. Pratt, *Imnema punctata*, 85 points, and Mr. Pratt, Mr. Scurry and Master C. Smith all tied for third place with a burrus catfish, a red fin shark and a red tail black shark, all with 84 points. A discussion took place during the same evening on the various diseases that fish suffer from and the cures. The meetings of the society are now held at The Labour Rooms, 70, Heath Road, Hove, Sussex, M11.

AT their annual general meeting recently, Fort Dunlop A.S. elected the following officers and committee: Chairman, Mr. D. A. Fraser; secretary, Mr. A. McDonald; treasurer, Mr. R. Elms; magazine editor, Mr. C. Bird. Other committee members were Mr. R. Apple, Mr. I. Ashby and Mr. A. Bowler. As a reward for past service to the society, Mr. T. Wainwright was made a life-member and as such will be eligible to sit at any committee meeting held. Certain changes have become operative as a result of the elections and mean that the new name of the society is as stated above, which there is also a new secretary whose address is: Mr. A. McDonald, Physical Research Section, Research Centre, Fort Dunlop, Dunlop Rubber Co., Ltd., Erdington, Birmingham, 24. Highlights of this year's activities will undoubtedly be the holding of Midland Association of Aquarist Societies (M.A.A.S.) annual convention, which is to be held in the Dunlop Hall on Saturday, 23rd May.

THE Kingston and District A.S. were entertained recently by Mr. George Canale with a collection of slides taken on his latest expedition to the Holy Land. They covered the latest methods of fish-keeping, and the flora and fauna of the desert. More than 100 members of local aquarist clubs were guests of the Kingston Society, and it is hoped that the success of this venture, the largest evening event staged by the society for many years, will encourage further inter-club activities.

The officials for this year are: Chairman, Dave Ellis; treasurer, Jan Lambert; secretary, Cliff Harrison, 1, Woodside, Wimbledon, S.W.19. Tel. WIM 7812. Show secretary, Harry Towell, 11, Belmont Terrace, Chiswick, W.4. The Kingston and District A.S. last club open table show will be held on Saturday, 26th September. The time and place will be announced at a later date.

THE programme at the January meeting of the Hastings and Beshill A.S. was the Mendon slide show "Evergreen an Eggar", which proved to be of great interest to all members present. A coldwater fish table show was also held, and later various problems concerning fish-keeping were discussed.

At the February meeting, the speaker was Mr. Brooks from Arco Ltd., a firm which manufactures plastic aquariums, and his subject was the use of plastics in the hobby. Mr. Brooks first talked on the origin of plastics which was far earlier than most people imagine, and then showed members one of his tanks, which was specially designed to fit into a corner of a room. Lastly a general discussion was held regarding the advantages and disadvantages of this type of tank as compared to the standard angle iron aquarium. Another feature of the evening was a miniature aquatic table show.

THE following officers were elected at the annual general meeting of the Riverside A.S.: Chairman, Mr. F. Sanderson; secretary, Mr. T. Bagn, 186, Cleverly Estate, Worsfold Road, London, W.12; treasurer, Mr. M. Richardson; vice-chairman, Mr. R. Cleveland. The show secretary is Mr. E. Doyce, tel. 8210 7673.

AT the Cambridge and District A.S. annual general meeting the chairman reported another successful year, which has included

three very well supported shows in addition to outings and a dinner. A number of new members have joined during the year and the finances of the society have remained steady despite the purchase of new show equipment. The officers elected were as follows: Chairman, Mr. B. K. Ebberton (re-elected); secretary, Mr. W. Ingrave (re-elected); treasurer, Mr. N. Radford (re-elected); vice-chairman, Mr. R. Burt; assistant and show secretary, Mr. P. A. Ward; committee: Alvert, F. Freeman, A. Hulver, H. Haman, A. Mason, E. Wright and Dr. N. Thompson. The Founder's Trophy for most points gained in shows during the year was presented to Mr. A. Hulver.

THE Council of Massachusetts Marine and Aquarists for a film show on marine life to be given by Dr. Hugh Thomas of Manchester University. Unfortunately the car in which Dr. Thomas was travelling broke down at Ormston and he was unable to attend the meeting. Mr. Dentham immediately stepped into the breach and offered to give everyone a talk on the latest plans of Massachusetts Marine and Aquarists, and this offer was gratefully accepted. He then told members of the intended type and size of tanks and ponds to be constructed, the class of fish and animals, the transportation and feeding problems in keeping fish and animals of this size, the methods of heating and cooling the various tanks and ponds, and a host of other problems involved in maintaining a successful holding of this kind. Mr. Dentham's talk proved to be very interesting and entertaining and was thoroughly enjoyed by all members.

A VARIED programme for March has been arranged by the City of Salford A.S. On the 3rd March there is a plant table show and discussion on propagation of aquatic plants. A table show for livebearers and s.o.v. has been arranged for the 17th March and on 31st March there will be a lecture on vegetation, foods and feeding. To help the beginners there will be a talk on the particular species exhibited. More additional and unusual plants will be given during the forthcoming season which should create quite an amount of interest and which will have an appeal for all the members old and new. The secretary of this society is Mrs. A. Harford, 47, Wernworth Road, Swinton, Lancs.

A LARGE variety of fish were exhibited in Willingham and District A.S. show recently. Judge of the show, which was for pairs of fish, was honorary member Mr. F. Riddle, who gave an interesting lecture on "fish housing". The results were: 1. Mr. R. Sullivan (pair of black mollies); 2. Mr. E. Nennel (pair of crystal mollies); 3. Mrs. C. Brown (pair of crystal gouramis); 4. Mr. D. Smith (pair of Nigerian loachfish).

Recently Uxbridge A.S. came for a table show in four classes of fish, with Mr. M. Dixon judging the show. This resulted in a win for Willingham by 23 points to Uxbridge's 17.

Crossword Solution

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

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BERKSHIRE

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

BUCKINGHAMSHIRE

Grange Pet Stores
Well Street, Buckingham
Telephone: Buckingham 3216
Open every day. R. C.T.P.A.A. R.&A.

CHESHIRE

Grassby, Joe., F.R.H.S.
"The Glen" Fisheries, Mobberley, Nr. Knutsford
Tel.: Mobberley 3272. W. C.T.P.A.A. R.&A.

DEVON

Plymouth Tropicals
127, North Road, Plymouth
Telephone: Plymouth 62663
E.C.D. Tuesday. R. C.T.P.A.A.

DURHAM

Powell, M.C.
The Honey Pot,
Claypath, Durham City
Telephone: Durham 2108
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

The Fish Bowl
Burdon Road, Sunderland
Telephone: Sunderland 71026
E.C.D. Wednesday (All day). 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, C. J., Aquarist
"Ridgeway", 139, Galleywood Road,
Chelmsford
Telephone: Chelmsford 56878.
E.C.D. Saturday. W. C.T.P.A.A.

GLOUCESTERSHIRE

Patricia Preece (Prop. Mr. B. R. James)
10, Suffolk Parade, Cheltenham
Telephone: Cheltenham 24949
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

HAMPSHIRE

Arundel Aviaries & Fisheries
241/243, Arundel Street, Portsmouth
Telephone: Portsmouth 20047
E.C.D. Wednesday. R. 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 End, Hemel Hempstead
Telephone: Water End 44
E.C.D. Saturday. W. C.P. R.&A.

KENT

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

Medway Aquariums
314, Canterbury Street,
Gillingham
Telephone: Gillingham 52156
E.C.D. Wednesday. R. C.T.P.A.A.

Sherwood Pet Stores
(Proprietors, Fairbairns Aquaria, Ltd.),
252, Sherwood Park Avenue, Sidcup
Telephone: Bexley Heath 7217
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

LANCASHIRE

Hornby's
Trafford Bar, Old Trafford,
Manchester, 16
Telephone: Trafford Park 2989
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

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

LONDON (East)

Wade Aquatics
333, High Street North,
Manor Park, E.12
Telephone: Grangewood 6333
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

LONDON (North)

Philip Castang Ltd.
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Hampstead, N.W.3
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Gould, K. T.
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Wood Green, N.22
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LONDON (South)

Fairbairns Aquaria, Ltd.
15, Well Hall Parade, Eltham, S.E.9
Telephone: Eltham 5859
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The Jaynor Organisation
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Lewisham, S.E.13
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Petfish
354, Garritt Lane, S.W.17
Telephone: Lakeside 2805
Closed Wednesday. R. C.T.P.A.A. R.&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 Ltd.
244, Vauxhall Bridge Road, Victoria, S.W.1
Telephone: Victoria 3179
(Open all week except Sundays).
WR. C.T.P.A.A. R.&A.

LONDON (West)

Aquapets
17, Leeland Road,
West Ealing, W.13
Telephone: Ealing 2748
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

Owen Reid's, Aquarium Dept.
12, Spring Bridge Road, Baling Broadway, W.5
Telephone: Baling 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.

The Pet Shop
120, Kettering Road,
Northampton
Telephone: Northampton 38841
E.C.D. Thursday. R.C.T.P.A.A.

OXFORDSHIRE

The Goldfish Bowl
9, East Avenue, Cowley Road,
Oxford
Telephone: Oxford 41825
E.C.D. Thursday. WR. C.T.P.A.A.

STAFFORDSHIRE

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

SURREY

Aquapets
1, Grand Parade,
Tolworth
Telephone: Elmbridge 0678
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

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

SUSSEX

Dowding, Conrad A.
1, St. John's Terrace,
Lewes
Telephone: Lewes 3970
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

Preston Aquarium
44, Beaconfield Road, Brighton
Telephone: Brighton 681602
(Open all week). R. C.T.P.A.A.

Regency Aquaria (Prop. R. A. Bassett)
49, Surrey Street (outside Brighton Station),
Brighton
Telephone: 29940 R. C.T.P.A.A. R.&A.

WARWICKSHIRE

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

Funday Aquaria
Funday 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.

Victoria Aquatics
Bank Top, Staithes,
Saltburn-by-the-Sea
Telephone: Hinderwell 322
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SCOTLAND

Aquarists' Rendezvous
164/168, Albert Drive, Pollokshields, Glasgow, S.1
Telephone: South 4258
E.C.D. Tuesday (1 p.m.) WR. C.T.P.A.A.

P. N. Greening
176, Blackness Road, Dundee, Co. Angus
Telephone: Dundee 66409
E.C.D. Wednesday. R. C.T.P.A.A.

NORTHERN IRELAND

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15, Muntgomery Street, Belfast
Telephone: Belfast 27144
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March, 1964

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TACHBROOK TROPICALS

244 VAUXHALL BRIDGE ROAD, LONDON, S.W.1

Telephone: VICTORIA 5179

ANGLE IRON TANKS	PRESSED STEEL TANKS	WHITEWORM CULTURE	FILTERS	NETS
18 x 10 x 10 in. £1 15 0	10 x 7 x 7 in. 11 0	Small 3 0	Windmill Premier	Round Nylon nets:
18 x 12 x 10 in. £1 17 4	12 x 8 x 8 in. 12 4	Large 5 0	Biological Filters	3 in. 9 4 in. 1 3
18 x 12 x 12 in. £1 8 0	12 x 8 x 8 in. 18 0		15 18 x 18 in. 12 0	Green cotton mesh:
24 x 12 x 12 in. £2 12 4	14 x 8 x 8 in. 17 4	PISTON PUMPS	15 24 x 12 in. 12 0	3 x 2 1 4 3 x 6 2 0
24 x 15 x 12 in. £2 17 4	16 x 8 x 8 in. £1 0 0	Hyflo 2in. £3 2 4	Windmill Regain 10 0	3 x 4 1 4 4 x 7 2 4
20 x 12 x 12 in. £2 10 0	16 x 10 x 10 in. £1 5 0	Hyflo "A" £8 10 0	Windmill Consort 19 4	4 x 3 1 9 7 x 9 3 9
20 x 15 x 12 in. £2 15 0	18 x 10 x 10 in. £1 7 4	Hyflo "B" £8 5 0	Internal Corner 4 4	Breakers short wooden handles 4 x 9 3 9
20 x 15 x 15 in. £4 7 0	18 x 12 x 10 in. £1 10 0	Hyflo "C" £12 10 0	Hyflo Top Bottom 2 0	Connet Nylon nets:
24 x 12 x 12 in. £4 5 0	18 x 12 x 12 in. £1 15 0	Locks Gals. Fil. £7 10 0	Hyflo DeLuxe 13 4	3 x 4 3 8 3 x 6 3 0
24 x 15 x 12 in. £4 15 0		Float Assembly £1 10 0	Michael's Under-gravel 8 4	4 x 5 2 0 4 x 6 3 4
24 x 15 x 15 in. £5 15 0	BOW FRONTED BOOKCASE SETS	Dynas Pk. 1 £9 0 0	Low Joe External 17 4	3 x 3 1 6 4 x 3 1 9
40 x 12 x 12 in. £6 2 4	36 x 13 x 12 in. £19 17 4	Dynas Pk. 2 £9 0 0	Clear King External 22 4	2 x 4 1 6 3 x 6 2 0
40 x 15 x 12 in. £6 15 0	48 x 15 x 10 in. £32 0 0		Ornamental Rack 17 4	Wooden handles 6 x 9 3 9
48 x 15 x 15 in. £8 15 0		AIR PUMPS		American System nets:
		Summit £1 1 0	FILTRATION ACCESSORIES	3 x 2 3 4 6 x 5 4 6
HEATERS	BOW FRONTED PLAIN STANDS	Model "Q" £3 3 0	Brown Glass Wool 1 4	4 x 3 3 0 9 x 7 7 0
Ex. Ex. Standard—25, 50, 75, 100w. 7 4	24 x 15 x 12 in. £12 10 0	Super Summit £1 3 0	Brown Glass Wool 1 4	with plastic covered handles.
Ex. Ex. Superb—25, 50, 75, 100, 125, 150w. 19 6	30 x 15 x 12 in. £18 0 0	Monroe Filter £1 1 0	Brown Glass Wool 1 4	
Uno Regal—25, 40, 60, 75, 100, 125, 150, 200w. 9 4	36 x 15 x 12 in. £24 0 0	Monroe Filter £1 1 0	Brown Glass Wool 1 4	
Ex. Ex. Flexible—100w. only 19 6	48 x 15 x 10 in. £32 10 0	Oslo Pump £1 2 0	Carbon 2 0	BREEDING TRAPS
Elephant—25, 40, 50, 60, 75, 100, 120, 150w. 10 6	FLAT FRONTED BOOKCASE SETS	Oslo Pump £1 2 0	Carbon 2 0	Woodmill combined breeding and rear- ing 15 0
Rana—25, 50, 75, 100, 150, 200w. 10 6	36 x 15 x 12 in. £19 10 0	Ferry Pump £1 5 0	Carbon 2 0	Hydro (Swiss) 7 0
Inter Pac 19 6	48 x 15 x 12 in. £31 0 0	German Filter £1 10 0	Carbon 2 0	Rubber Jaws 15 0
	TWO TIER STANDS	Zeal £1 17 4	Carbon 2 0	Growth-Swim American 28 6
COMBINED HEATER & THERMOSTAT	18 x 10 x 36 in. £1 17 4	2in. Zealens £1 17 4	Cleaning Equipment	Hydro fish breakers, one and ocean 4 4
Ex. Ex. Dual-O-Matic—100, 150w. £1 15 0	18 x 12 x 36 in. £2 3 4	Zeebeke £2 4 0	Windmill Air Re-actor 10 0	AQUAMASTIC
Ex. Ex. Proton-Plastic 10, 100, 150w. £1 4 4	24 x 12 x 36 in. £2 7 4	Silena £2 10 0	Windmill Hand Re-actor 15 0	1 1/2 in. 2 1/2 plus a. s. p. 2-
Inter Pac Submersible—100, 125, 150w. £1 9 4	30 x 12 x 36 in. £2 10 0	Silo (twice coated) £4 15 0	Windmill Hand Re-actor (Battery) 46 0	2 1/2 in. 3 1/2 plus a. s. p. 2-3
	36 x 12 x 36 in. £2 2 4	Rana £2 2 0	Acqua Vax Super (Battery) 54 0	3 in. 1/2 plus a. s. p. 2-3
THERMOSTATS	40 x 12 x 36 in. £3 0 0	Zero £1 0 0	Acqua Vax Super (Battery) 54 0	4 1/2 in. 17 1/2 plus a. s. p. 4-
Uno Popular 19 0	VICTOR ALL OVER SHADES	Zero The Silent £1 19 4	Acqua Vax Super (Battery) 54 0	DUROGNOST
Uno Pop/Neon 12 4	18 x 30 in. £1 2 4	Zero (Down outlet) £2 19 0	Acqua Vax Super (Battery) 54 0	Water hardness testing kit 14 6 and 17 6
Uno Inside Control 15 0	18 x 12 in. £1 5 4		Acqua Vax Super (Battery) 54 0	Spore tablets, P.M. or N.S. Indocum each 2-
Uno Outside Control 18 0	24 x 12 in. £1 7 4	AIR PUMP ACCESSORIES	Acqua Vax Super (Battery) 54 0	COLORMETER P6
Uno Comet Top 15 0	30 x 12 in. £1 12 4	Taking clamps 1 0	Acqua Vax Super (Battery) 54 0	P6 testing kit 27 4
Uno Comet Top/Neon 17 4	36 x 12 in. £1 5 0	Tapcocks 10 0	Acqua Vax Super (Battery) 54 0	MISCELLANEOUS
Ex. Ex. Minor 19 0	36 x 15 x 36 in. £2 0 0	Swag pieces 1 0	Acqua Vax Super (Battery) 54 0	Hydro Aqua Saker 1 0
Ex. Ex. Major 28 0	48 x 12 x 36 in. £4 5 0	Small tubing diffuser 1 2	Acqua Vax Super (Battery) 54 0	Hydro Leak Stopper 2 0
Ex. Ex. Sentinel 28 0	48 x 12 x 36 in. £4 5 0	Stone with 12 in. stem Square diffuser stems 1 4	Acqua Vax Super (Battery) 54 0	Apposap 2 4
Elephant Standard 15 0	48 x 15 in. £5 2 4	with stem 1 10	Acqua Vax Super (Battery) 54 0	OTHER FISH FOODS
Elephant Key Set 18 0	ASBE PLASTIC AQUARIUMS	Diffuser stems 12 in. 3	Acqua Vax Super (Battery) 54 0	Flakes 3 0
Rana Top/Control 17 4	Bow fronted	15 in. 4	Acqua Vax Super (Battery) 54 0	Wheat Germ Flakes 1 3
Inter Pac Super 21 0	18 x 12 x 11 in. £8 0 0	24 in. 5	Acqua Vax Super (Battery) 54 0	Shrimp Meal, Medium 2 0
Submersible 32 4	24 x 15 x 12 in. £12 17 4	24 in. 5	Acqua Vax Super (Battery) 54 0	Shrimp Meal, Small 1 3
	36 x 12 x 14 in. £16 19 0	24 in. 5	Acqua Vax Super (Battery) 54 0	Turtle Food, Large 2 3
OUTSIDE FITTING THERMOSTATS	36 x 15 x 14 in. £22 18 0	F.V.C. flexible non-toxic air tubing	Acqua Vax Super (Battery) 54 0	Turtle Food, Small 2 3
Constat Q.K. 1400 £1 2 0	Corner Aquaria	per ft. 3	Acqua Vax Super (Battery) 54 0	Invertebrate Powder 3 4
Constat J.L. 1400 £1 2 0	36 x 15 in. £21 0 0	per ft. 3	Acqua Vax Super (Battery) 54 0	Isospora Tablets 2 4
Constat J.L. 1400 £1 2 0	3-D BACKGROUNDS	F.V.C. air tubing	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
T.D. Thermostat 17 4	For 16 in. and 18 in. tanks 30 4	60 ft. coil 7 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
Prokter Neon £1 18 0	For 24 x 12 in. and 24 x 15 in. tanks 34 4	Hydro regulator valve 4 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
	For 30 in. and 36 in. tanks 42 4	Air Line Valves 2 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
THERMOMETERS	PERMA GRAVEL	AIR PUMP SPARE PARTS	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
Ex. Ex. Dumpy 4 4	Multi-colour, Green, Black, Yellow, Blue, Red, Orange, Ultra, White. 4 4	Fury Diaphragms 1 2	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
S.F. Plastic Back spire 3 4	4 4 per 3 lb. bag, also 5 and p. 15	Fury Air Chambers 1 2	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
Uno Silver Line 5 0		Prokter Diaphragms 1 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
Uno Spring Pak/Leak Fixing Spire 5 0		American Diaphragms 1 0	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
Uno Blue line 4 4		Zeebeke Diaphragms 2 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
Uno Perseus Back Mercury 3 4		Blue Diaphragms 2 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
Seare Dumpy Rings 4 4		Claris 2 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
		Monstra 2 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
		Hyflo spare piston sets, old and new models from 21 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
		K&S Diaphragms 4 0	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
		Summit Diaphragms 4 0	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
		RUBBER SUCKERS	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
		Knob type 3	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
		Shank type 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0
		Double sided 4	Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Small 2 3
			Acqua Vax Super (Battery) 54 0	Conditioning Goldfish Food, Large 3 0

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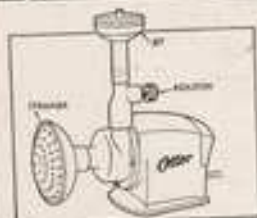
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