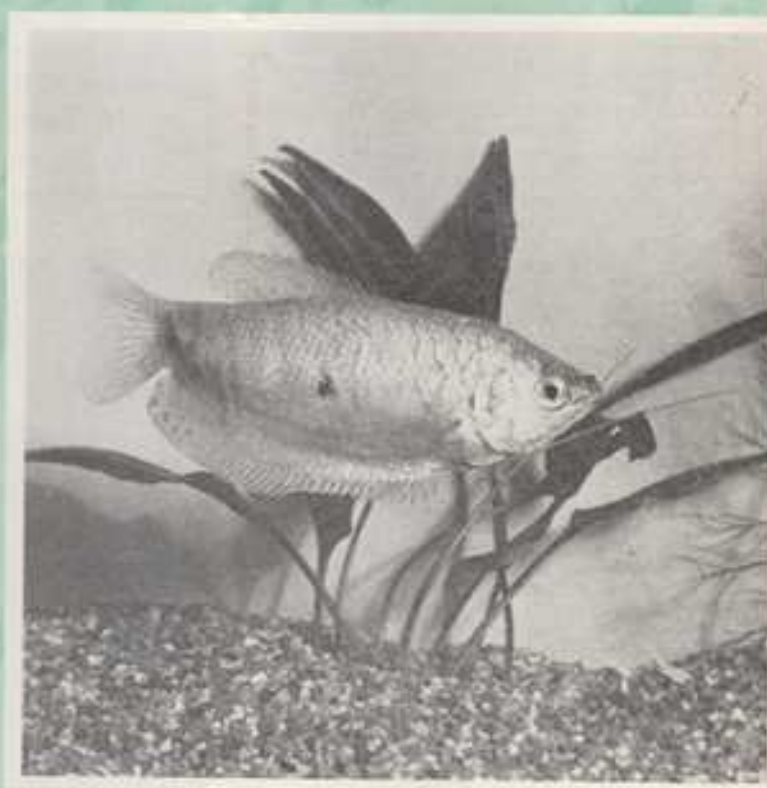


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and Pondkeeper

SEPTEMBER, 1960



MONTHLY
Vol. XXV No. 6

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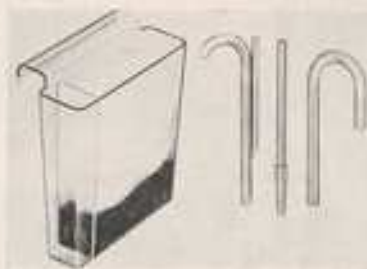
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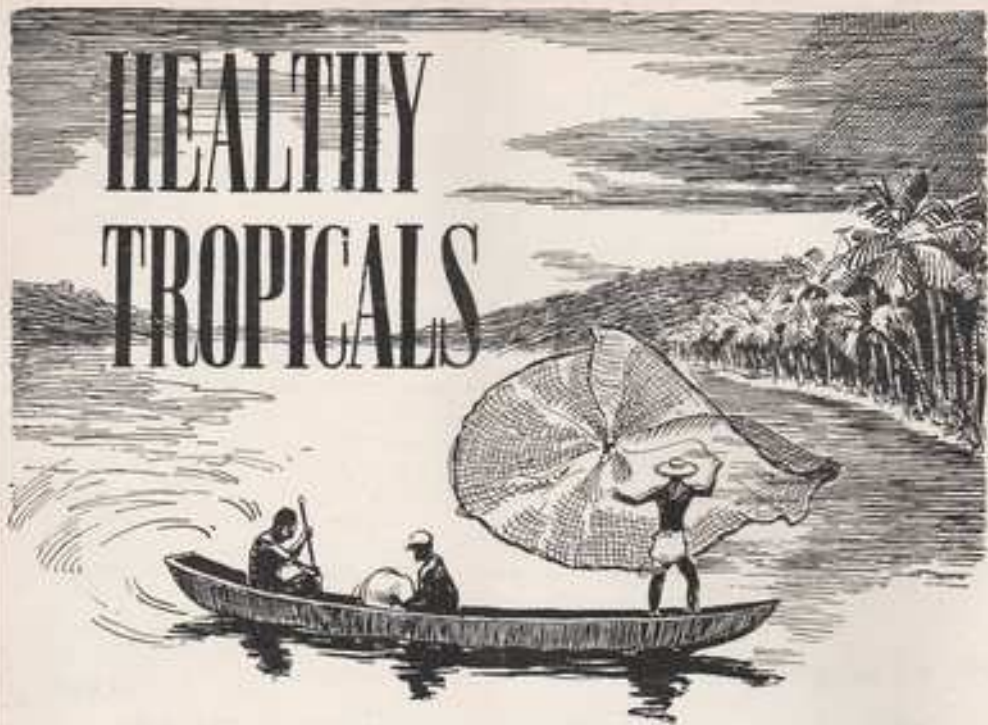
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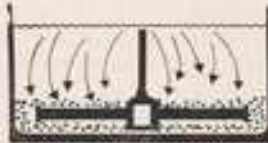
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VOL. XXV No. 6

1960

Editorial

A SHORT time ago we were pleading for a widening of interests in aquarium-keeping, for the study by amateur aquarists of animals other than fishes. Since then a remarkable event has taken place at New York Aquarium, with the exhibition there of a live whale—a species that will not come within the collecting ambitions of aquarists (it is also regrettably true that in this country there are no facilities for the study of any large aquatic animals in captivity). New York's whale, a North Atlantic pilot whale, was found stranded alive on the beach less than a mile from the Aquarium. Despite the great difficulties created by its 12 feet 9 inches length and 1,200 pounds weight, the whale was transported to the Aquarium and released into a large observation pool, where it lived for nearly a month and was seen by thousands of visitors. An interesting account of the techniques developed for whale-keeping is given in *Animal Kingdom* by Dr. James Atz, the Aquarium's Associate Curator.

IF and when water snails begin to lessen in number in aquaria most aquarists thank Providence for the change and do not delve too deeply into the reasons for it. Decrease in snail population of the largest lake in the Philippines, Laguna de Bay, has, however, promoted the interest of scientists of the Food and Agriculture Organisation, who are studying the life-history and distribution of the native water snails to find why their numbers fluctuate. This interest is not because the snails serve as human food but because their availability does influence the production of a Filipino delicacy called the balut. Baluts are fertilised and incubated duck eggs that are boiled and eaten hot with salt. The thousands of ducks kept by farmers to produce the baluts are normally nourished on water snails collected from the lake, and size of the flocks and output of baluts go hand in hand with snail supply. When more is known about the habits of the snails it is hoped that a way of avoiding times of scarcity can be found.

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The Story of the Genus *Nothobranchius*

by R. E. MACDONALD (Illustrations by the author)

EACH fish has its own individual life story. This is the story of one particular genus, the strange manner in which it breeds and the reason for the fish breeding in an eccentric way. It will also be seen that reproduction of the species concerned may be accomplished in the home aquarium.

In their natural habitat, the chance of survival, allowing for the expected hazards of disease or attack by other fishes, is pretty reasonable for the majority of tropical fishes, but there are some species that suffer seasonal changes in their environment which is of such great extent that death after but a short life span is a foregone conclusion. Without the help of nature these fishes would become extinct after 12 months have passed. To combat this apparently certain annihilation of the entire genus concerned, nature has endowed the eggs of these fishes with the ability to remain dormant during the intense seasonal changes and allows the eggs to hatch only when the living conditions have returned to normal; but for the living generation there is absolutely no chance of survival.

Annual Fishes

Fishes that are affected in this way by season changes in their environment are known as "annual fishes," and seemingly as an atonement for the fate they are forced to suffer, they are gifted with the most brilliant colours, which are maintained throughout their short life. The species of genus *Nothobranchius* (pronounced noth'-o-brank'-ki-us), are annual fishes such as these and bear all the trials and tribulations of seasonal environmental changes. They are native to equatorial Africa, where their habitat ranges from Somaliland to Portuguese East Africa on the east coast and inland to Northern Nigeria and the central northern lakes.

Each year, in their natural habitat, the effect of the dry season drawing nearer infuses the species of *Nothobranchius* with an uncanny and perhaps desperate desire to spawn, for as the level of the water in the pools and lakes gradually falls there is a sharp increase in the activity of the fish. The urgency of the changing situation produces a definite effect, for soon the individual pairs of fish begin to dig depressions in the soft mud bottom in which they lay their eggs and, after spawning has taken place, the parents cover their eggs with mud for protection against the dangers to follow. With a new generation secured from harm, the adult fish will seek seclusion among the roots and aquatic plants to await their fate quietly. Once the work of preparing an entirely new generation is finished, the adults generally refuse all food, with the possible exception of an occasional morsel, giving the impression that they somehow sense their lives are drawing to a close. Many hundreds actually die before the pools, lakes and river beds are reduced to steaming mud by the hot tropical sun, but the "not so lucky" thousands are left to perish in an agonizing way soon afterwards in the rapidly drying wastes.

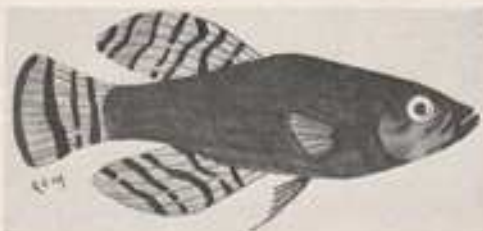
The eggs remain dormant throughout the long, hot, dry season, which lasts for some 2 months, sealed from danger beneath the surface of the mud and, ironically, beneath the rotting bones of an entire generation of their own species. Then as the moisture from the first droplets of tropical rain seeps through to the interbedded eggs, the embryos within begin to form a new generation. With the life-giving rain falling steadily, the water level will rise at the rate of

approximately an inch per day, with the result that after nearly 2 weeks after the stage when the water has attained a depth of between 4 and 5 inches, the eggs hatch and will populate the surrounding waters once more with the *nothobranchius*. Nature, however, has not finished her work in the fight for the continuation of the species until she has induced the young to mature into adult fish after only 3 months from the day they were hatched.

There are three actual species of the genus *Nothobranchius*. There is a fourth, *Nothobranchius zambesicus*, which is very similar to *Nothobranchius zachowi*, but as it appears that no one has yet made a study of the relationship of these two fishes, there is the possibility that they may be of the same species. The *Nothobranchius* species are members of the Cyprinodontidae (top minnows) family, and are undoubtedly a fresh-water fish. By far the most striking feature is the brilliant colouring of these fish; they really must be seen to be appreciated. They are timid and prefer semi-darkness with plenty of vegetation and roots in which they can hide, and for this reason they are best kept on their own. The main differences between the species of *Nothobranchius* are as follows.

Guenther's nothobranch (*Nothobranchius guentheri*)

The dominant colour of the male is a beautiful blue, which darkens over the back area and is maculated with minute splashes of blood red situated at the outer edge of each scale and which form bars on the lower part of the body. The pectoral and pelvic fins are sky blue edged



Zachow's nothobranch (*Nothobranchius zachowi*)

with white, and the dorsal and anal fins are olive green with dark-red spots. The caudal fin is a sparkling crimson edged with chocolate brown. The female, on the other hand, does not possess the brilliant colours of the male but is a simple olive green, which tends to become a shade darker over the back area, and the fins, both paired and unpaired, are completely colourless. *N. guentheri* will grow to about 3 inches during its short life span and will breed at approximately 2½ inches. It can be further identified by taking a scale count, which shows this species to possess from 27 to 30 scale rows. *N. guentheri* also favours the higher water temperatures of between 74° and 84° F.

Gorgeous fundulus (*Nothobranchius mlatensis*)

This species is not quite so contrastingly coloured as Guenther's nothobranch, but is nonetheless just as beautiful



Gorgeus fundulus (*Nethobrachius orthonotus*)

in its own particular way. The body colour of the male consists of varying shades of green and blue with green as the dominant colour. Many of the scales, particularly over the back area, are suffused with crimson. All fins, both paired and unpaired, are red, which darkens to a great extent towards the margins. The female is plain and uninteresting, with no colour at all in the fins.

There is a possibility that this particular species of *Nethobrachius* will lose a great deal of its colour and sparkle in the aquarium if not fed regularly with plenty of live foods such as *Daphnia*, white worms and chopped earthworm. Provided that the diet is adequate in this way and the fish are not unduly disturbed, there should be no difficulty in maintaining their brilliant colouring.

This species breeds in the same way as the other two *nothobranchs*, with the exception that the eggs hatch out in something like half the time (28 days) and at a much lower temperature (72°F), but, once hatched, the fry should be slowly acclimatised to the higher temperature of between 72° and 80°F. This fish will also grow to about 3 inches and breed at 2½ inches. A scale count reveals between 28 and 30 scale rows.

Rachow's nothobranch (*Nethobrachius rachowii*)

This fish is smaller in size, compared with the other two species, but is just as beautifully coloured. The male is a strikingly brilliant orange-red and has about 12 crimson-red stripes running vertically from just behind the opercular opening (gill cover) to the posterior edge of the caudal fin, where the stripes are shown most effectively against a sky-blue background. The extreme edge of the caudal fin has



Gunther's nothobranch (*Nethobrachius guentheri*)

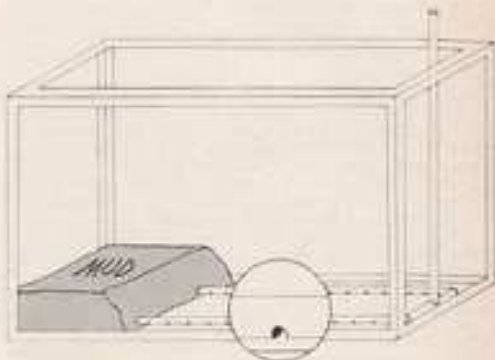
a dark-brown margin similar to that of *N. guentheri*. The unpaired fins compare with the caudal fin as they are sky blue in colour but possess much darker red bars, and the paired fins are yellowish orange. The female, like its two cousins, possesses no startling colour combination and is simply a yellowish orange. This species grows to about 2 inches and breeds at 1½ inches. Its breeding habits are the same as those of the other two species and it prefers temperatures between 70° and 80°F, and as with *N. guentheri*,

the eggs hatch out in about 8 to 10 weeks. A scale count shows 25 or 26 scale rows.

Breeding

Breeding the *nothobranchs* presents many problems and is certainly a challenge for the aquarist. The most important period of the breeding process lies during the time the eggs are dormant, as by necessity the mud containing the eggs must be kept warm and moist. In practice it is essential to perfect a method whereby these conditions can be maintained continuously for the period required, and once a method has been tested and proved satisfactory a trial run without the fish should always be undertaken as a further precaution against possible mishaps.

For breeding purposes a small tank, say about 16 in. by 8 in. by 8 in., with a slate bottom, should be used. The tank should be filled to about the half-way mark, when it will contain some 4 to 5 inches of water. The water should be old and have a pH value of 6.8. The floor of the tank must contain over an inch of mud as a spawning medium, in which some vegetation may be planted. The number of bottom plants, however, should be kept to the minimum and preference given to the floating varieties such as Spanish moss and crystalwort (*Riccia* species), which will be most useful as shading plants, giving the desired effect of semi-darkness in the tank. The addition of boiled willow root will assist by adding a "natural" aspect to the tank as well as providing a suitable hiding place for the fish.



Suggested arrangement of the breeding aquarium for *nothobranch* species (see text)

Consideration must be given to the heating of the tank and the best method to adopt is the use of oil or gas jet applied beneath the slate bottom of the tank to maintain a water temperature of between 78° and 80°F. The aquarium should be allowed to age before the fish are introduced.

Once introduced, the matured species concerned should be well conditioned with live foods such as *Daphnia*, *Tubifex*, white worms (enchytrae) and chopped earthworm. The next objective is to have the water slowly evaporate from the tank, which should not present any difficulties as this will occur naturally owing to the high temperature of the water, but this process can be accelerated by playing an electric fan gently across the surface of the water. As the level of the water gets lower the activity of the fish will increase until spawning takes place. The fish will dig a depression about ¼ inch deep in the soft mud and by resting side by side in this depression with their ventral surfaces touching, they will commence to lay and fertilise about 25 eggs. When spawning is finished the fish will com-

pletely cover the eggs with mud and will not disturb them under any circumstances. It does not make any difference if the fish are removed from the tank once spawning is completed for they will die in any case within a fortnight even though introduced to a fresh tank.

Once the water has completely evaporated from the tank, the remaining mud should be continuously inspected to ensure that it does not dry out. Under natural conditions the mud is kept moist by the swampy state existing below the surface. To apply water from above the surface in an endeavour to maintain this dampness will result in the destruction of the natural effect in incubation and hatching; therefore if water must be added, then it should be old water and be applied from the bottom region of the tank below the level of the entombed eggs. It should be remembered that it is essential to maintain a good relationship between the amount of extra water added and that lost by evaporation. The introduction of extra water can be facilitated by laying plastic tubes that possess a series of small holes on their underside on the bottom of the tank when setting up the aquarium, as shown in the diagram. If it becomes absolutely necessary to apply additional moisture, only a small amount of old water should be added

at a time. It is emphasized that this action must be employed only in cases of absolute necessity. Most important of all, never apply water once the mud in the tank has become completely dry. Close observation will avoid disasters of this nature.

It is equally important to ensure that the temperature of the mud never falls far below 72°F. A good general warmth can be obtained by keeping the room temperature of the fish house consistently high during the dormant period, and by previous experiment, heat of the right temperature can be applied in jet form to the slate bottom of the tank to ensure favourable temperature conditions within the mud.

After about 2 months, fresh rain water can be added to the tank at the rate of approximately an inch per day until the level of the water has reached a depth of about 4 or 5 inches. The temperature of the water can now be slowly increased to the desired 80°F. Some 14 days after this stage the fry should begin to appear. They are quite hardy and immediately require feeding with Infusoria, sifted *Daphnia* and brine shrimp. When all the eggs have hatched the breeding tank can be replanted with fresh vegetation and then cared for in the usual manner.

HERPETOLOGIST'S NOTEBOOK

by ROBERT BUSTARD

BELOW I am listing an excellent recipe for the culture of fruit flies (*Drosophila*). These small flies (both winged and wingless or vestigial varieties can be cultured) are an indispensable food for rearing many small lizards such as chameleons and geckos and also for newly metamorphosed frogs and toads. For the basis of the recipe I am indebted to Mr. R. A. Lanworn of the Reptile House, The Zoological Society of London.

Take the following: 27½ ounces of water (500 ml.); 1 teaspoonful of molasses; ½ teaspoonful of NIPAGIN (preservative).

Heat this mixture till boiling, then add: 5.55 ounces of water (100 ml.); 0.55 ounce of agar (12 g.).

When boiling again add the following: 11 ounces of water (200 ml.); 5.55 ounces of oatmeal (100 g.). Stir till boiling, then simmer for 1 hour.

When ready the mixture should be poured into half-pint milk bottles (jam jars can also be used). A layer of 1 to 1½ in. should be poured into each jar. Since it can only be poured when really hot the jars should be heated in the oven to prevent them breaking. Allow to cool, then add two drops of yeast solution per jar. The bottles—the above-mentioned quantity of culture mixture will provide about 15 bottles—are now ready to receive flies, and at least three pairs should be added. In laboratory practice the flies are anaesthetised with ether, sexed under a binocular microscope and then added together with a piece of filter paper or cotton wool so that they do not become stuck to the medium. I have found it satisfactory and much quicker to add about a dozen flies, which will contain sufficient numbers of each sex.

The bottles can be stoppered with cotton wool to prevent the escape of the flies and should then be kept at about 65°F, at which temperature the next generation will appear in about a fortnight.

I am frequently asked what to feed small lizards on when they require a larger insect diet than fruit flies yet are still too small to cope with bluebotflies. The best food is house flies (*Musca domestica*), which, although not so easy to

culture as bluebotflies, can be bred on a paste of brown bread and banana.

Geckos

Many geckos have adhesive arrangements on their toes, which may also terminate in claws. Geckos are classified largely on the arrangement of their feet hence most generic names end in "dactylus." The habits of the gecko are closely allied to the structure of their feet, hence members of the genera *Pachydactylus* and *Hemidactylus*, for instance, can climb a vertical sheet of glass with ease or run upside down across a smooth ceiling. On the other hand the feet of *Nephrurus* do not permit it to climb anything that its claws cannot get a firm hold on, with the result that the members of this genus of geckos are found under logs and stones.

Hemidactylus brooki, *H. tarciani* and *Tarentola mauritanica* I have already recommended. Among the larger species one of my favourites is the South African *Pachydactylus bhobei*. Although this gecko seldom exceeds 6 inches in length it is very well built. Not only does it do well in the vivarium but it readily accepts gentles and will come down from its position near the roof or on the ceiling of the vivarium and eat about 50 at one time. It will take them from a dish.

Pachydactylus porphyreus, a 3½-inch species from South Africa, lives well and breeds readily but is shy and seldom seen. Another very attractive South African species is *Pachydactylus ocellatus*, which measures about 3 inches. Unfortunately I have found this a poor feeder in captivity.

There are many fine Australian geckos but few are often available in Britain. Mention should, however, be made of *Gymnodactylus miliumi*, the fat-tailed or barking gecko, which is marked in chocolate with reddish markings and white bands. This gecko, like the knob-tailed gecko (*Nephrurus levis*), has a very interesting display behaviour. Both of these geckos stand up to enemies and try to appear fearsome; the foregoing barks and the latter hisses very loudly. Some members of the genus *Oedura* are sometimes available and can be beautifully marked. They do well in the vivarium. The above are only a selection of several interesting species. It must be remembered that there are about 300 species of geckos.



Equipment recommended for the rock-collector includes a book on pond or marine life, a hand lens, a steel-tape rule, a hard-bristled brush, a sheet of polythene and specimen jars.

Rock-collecting for the Aquarium

by P. B. MILLINGTON (*Photographs by the author*)

THE added interest that a skilful arrangement of water-worn rock can give to the lay-out in an aquarium, makes it well worth while to take the opportunity of a fine day, and travel into the countryside or to the seaside, in search of suitable material.

The most likely places to visit can best be determined by consulting the Ordnance Survey topographical and geological maps. Both of these can generally be had on request in the Reference Department of your local library.

If the visit is to be to the countryside, choose an area where rising contours indicate an effective watershed. There the soft rain-water will filter through the peat bogs of

the uplands to form numerous watercourses which will feed streams that rarely dry up and which will flow rapidly enough to prevent the rocky bed from being covered by sand. The continuous flow of soft, acid water will ensure that the rock is well worn and that any soft mineral deposits will have been dissolved.

Most of these upland areas in Britain are composed of Old Hard Rocks, which are ideal for the aquarium. However, to be sure, it is best to take a quick look at the geological map and see that the area is not one composed mainly of limestone, for this type of rock is soluble in water and can be dangerous to the welfare of most of the fresh-water fishes we keep.

If the visit is to be to the seaside, one must choose a rocky shore-line for the best results. The scour of the sea is very powerful, and loose stones are generally worn into smooth, spherical shapes that are almost all alike. The most likely places are in the rock pools exposed at low tide, as it is in these, protected from the full power of the sea, that the stones will be not so completely uniform in shape. Unless, of course, one is prepared to hammer pieces from the cliff face or bed-rock.

Wherever it is decided to go, take with you a hand lens and a jar and a good book on the seashore or pond life, for there will be lots of interesting plant and animal life brought to light, when lifting and removing the stones.

Stones from the sea should be scrubbed, then boiled or soaked in water for some time, before being introduced into a fresh-water aquarium. Only scrubbing and rinsing is required for those from a stream. A word of warning: if the stones are to be scrubbed in the sink unit, put a cloth under them, for they will damage enamel, porcelain or stainless steel very easily.

If the place you have chosen is a good one, you will be surrounded by stones of all shapes, colours and sizes. Size is important, and, judging by eye, one tends to choose pieces far too large; so take a tape measure and mark out the size of the aquarium on the bank or shore. Some time can then be spent, arranging and re-arranging the pattern of stones, until a satisfactory lay-out is made.

Remember that shape is more important than colour, for in a well-established aquarium the rocks will eventually become covered by a thin coating of green algae. However, if the veins of colour are striking and one intends to preserve them in the aquarium by occasionally scrubbing them with



Stream with a rocky bed that can provide suitable stones for aquarium use

an old tooth-brush, then marching will have to be made more carefully and it will be necessary to ensure that the strata are carried in the same plane throughout the lay-out, for it to be effective. Some colours on the rocks may only be superficial, so it is advisable to take a hard-bristled brush and scrub them a little, before taking them home.

The greatest value of rockwork in the aquarium is to hold the sand in pockets of varying levels, for planting. To do this effectively, the rocks must surround each level of sand, in order to secure it, and should be sufficiently tall to hold the level you have in mind, when placed on the base of the aquarium. The rocks do not necessarily have to protrude too far out of the sand; in fact, it is where they appear to be a small part of the bed-rock showing through the sand that they make the lay-out look most realistic.

There are other considerations which may well be borne in mind. Rocks can be used to conceal heaters and thermostats and to provide shelter for fishes like the loaches and *Bala khatia*. In fact, if realism is to be carried to great

lengths, then the species of fishes are very important. For instance, harlequins could be housed in a tank with a lay-out made of lumps of red sandstone and red sandstone pebbles, to typify a stream like the one described by Wing Commander Marsack in his article about collecting these fishes in Malaya. Such a lay-out could be quite academically correct when planted with Sumatra fern and *Cryptocoryne*.

When pottering in and about a stony shore or stream, the wear on one's feet, as they become soft with immersion in water, can make them very sore. An old pair of rubber-soled canvas shoes gives ideal protection.

Finally, it is important to remember, when gathering material from mountain streams, that these usually support a valuable stock of sporting fish. Turning stones over in great numbers can destroy the balance of life in that stretch of stream for some time. Fishing rights are zealously guarded and expensive to maintain; the writer therefore makes the plea: do not make the manner of your stay too obvious and leave no traces of your visit.

The Garden Pond in September—by ASTILBES

MANY pondkeepers like to fit either a fountain or a waterfall to their ponds, not only to improve the look of the pond but also for the benefit of the fishes. This is a grand idea, and either can be made to look quite attractive. Perhaps the waterfall is the better idea as this is more natural than a fountain. To provide a waterfall one must have a raised rockery at the pond side. When a pond is first constructed it is an easy matter to make a good rockery at one side of the pond with the soil which has been excavated. Some well-placed seasoned rocks can then be laid and a small waterfall can be constructed so that water comes from the top of the rockery and then falls gradually into the pond. Some small shallow pools can be constructed on the falls so that a succession of tiny waterfalls supply each pool and then overflow into the next. The sound of the water trickling will be a pleasant sound during the summer months.

The making of the pools must be done with great care to prevent the unnecessary loss of water. Make the pools strongly and then before the concrete has set place the rock above in position and see that a good join is made. Make sure that the rocks are securely placed so that there is no chance of them sinking. If you are not particular when siting the rocks, a sinking one can soon upset your waterfall. You will, of course, have to have an electric pump unless you are clever enough to make a windmill which can pump the water from the pond to the top of the rockery. There are several small pumps on the market and often are advertised in *The Aquarist*. A suitable one for a small pond and fall would be a quarter-horse-power pump. This would have to be fitted in a waterproof box and in such a position that the water can enter the chamber of the pump without having to prime the pump to start it working. A switch can be placed in a position out of sight and protected from the weather. If a greenhouse or outhouse is nearby then this is a good place to site the switch and perhaps the pump.

There is no need to keep the waterfall running for long; perhaps for an hour or so when you are in the garden or if the water becomes too warm in the summer. The action of the air on the water as it runs over the rocks will benefit the water considerably. On the other hand, if the water is foul, all the running over the fall is not likely to do much good as the water will only become foul again when it returns to the pond. If one is trying to breed fishes in the pond the use of a waterfall is a great advantage

and even golden orfe can be bred in a pond provided with a fall.

If you prefer a fountain or if you have no rockery or high ground from which a waterfall can be worked it is possible to have a small fountain, either in the centre of a formal pond or to one side playing across the surface. Whichever is preferred it is essential that no copper or brass is in the fittings which are in contact with the water. It is well known how poisonous these metals are to fish life, and the trouble is likely to be accentuated if the water runs through the pipes only occasionally.

Pond-side plants can be planted at this time of the year. Many of the hardy primulas which have been raised from seed can be planted out into their winter positions. *Primula denticulata* is a handsome one to use. Do not forget the long-spurred aquilegias; these are very handsome flowers and the plants enjoy a moist position. Plenty of peat or well-rotted leaf mould can be incorporated into the planting site for these. Any of the irises can be split up and transplanted now and some of those fibrous types should be added. These have very delicate flowers, smaller than the bearded irises but very dainty, especially adorning the pond. Do not forget the rockery by the pond, as some fresh spring-flowering plants will be a welcome addition.

If *Aubretia* have been raised from seed they can be planted out now. Make sure that there is a good pocket of soil in which to plant each one as it is not reasonable to set a young seedling among matted roots of a strong-growing plant and then expect it to thrive. If the rockery has become really overgrown it should be remade. This may sound a major operation but it is only the thoughts of doing it which can worry. Once a start has been made it will be surprising how soon the task can be completed. Start by removing all the rocks to one side. Then dig up all the specimens you wish to preserve. Place these on sacks in a shady spot in the garden and keep them damp. Now dig through the rockery, removing all weed roots and unwanted alpines. Next the rocks can be replaced and a fresh design worked out if needed. See that all rocks are well bedded in, as it is very annoying to find one or two sliding away after heavy rain. Make sure that the soil has settled well and water it if dry. The old plants can be then reset, splitting any that require it. Leave spaces for the addition of new subjects. It may seem a lot of trouble but it would be worse to try to weed thoroughly a rockery which has got out of control and overgrown with weeds.

GECKOS

by ROBERT BUSTARD

(Photographs by the author)

AMONG the smaller semi-tropical lizards is a large group, the members of which are popularly called "geckos" because of a fancied resemblance between this word and the sound made by one species. They belong to the family Gekkonidae and enjoy a cosmopolitan distribution in the warmer parts of the world. All geckos are small lizards, and although a few measure about 1 foot in total length, most are under 6 inches. Some of the members of the genus *Sphaerodactylus* (from South America and the West Indies) measure a mere 2 inches when adult.

Many geckos do very well in close confinement. They are intelligent lizards and in nature are often found in and around human habitations, where they are no doubt attracted by the winged insects which in turn are attracted by the lights at night. Such geckos will become quite tame and will, with perseverance, even accept food from the fingers. A Professor of Zoology in Ceylon told me that he found the native *Hemidactylus* enjoyed liqueurs! They regularly climbed on to the dinner table in the evening to lick the glasses. Their inquisitive nature, hardiness and the ease with which they can be tamed make them ideal vivarium inmates, yet they are often overlooked. This is largely because many collectors purchase one or at most a couple of geckos and put them in a vivarium containing other lizards. Under such conditions the geckos are seldom seen. Although most species are active at night many will often be on view during the day.

I have always given my gecko vivaria to themselves and when possible I have established a colony of one species in a vivarium. The pleasure which can be derived from doing this makes it well worthwhile, as geckos are truly gregarious lizards and constant amusement may be had from watching them. One of my favourite species is *Hemidactylus brooki* [see "A Gecko Community," *British Journal of Herpetology*, vol. 2, No. 4 (July, 1957)]. This gecko, known as Brook's gecko, originally came from West Africa but has extended its range to many parts of the world largely by human agency, and most of the specimens which I have kept came from Ceylon. Brook's gecko is a good one to



This photograph of the South African gecko (*Pachydactylus bicroni*) was taken through a vertical sheet of glass to which the lizard was adhering by means of the ridges and dilated tips of its digits. Like many other geckos this species can also rest upside down on a ceiling.

keep inasmuch as it does not tend to hide away most of the time behind bark or under the moss. For this reason species such as *Ptychocheilus porphyreus* (from South Africa) should be avoided, although this species lives well and is even a ready breeder in close confinement. Other species which require identical treatment are the common Mediterranean gecko (*Tarantula mauritanica*), which measures about 6 inches, and *Hemidactylus turcicus*, also originally from the Mediterranean but now established in the New World. It is just under 5 inches when adult.

Brook's gecko measures about 3 to 3½ inches and I kept about a dozen in a vivarium measuring 20 inches cubed. In one corner of the vivarium, the temperature of which was maintained at 70° to 75°F during the day and fell to 55° to 60°F at night, was a hollow log into and behind which the geckos retreated when alarmed. One should always try to include a hollow log in the set-up, so much do they enjoy the protection it affords. After a short time one would be seen peeping out and it would then come slowly out and bask in the heat from the light bulb. This would be a signal to the others that all was safe and in no time six or more other geckos would appear from behind pieces of bark, which were placed here and there against the sides of the vivarium. The floor of the vivarium had 1-1½ inch of sand, which was covered by dry moss.

Many lizards will lay eggs in the vivarium [some, of course, like our common lizard (*Lacerta vivipara*), will produce live young (ovo-viviparous)], but few are as easy to breed, or their eggs as easily hatched as those of the geckos. Most reptiles which lay eggs or give birth to young in close captivity have mated before they were caught. Geckos, however, will readily mate in close confinement and in the small vivarium mentioned above I observed matings on several occasions. The male usually grasps the female by holding one of her forearms, or the loose skin at the side of her neck, in his mouth. He then inserts the hemipenis nearest into her cloaca (male reptiles of the order Squamata, which comprises the lizards and



Australian barking gecko (*Gymnodactylus milii*)

snakes, have paired copulatory organs). The act of pairing lasts about 4 minutes.

Female geckos usually lay a pair of eggs at one time and will lay a number of clutches during the course of the year. The site for egg-laying is often chosen with great care (this is the case with *H. brooki*) but certain members of the genera *Phyllodactylus* and *Pachydactylus* seem to deposit their eggs at random under the moss of their vivaria, and if a really good site is present in the vivarium several females may use it to lay their eggs in. On the other hand, if no suitable site is present the geckos may retain their eggs within their body and die of "egg-binding" rather than deposit them in an unsuitable place. One evening I observed a female which had just laid her eggs behind a piece of bark, and the eggs were still moist and clearly visible. An hour later she had pulled fragments of moss over them and they would have been difficult to discern had I not known their whereabouts. Still later the same evening they were completely covered and quite invisible. Like most reptiles, once the eggs are laid and hidden the mother gecko shows no further interest in them.

The eggs will stand a good chance of hatching if they are left where they were laid but I prefer to remove mine



To make it appear larger this knob-tailed gecko (*Nephrolepis levis*) has inflated its lungs fully with air; to aid its bluff it also makes a loud hissing noise.

to a small box within the vivarium. They are carefully placed in depressions in the moss in this box. The moss lies on a layer of dry sand and a small number tag is placed beside each clutch. In this way, by keeping a careful check on the vivarium and knowing each gecko individually it is possible to have an accurate knowledge of the incubation period and perhaps even the time from mating to egg-laying. An added advantage is that the young are not at liberty in the vivarium containing the adults, where they might well get eaten. I have had experience of even half-grown young being eaten by *H. brooki* and also newly laid eggs before the shells have hardened completely. It is important when moving the eggs to the "incubator" not to rotate them. The eggs of geckos have a hard calcareous shell and probably therefore do not require to be moistened. I have usually sprinkled some water on them and the surrounding moss from time to time during the 2 to 3 months' incubation period but this has never been done with the regularity necessary to hatch eggs with parchment-like shells, yet the eggs have hatched almost without exception. The young geckos, which in *H. brooki* measure about 1 inch, are fed on fruit flies (*Drosophila*) and should be kept apart from the adults until they are at least half grown.

Geckos easily lose their tails when these are grasped or even touched firmly and substitute tails (minus the bony core) quickly grow to replace the original. In many species the replacement is so good externally that only careful examination or X-ray will tell whether or not it is the original tail. When keeping these small geckos I strongly urge collectors to keep at least half a dozen of the same species or more if possible. If kept under the conditions outlined above a breeding nucleus will soon be established which will increase the numbers in the collection in a short space of time.

Geckos require water to drink and this should be sprinkled on the foliage and moss in the vivarium, also on the walls. As regards food the best diet is bluebottles—any live insects can be given, the size depending on the size of the species kept. Some species will eagerly devour gentles (maggots) but many will not accept these. In my Notebook in this issue I am giving details of how to culture *Drosophila*, as few reliable recipes seem to be available, and I am also listing which geckos are good to keep and which are not. The behaviour and habits of the geckos have always endeared this large group of small lizards to me.

CACTI IN THE FISH HOUSE

ONCE the warmer weather has ended most cacti and other succulents will need a good winter's rest if they are to be expected to flower well the following year. The stopping of the main watering will mean that the plants for the most part will cease to grow. However, there is a danger here that because the plants may be in a fish house which is heated the plants may be encouraged to make fresh growth. Even though water is not given, some cacti have been known to continue to grow on themselves. Cacti grow from the growing centre at the top of the plant unless fresh off-shoots are produced and even if no water is given the warmth can start the plants to make new growth at the top, often at the expense of the lower part of the plant.

It is imperative to examine the plants carefully and give enough water to keep the plants just plump but not enough to start them into vigorous growth. A great deal will depend on the temperature of the house. Most cacti can withstand a few degrees of frost if they are dry at the roots,

but if they are in any way damp and get frost-bitten it is almost certain that they will rot.

Be guided by the warmth, the colder the position where the plants are kept the less water will be required, and *vice versa*. Make sure that the plants do not stand where there is a drip from the roof, nothing is more likely to destroy a plant in the winter than this.

Aquarium Keeping

A COURSE with the above title is to be held on Tuesdays, 7 p.m., starting on 20th September next at the Zoology Dept., The University, Manchester 13, under the charge of Dr. M. Pugh Thomas. All branches of the subject will be dealt with, including marine aquaria and vivaria and such subjects as fish anatomy and fish behaviour. Fee for the course is £1 and those wishing to attend should register at the College of Adult Education, 49, Mosley Street, Manchester 2.

AQUARIST'S Notebook

by

RAYMOND YATES



IN August, right in the middle of the season, I decided to look in at Blackpool Tower Aquarium. Public aquaria in midsummer are always crowded and the serious student has little chance to enjoy a quiet look at the fishes on display. However, it can be done if one is prepared to time one's visit to coincide with the period when most of the visitors are at lunch or tea. I chose to go in at 4.45 p.m. and soon found I had guessed correctly as I had the Aquarium very much to myself. I have been in the Tower Aquarium many, many times in good times and bad, in summer and mid-winter, and never have I found it so well set up and such a credit to the hobby as on this occasion. Every single tank was a delight, all the plants in all the tanks were in splendid condition. So, for that matter, were the fishes. What a wonderful show! I cannot imagine any hobbyist having any grumbles at all after viewing the present set-up.

Blackpool Tower Aquarium is probably seen by 90 per cent. of all the people who visit the town for a period, quite apart from the day visitors, and this puts it in the position of being Britain's main shop window for the hobby. Almost all visitors to Blackpool visit the Tower building during their stay and, as there is no extra charge for the Aquarium, they view the fishes as a matter of course. The numbers passing through the Aquarium from Easter to October must be enormous and far in excess of the 150,000 who visit the London Zoo Aquarium in a year. Some alterations have recently been made and a splendid additional marine section has been added. The entire Aquarium provides a wonderful advertisement for the hobby. In the past, on occasion, I have criticised certain aspects of this public aquarium when necessary, so I am all the more pleased to be able to give unstinted praise to a splendid effort.

The most obvious aspect that would please the visiting hobbyist is the tremendously wide range of fish species on view. Just about everything you have ever kept or even hope to keep is on view except pompadour fish. Most of the specimens are large, and there are almost always at least half a dozen of any one variety. The majority of the tropical tanks are protected behind a glass window which allows visitors to tap on the glass to their hearts' content without being any inconvenience to the fishes. Now for a quick résumé of the main items of interest. Quite the neatest feature is the way groups of similar or related fishes are housed together in one tank. For example, one large aquarium contained some brilliant Australian rainbows, flying fox, *Anostomus anostomus*, *Phenacogrammus interruptus* and both *Tropethus aquilans* and *Telenganus*. The last two fishes are not so often seen and are most interesting; the former because it looks like a cross between a hatchet fish and *P. interruptus* and the latter because of its slim build and the optical illusion of its ragged finnage. All these specimens were 3 inches upwards. Chocolate gouramis looked very healthy—in spite of always having the appearance of being wrapped up in a blanket. I am very fond of this fish, in spite of the fact that the only adult specimen I ever owned lasted with me a mere 4 days. Large black paradise fish caught the eye, in particular their very long trailing filaments.

Many splendid cichlids were kept together, including all the well-known ones as well as pike cichlids and some large maroni which give one the impression of being marine specimens. Head-and-tail lights were kept with black-line tetras, a fish rarely seen to-day owing to its chasing habits. Some silver tips (*Hemigrammus nanus*) included the usual type with some others which were a rich chocolate red-

brown, small but charming. A shoal of bleeding-heart tetras were quite a dream and a glass tetra (*Roeboidea microlepis*) was most appealing with its inevitable head-down stance. A tank of various pencil fishes reminded me of my first *trifasciatus* long ago, which I treasured more than gold. All pencils are well worth keeping if sizeable and get along quite well with all other fishes of reasonable size (at present I am keeping *harisimi* and find them most interesting).

A wonderful livebearer tank (about 48 in. by 30 in. by 30 in.) contained some excellent specimens of all the most desirable types. Red and yellow wagtails were also on view, a fish not often seen nowadays although a tremendous novelty when it first appeared. Almost all the *Rasbora* were on view in another tank set aside for this genus. I was fascinated with a tank which contained ten full-size *Pelmatochromis*, half a dozen flag fish (*Jordanella*), four headstanders and some black-banded sunfish. The first two varieties were constantly bickering, although they ignored the other fishes. It was obvious that the flag fishes got the worst of it (without any damage being done) and they mostly kept to the surface layer. A quite small tank held half a dozen very large *Morone* and some porthole catfish (*Hoplosternum thersites*).

A fresh-water tank of local species exhibited about 30 minnows, rudd, dace, chub, carp, ruffe, stone loach, gudgeon, sticklebacks and miller's thumb, all in miniature. The usual large fresh-water fishes were on view, also about 60 trout and grayling in addition to the enormous marine specimens, which never fail to attract the crowds. I always enjoy the small tanks set out as rock pools, the anemones, the crabs and the large lobster.

Wonderful as were most of the tropical tanks the new marine section really takes the eye. Perhaps it is easy to have a good marine section with the sea actually at one's door-step (as it is at Blackpool Tower Aquarium); one wishes it were as easy to keep such magnificent fishes at home. One tank contained about a dozen clownfish which played tag in and out of the waving fronds (a good expression) of a huge anemone quite 14 inches across. This was colour at its best. Other fishes included cloudy damsel, cow fish, an emperor angel fish (roughly 8 inches by 6 inches and what colour!), triggers, French angels, dwarf puffers, one-spot cardinals, butterfly maetimes, sergeant majors, lions, blue angels and two gorgeous bat fish quite out of this world. The curator has been collecting coral for some time and the display of coral in the marine tanks is quite breath-taking.

One false note was a tank of mudskippers. The glass above the water level had steamed up slightly and although it was possible to see, the public just have no time to peer round for what isn't obvious. Many of them would never make aquarists—the cursory glances they give. The tank which seemed to attract most attention contained elephant fish. Newcomers to the hobby should have a look at the enormous tinsel barb and realise what big babies some of the miniature fishes can become. The Tower Aquarium is open all the year round so if you find yourself that way don't fail to look in. You will find it well worth your time.

The present Chinese government has not been slow to make full use of the advertising value of different issues of

postage stamps. Many attractive sets have been issued but a recent one seems to have been issued solely for interest abroad. There are 12 stamps in the set but only two values; four different stamps at 4 yuan, and eight different stamps at 8 yuan. The stamps each depict a variety of the goldfish in brilliant colour and are a joy to behold. A complete set, used, can be bought through stamp dealers for as little as 2s. 6d.

One of the fishes which is often overlooked is *Morone chrysops*. This delightful fish from Venezuela suffers from the fact that it lacks obvious colour when compared with more garish tropicals. This is a pity because it has quite a charm of its own and many good points. It is a fish which is never still and one which carries all its fins erect all the time. The very fine dorsal and anal fins give this fish an air of nobility. It is ready to eat anything and is very quick off the mark when food is being given. Never larger than about 2½ inches, it is quite peaceful with other fishes and is not timid in the presence of large fishes. This fish is one to see in various lights as the olive-green-yellow body is bespangled with many iridescent metallic green-gold dots which reflect the light entrancingly. A dark-blue stripe runs tailwards and violet tints enhance the whiter lower parts of the body. The gold eye is eye-catching, too. The male is recognised by having more pointed and larger fins. Any temperature from 70° to 85° F suits this fish quite well.

For years we have enjoyed having the serpaie and rosaceus tetras with minor variations, and very charming tank fishes they have been. Recently some more fishes on similar lines have appeared under the shop name of phantom tetra. Similar in shape and build and habits to serpaie they differ rather in colour. All have an ocellated spot, like that of the jewel fish, on the shoulder. Some are a rather dusky deep-purple hue with reddish fins, others have a red body with a red adipose fin, black dorsal and black tail with a black-edged red anal, and ventral fins red. A bit on the small side, they may grow to equal their more well-known relations, but meanwhile I find they are very timid and retiring when on their own (like many people), but active and almost cheeky when with a number of others of their own kind. Feeding is no trouble and they seem to lack the nipping tendencies of the better-known serpaie. Undoubtedly a fish to have when the chance comes your way.

An amusing little club magazine is issued monthly by the Lockheed Employees Recreation Club of Burbank, California. Entitled *Fish Fun*, it is mimeographed and distributed free of charge by a team of six plus the editor and the assembling chairman. It runs to 16 pages and a cover and has a light-hearted approach to every subject, as its title implies. The club is now in its eighth year and is highly successful, as can be gathered from the fact that the monthly raffle runs to 100 to 120 prizes, which must surely be a world record for any club anywhere. Nor are dealers badgered to present prizes; very few come from this source—the club paying from its own funds. You never know what you get: recent prizes included a 15-gallon tank and a palm-leaf voodoo devil mask. Recent film shows have included "The Sea Around Us," "The Power of the Sea" (Couture) and "Inner Space" (the record Picard dive). A seaside excursion to hunt and obtain living specimens from rock pools has been fixed.

Billy Elkins, aged 13 years, contributes articles to the magazine, as for example: "The Story of Little Devil and Big Bully." "Hello, my name is Mike, but master calls me Angel. Master is the one who feeds me, but even if he masters me, I master everyone else in the tank. It all started two years ago when master bought me for about a shilling from a friend. Master took me home and put me

in his tank where I saw all the fish happily playing together. This made me jealous, I just had to nip one. Right away the rest of the fish started to respect me, except a few. One particular tank-mate I remember, was Big Bark. All he actually was was a cheap little neon, but I must give him credit for one thing, he could beat any other neon in the tank. I never like the expression runt, because he's always bragging about being one of the 'neon lights' in Las Vegas. All he is anyway is a big bark with a little blue. After two years of chasing and nipping the day came when my master put in a veiltail anguilla. Wow! I ran over to greet my new neighbour, hoping to be the first to get acquainted, but looking round and seeing all my tank-mates on my tail with the same idea, the situation looked rather hopeless. Master looking into the tank and seeing all of us coming at full speed, decided that we were out to kill her, so he took my girl friend out. This was very discouraging. I heard master say that when he got a bigger tank he would put the veiltail in with the other fish, so we sit in our separate kingdoms and dream of the future." Readers will agree that Billy has the right ideas and can put them into words. Keep it up, Billy.

The Rev. Thomas K. Ray of St. Mark's Cathedral, Grand Rapids 2, Michigan has set himself the problem of the successful spawning of *Labo bicolor*, and would be very interested to hear from anybody on this knotty problem about their experience, successful or otherwise. Breeding other varieties offers no problem it would seem from one club-member advertisement, which reads "To swap—300 zebbras, 6 months old. 40 Yucatan and marble mollies... want to trade with any other hobbyist who has too many of something." How is it we never see these sort of advertisements in England?

Table shows in Britain rarely produce as many entries as hoped for and sometimes those who fail to bring any offer the excuse of their fishes being too small. A note in *Fish Fun* warns intending exhibitors for the forthcoming mollies-only show that experience has proved that these fish when shown all too often prove to be rather "tasy-busy" and too young to be away from their mothers. Some varieties of mollies are very slow growers and late developers so home enthusiasts can take heart from this trans-Atlantic plea. As for table shows, surely any fish, however small, are better than no fish. Mind you, I am not one who can protest too much on this topic, however. Only once in my life did I ever show a fish in a table show. It was a beauty, absolutely first class and a certain winner. Pity, it didn't get a prize: it was mid-winter and bitterly cold and nobody else bothered to enter any fish.

No matter where else you may have your home aquaria tank in the hall is well worth having. There is usually some corner or recess which will hold a tank and which is improved by this addition. Visitors cannot fail to notice what is to them an interesting novelty and a tank so situated is so out of the way that it cannot cause domestic friction, as can happen with other locations. At dusk the tank can have its lights switched on and this dispenses with the need for a hall light. It can also be left on when you are out and any prowling members of the Bill Sykes clan naturally assume you are at home. Electrical connections are usually no difficulty as the tank can be wired to the hall power plug. In winter this is quite a luxury as the diffused light seems to warm up the hall. If your tank can be seen from the open door you will be surprised how many callers from tradesmen to meter-readers evince interest. The main point about a hall tank, of course, is that it can be used as a quiet tank for breeders or shy fishes because in this situation there is a minimum of disturbance. This presupposes you haven't got seven or eight children, of course; if you have you shouldn't keep tropicals!

The Guppy—King of Tropical Fishes

by PETER DENDY

IN the last article we reached the stage of the arrival of the first brood in a 12 in. by 8 in. brood tank, from which the female was removed as soon as she had completed her delivery. No attempt should be made to feed the fry for the first day as they are still absorbing the remains of the egg sac. When feeding is commenced the ideal is to keep food in front of their noses all the time for the first few days, as this is the most important period of their lives. At 3 days they should be developing nice fat tummies.

Guppy fry are surprisingly large at birth and do not need Infusoria or the like, being able to cope at once with larger foods. The very finest food for starting them off is haine shrimp, and I always have shrimp swimming around the tank to tempt the young guppies to eat their fill. This can be varied by using the tube fry food, but very little should be added as it clouds the water. Later they can be weaned on to fine dry foods and amongst the best of these is liver, oven-dried till it is hard and then reduced to a powder by rubbing on a file.

Sexing the brood should be done as soon as possible, to obtain virgin females, and completed before they are a month old. I normally separate the sexes at 2 to 3 weeks, before any males have developed their gonopodiums. This is not too difficult, though some of the gold guppies are a bit tricky at times. The aim is to secure at least eight virgin females, which will give you four for breeding purposes and four for showing. Sexing is best carried out under a medium back or top light, which shows up the female gravid spot. Experiment will soon show you the best type of lighting to suit you. The shape of the anal fin is also a guide, as the female's is rounded and the male's gradually elongates, starting from the outer ray of the fin, which gives a pointed appearance as the gonopodium develops.

The sexed guppies should be put into two separate tanks as they are sorted out and a very watchful eye kept on the females' tank to make sure that a male has not crept in by mistake. This sexing is of the greatest importance if you want to raise top-quality fish, as you can then in subsequent generations improve the strain by the mating of selected males with selected females, or if you cannot improve it at least you can maintain it at its best.

Many aquarists "flock-breed" their guppies with all the females and males together in the same tank, which is extremely bad policy for three reasons. Firstly, the quickest maturing and most active males are often the smallest when fully grown, and these early maturers will dash round the tank fertilising all their sisters so that the tendency is for fish size to decrease from generation to generation. Secondly, the females will be fertilised before they are mature and this too has an adverse effect on the strain. Thirdly, this flock-breeding allows no control over the strain and you are in fact controlled by your fish and not your fish by you. It is remarkable how quickly an undesirable trait can become established amongst a repeatedly flock-breed strain.

Once you have sorted out your virgin females you must take care to keep them that way until you are ready to breed from them, and that means taking some elementary precautions with nets and wet hands. Several experiments have been carried out to show that free sperm in the water may be transferred to a female tank and effect a fertilisation. One batch of females became gravid after dipping a net into a male tank and then into the female tank. Wash your net out after use or better still use a special net for the females and do not plunge your hand from tank to

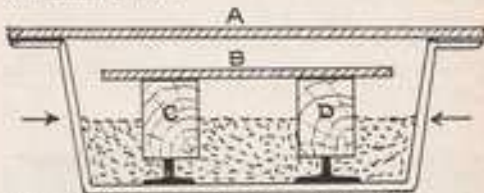
tank fiddling with the plants; you might cross over two strains if you are keeping more than one, and then you would be sunk.

The arrival of your first brood is the time to start keeping records. These will prove invaluable at a later date when it is time to out-cross or to carry out a few calculated crosses to obtain special features. Records are essential because you cannot carry everything in your mind with several strains being bred and it is wise to mark your tanks with brief details, particularly of the virgin females. Your record need only be brief and should give the following details: age and origin of original breeding stock, date of mating, date of birth of brood, number in brood, brood code letter to show the strain and general remarks relating to the particular brood.

Micro-Worm Culture

by B. POPLAND

MICRO worms present one of the most convenient sources of live foods available to the home breeder of tropical fishes. Almost all books on the subject speak well of their value as a food and yet in almost every book, the method of setting up the culture is awkward. For instance, one method suggested is to culture the worms in small tins and to dip match-sticks into the culture to obtain the worms. Presumably, then, one will also add the porridge culture medium to the fish tank. Most methods suggested have seemed to me to be in the same inconvenient manner and when I set up my own culture a friend advised me of a vastly superior method which I would like to pass on.



In this sectional view arrows show the level of the culture medium in the dish, which is covered by a glass or plywood sheet (A). Another piece of glass (B) is set on two hard-wood blocks (C, D) into which nails have been hammered.

Use a small dish as the container and cut two small pieces of hard wood to fit closely in the dish, high enough to allow a piece of glass to set on the wooden members, clear of the culture medium. Knock two nails into each piece of wood to stop any floating action and cover the whole set-up with a piece of plywood, glass or another dish. The worms, having an affinity for damp wood, swarm over the timber and cover the glass. To feed, merely lift the glass and dip it into the aquarium water, gently moving it to swirl off all the worms. In this way plenty of worms will be fed thus keeping down the numbers in the culture, and no porridge will be introduced into the aquarium. This method will be found convenient and satisfactory and if a really continuous supply is essential have two such dishes and overlap their starting dates.

ANTI-HERON NET



Photos

Midacres Ltd.

A large formal pond protected from raiding birds with the square-mesh nylon netting stretched above the surface

LOSS of fishes from garden ponds as the result of visits from herons is a nuisance met with in country areas.

The firm of Midacres Ltd. experienced this trouble with ornamental ponds in their grounds many years ago and commenced experiments to find ways of deterring the birds. This work has led to the development of an underwater net of nylon cord that is now available to others with "heron trouble." The net, of 6 in. mesh, can be stretched above the water surface or submerged 3 to 12 in. below the surface and is supported on nylon cord. It does not rot and does not detract from the appearance of the pond if used in the ways recommended by the makers in their descriptive pamphlet, which can be obtained from Midacres Ltd., Hyver Hill, London, N.W.7.



The anti-heron net in use in this pond is barely visible and growth of plants with surface leaves is not affected

GREEN WATER

by JACK HEMS

GREEN water is caused by the presence of free-floating unicellular plant organisms known as algae. Free-floating algae occur most frequently in thinly planted bodies of water exposed to long days of strong light. That is the reason why green water is always more common in the summer than it is in the winter. But unless green water suddenly turns yellow and smelly it does no harm to fish life. As a matter of fact, the majority of fishes grow fat and frisky in it; particularly baby fishes, for they eat the "greens," which are small enough to be swallowed without any difficulty.

Two love foods can be cultivated most successfully in green water. One is *Infusoria*; the other is *Daphnia*. To obtain a plentiful supply of *Infusoria* for feeding baby fish, fill several tall jars with green water. Into each jar introduce lettuce leaves, banana skins, slices of raw potato or chopped hay. Stand the jars in a dark, warm place. In next to no time the water in the jars will lose its green colour and develop greyish clouds of microscopic life—the right size for week-old fry.

To breed *Daphnia* in sufficient quantities to give 30 medium-sized fishes a good feed at least twice a week, the aquarist needs a container large enough to hold about 12 gallons of water. Introduce a few large *Daphnia* into the tank or barrel, and keep their water habitually foggy with copious supplies of green water and occasional handfuls of lawn mowings, cabbage leaves, or sprinklings of dried blood. The *Daphnia* will multiply in prodigious numbers throughout the warmer months of the year, but cold slows down their rate of increase.

To eliminate green water from the aquarium set up to add beauty and interest to a room, it is necessary to get rid of the algae in gradual stages. If the aquarium is darkened to the extent that the algae die in their millions almost overnight, then pollution of the water will follow, and the unfortunate fishes will have to be removed quickly before death overtakes them.

If the tank is located close to a window, pieces of tissue paper pasted on the back and two ends will soften the light sufficiently to check the growth of free-floating and other forms of algae without hindering the growth of higher plant life. To hasten the process of algae elimination, remove some of the green water, top up with fresh, and introduce more higher plant life to compete with the remaining algae in their struggle for light and food (nutrients in the water).

If the aquarium is lit by artificial light, reduce the quality of the light by replacement of a lamp or lamps with ones of lower wattage, though about the same effect can be obtained by covering the surface of the water with a thick carpet of floating vegetation.

There are chemical methods of dealing with green water. Perhaps least dangerous is to pour a solution of potassium permanganate into the aquarium until the water turns from green to brown. The result of this treatment is sudden death of the algae and serious depletion of oxygen in the water. So to safeguard the fishes from asphyxiation, the aquarium must be supplied with artificial aeration and filtration. The water will clear within a few days.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

I transferred a female swordtail in an advanced stage of pregnancy to another tank, and a few days later I found her dead on the floor of the aquarium. When I examined her, several dead fry fell from her body. Can you please explain this strange happening?

It is not wise to remove a female livebearer on the point of dropping her babies, to another tank. The shock sustained by netting, and the different surroundings, often results in the death of the mother fish and her young.

I have a pair of rosy barbs, and the female looks fat with spawn. The male, however, takes little or no notice of her. What can I do to interest the male in his mate?

You should remove the male from the company of the female and feed him on plenty of live and flesh food for about a fortnight. When he looks in tip-top condition, place him with the female last thing at night, and raise the temperature of their aquarium by 2 or 3 degrees. As a rule, the excitement of seeing each other again will result in a spawning.

It is not possible for me to heat a tank by electricity, and I wonder whether you could suggest an alternative method of keeping 19 gallons of water warm enough to maintain a small collection of tropical fishes?

Oil heating should prove perfectly satisfactory. There are one or two specially designed oil heaters for aquaria on the market, but you could make a reliable heater yourself by soldering a strongly made incubator burner into the lid of a shallow, leak-proof tin. A pint of oil used with a 1½ in. wick will last for about a week. Keep the wick clean, and turned low to give a steady, non-smoking flame. The bottom of the aquarium must be protected from direct contact with the flame by a thin metal screen.

I am a beginner in tropical fishkeeping, and would appreciate your advice on breeding paradise fish. My fish have spawned several times, but every time the eggs have hatched out the fry die within the space of 3 weeks. I have been feeding the fry on flour-fine dried food, which causes a mould to form on the compost and a scum to appear on the top of the water.

You have probably killed the fry with kindness. Too much food has polluted the bottom and caused the scum on the top. Feed more sparingly in future, and use Infusoria rather than dried food. The surface of the water must be kept clear of suffocating scum by drawing sheets of newspaper across it at frequent intervals.

Please can you tell me something about the breeding habits of *Corydoras catfish*?

Corydoras catfish are more likely to breed in alkaline rather than acid water. *C. palustris* and *C. aeneus* have proved to be the two species most easy to breed. The temperature of the water should average about 70° to 75°F. A female in spawning condition develops rosy tints on her lower sides and underparts, and lays a few eggs at a time on broad-leaved plants, on smooth rockwork or on a side of the aquarium. Spawning may continue over several hours. After the eggs hatch out, the fry drop down to the floor of the tank, and make themselves scarce among the crowns of the plants and the sediment. Micro worms, mashed white worms and powdered dried food should be introduced into the tank for them to eat. The parent fish seldom make any effort to seek out the fry, or molest them.

I am on the point of glazing a 26 in. by 15 in. by 15 in. aquarium frame. What thickness of glass should I use?

Plate glass ½ in. thick will prove satisfactory. If you want to economise, you could use ¾ in. plate for the front of the tank and rough-wired glass of the same thickness for the back, ends and bottom.

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



Photo:

Lawrence E. Parsons

Growing to a large size in a roomy tank, the blue gourami (*Trichogaster trichopterus*) is a species that is inclined to bully and chase smaller fishes.

I have set up a 18 in. by 12 in. by 12 in. tank for the first time, and have stocked it with guppies, zebra fish and two small blue gouramis. I have been told that the gouramis are unsuitable for this tank because they will quickly outgrow its dimensions. Is this true?

A full-grown blue gourami measures about 5 in. long, and at that size it needs about 15 gallons of water to move around in comfort. But two small specimens should do well in your aquarium. They will not make rapid growth in a small tank. But after they reach a length of 3 in. they will probably bully and chase the smaller fishes.

My aquarium has started to ooze deeplets of water along the bottom front edge of the frame. Is there any way that I can seal the cement without having to empty and reglaze the tank?

As the amount of water oozing from the junction of glass and frame is small, try applying several dustings of Alabastine or a similar quick-drying plaster filler to the wet surface of the cement on the outside of the frame. In the majority of cases the filler will check the flow of water and form a damp crust. Sprinkle more plaster filler on the cement edge, dust off and then paint over the crust with two or three coats of aluminium paint. This treatment usually results in a permanent seal.

Is the cardinal tetra any easier to breed than the neon tetra, and are its breeding habits any different from those of the latter species?

The cardinal tetra spawns like the neon tetra, but is no easier to breed. Subdued light, a spotless tank filled with absolutely clear, acid water, and a temperature of about 72° to 75°F, are among its breeding requirements.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have bought a spatterdock plant and find that it does not grow well in my tank although other plants do so. It is in a pot of gravel. What is the reason for it not growing?

The plant needs more nourishment than it can get from its pot of gravel. Replant it in some good loam or some chopped turf. Once it gets a good start it can send out its roots into the mud and droppings from the fish and so continue to get enough nourishment. Any freshly planted specimen always has difficulty in becoming established when competing with plants which have already taken up most of the ground space with their roots.

I have a tank 12 in. by 8 in. by 8 in. and have some plants and snails in it. I bought two small goldfish and one died within 3 weeks and the other seems very mopey. What is wrong?

The whole set-up may be at fault. Provided that the fish were healthy when they were purchased then the tank could not have been in a good condition. Water plants should be allowed to grow before any fishes are put into a newly set-up tank. The main fault with all beginners is that they just cannot refrain from feeding the fish every time they go near the tank. A fish has only to open its mouth and the owner will rush for the food and give some. This may be eaten or it may not. Most fishes when first put into a tank do not want to feed and if food is given then the water gets foul. See that the water is pure and does not come from a source where copper pipes are included in the circuit. Check up on all such points also if there is any air pollution through too much smoking in the room or gas heaters.

My pond is very green; can I cure this with copper sulphate?

Some pondkeepers swirl copper sulphate crystals in a bag around the pond, but remember that one-fifth part of copper to a million parts of water can also kill the fishes.

I have a goldfish which stands on its head most of the time. It was in a pond but is now in a tank; I gave it Epsom salts but it is no better. What shall I do?

The fish appears to be suffering from swim-bladder trouble. The cold may have brought this on. Epsom salt is not a cure for this complaint. Place the fish in shallow water, and if you can warm it up a little the fish should soon recover. Some fish are more liable to this trouble than others, and if it is an inborn complaint then it may not be possible to make a permanent cure.

A friend of mine would like to rid the water in his moat of green scum. How should he go about this?

The green scum is a form of algae which is encouraged by plenty of sunlight and the absence of healthy growing water plants. It would be a good idea to plant plenty of water lilies in the moat. These would look very attractive and I know of few better subjects for covering the surface of the water in a short space of time. If the lilies were planted in April they would soon make enough growth to cover a fair amount of surface. The green can be removed by using copper sulphate, but this would also kill any fishes in the moat and other water plants. The trouble will cease during the winter months and by the time the water warms up again it may be possible to obtain the necessary covering to shade out much of the sun.

I wonder if any of your experts could help me to identify a strange creature which has appeared in a jar of water snails recently hatched. It is about 1/2 in. long, resembles a caterpillar, is fatty coloured with white zig-zags. It is somewhat transparent against the strong light and has a remarkable tail, which is capable of being extended to 3 inches in length. Could it have hatched from eggs on the plants?

The creature, so well described, is the larva of one of

the drone flies, *Tabolaria* or *Eristalis*. The fly is something like a hover fly and lays its eggs in water. The larvae, which are known as rat-tailed maggots, hatch and live in the mud etc., on decaying vegetation. The pupa is somewhat similar to the larva but has two small horns at the head.

I have a few small goldfish which I wish to winter in safety. They have been in an outside sink and could go into a greenhouse or come indoors for the winter. Which is better?

It does not matter where the fish are kept as long as the water is not fouled. It can be very cold but this will not harm the fish. See that the container does not freeze up solid and do not try to feed the fish too much whilst the weather is cold.

Can I keep some small trout in a water tank, 5 feet long, 2 feet wide and 2 feet deep? The tank is fed by rain water from the roof and we get plenty in this part of Devon.

Of all the coldwater fishes that you might be able to keep in your tank the trout is the least suitable. These fish need a well-oxygenated water and even in good clear water some form of aeration is necessary to keep them healthy in a tank. There are many other kinds of fishes which you could keep as long as you take certain precautions. Most kinds of goldfish, rudd, tench, carp or hi-goi would be all right. Although you live in a country area it is probable that there is a quantity of soot and other foul matter on the roof from time to time. This would pollute the rain water and so could be dangerous to fishes. If you can divert the water away from the tank for a time until the roof is well washed the following water might be quite safe. If you put an old sock over the water spout you will be surprised at the amount of soot etc. it will collect. As long as you are careful to see that the water remains fairly pure you should be able to keep the fishes mentioned without trouble.

I have cleaned out my pond and now wish to restock it. I would like some lilies, snails and mussels, also fish. Where is the best place to buy them?

You can choose a dealer from any of those who advertise regularly in *The Aquarist*. You need not have too many oxygenating plants as ponds usually get plenty of fresh air from the atmosphere and any plants added will soon increase. Addition of snails is a debatable point, they do not do much good, do a little harm but the addition of them must be left to you. Freshwater mussels will not thrive in a pond unless there is plenty of mud or mud at the bottom. Do not overstock with fish; remember that they will grow and breed.

I have a tank of goldfish and recently they have been losing their scales. They do not look sore and cannot have rubbed themselves in any way. What is the cause?

Goldfish do not lose their scales unless there is something very wrong with them. Sometimes a scale or two can get knocked off when they are netted or they can lose a few when they rub against a sharp rock. However, this is rarely done. It is possible that the fish are attacked by some kind of parasite which is weakening the base of the scale where it is joined to the body. Usually fish lose scales only when they are in very bad condition or have been attacked by fungus or fin rot. You say that your fish appear healthy, which makes it all the more surprising. You can try giving them the Dettol bath, a quarter teaspoonful to a gallon of water, and only leave the fish in until they turn over in the solution and in any case not more than 5 minutes. This should help matters if parasites are the cause.

our readers



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

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

Coldwater or Tropical?

I HAVE just received the Schedule for the British Aquarists' Festival at Manchester in October and have read the following paragraph: "Note:—Heaters optional in all 'Coldwater Classes'." Surely this is a contradiction in terms. How can the classes be justified as coldwater if heaters are used?

We have two main divisions in fishkeeping: tropical and coldwater. The difference is that heaters are used in tropical tanks and none is used in coldwater ones. Directly heaters are used in coldwater tanks they become tropical ones and vice versa. There can be no justification for allowing heaters in coldwater tanks for exhibition purposes.

I know when the position first arose, as I was asked to judge a coldwater class and found a heater in a tank containing a sunfish. I refused to judge the fish in such a condition but, to save disqualifying the fish, I agreed to judge it if the heater was removed and the water allowed to cool somewhat. This I did but realised that certain people were importing fancy goldfish from abroad which had been reared with heat treatment and they thought that the fish they imported would not live long if kept in cold water.

This is all the result of the authorities allowing cheap foreign-bred fish to be imported. Just after the war there were plenty of good healthy coldwater fancy goldfish which were bred in this country. Once cheap fishes were imported then the British breeder found that he could not get a fair price for his spares and discontinued breeding. It is surely up to all interested "coldwater" breeders to see that the proposed rule does not become universal or over used again.

A. BOARDER,
Reuslip, Middlesex.

Under-gravel Filtration

THE letter from Mr. L. C. Betts of Barnstead (*The Aquarist*, July) in reply to my letter is very interesting, though a trifle dogmatic. If I have learnt one thing about the keeping of fishes it is that you cannot be dogmatic, unless you are looking for an argument. I did not and cannot specify why biological filtration gives trouble in practice when theoretically it is supposed to be the catfish's whiskers.

The trouble I have had with guppies fading away has been going on for 18 months and it has not been confined to inbred strains either. I have experimented with feeding

by withholding first one kind of food and then another, but the trouble persisted until I tackled the biological-filter angle. On shutting off these filters I found that the water in all tanks became slightly cloudy and this cloudiness took from 5 to 7 days to clear before the tanks regained their normal sparkle. This proves that a biological change took place in the water balance and that conditions with and without under-gravel filtration are subtly different. Perhaps, Mr. Betts, I clean my tanks out too regularly for a "biological" film to develop!

Whatever the changes were they were certainly to the liking of my guppies as none of them has even looked like fading away since I shut off the filters. I have now removed the filters from the tanks and when I did so I was struck by the quite strong typical plastic odour given off by the plastic material from which the filters were made, even though, or perhaps because, they had been in use for 18 months. Could it be that the plastic material was tending to dissolve in the aquarium water and poisoning it in the same way that deteriorating rubber fittings can? This has been suggested before, but whatever the reason I am more than glad to be rid of my filtering apparatus and to lose the advantages of flocculation put forward by Mr. Betts.

The use of salt or Epsom salts in guppy water has been much argued over, though there seems to be no advantage attaching to it if your own water has a reasonable mineral content, and of course plants are not too keen on it. Some of the big breeders in the U.S.A. swear by it and claim that guppies are more active and happy in salty water. The suggested concentrations are from one teaspoonful to 5 gallons to one teaspoonful per gallon. If Epsom salts is used at the heavier concentration the effect on guppies is to make them evacuate heavily, which should at least make them more lively for a bit anyway.

Before signing off I feel I must refer to the fortunate (?) fact that the letter from Mr. Betts was printed on the facing page to my article on guppies, in which I spoke strongly in favour of sub-gravel filters. That article was written some while ago and I beg leave to change my opinion in the light of further experience.

P. DENDY,
Evesham, Worcs.

Shubunkin Article

MY attention has been drawn to a letter in the June issue of *The Aquarist* written by Mr. R. Affeck criticizing an article contributed by me and published in March, 1960.

I have no desire or intention to use *The Aquarist* as a medium for promoting a vendetta between aquarists as groups or individuals. The article in question was written with the sole intention of assisting the many people who have written asking for practical help in improving their strains of shubunkins.

To give a detailed reply to the objections raised by Mr. Affleck would serve no purpose without having practical examples of the subject before us, namely the fish; so I would like to take this opportunity to invite Mr. Affleck to visit me, then he can inspect my breeding results for himself. It would also give us an opportunity to discuss any aspect of shubunkin or goldfish culture he desires.

JOHNSON H. HOOD,
Gosforth, Newcastle upon Tyne.

Reproduction in Water Fleas

MR. W. J. P. SMYLY'S letter (*The Aquarist*, July) about my article "What do you know about *Daphnia*?" leaves plenty of room for argument. Before going further, however, let me frankly admit he is right to pull me up for referring to the ephippium as a resting egg. It is, as he states, the sheath enclosing the egg or eggs, and not the egg itself. And that is the extent of my agreement with his letter.

To begin with I have not "quoted" any observations. I have simply made them—observations and conclusions based upon years of experiments with *Daphnia pulex* and *D. magna*. In contrast, Mr. Smyly's letter is practically all quotes from various people's findings.

I have explained why I believe that the development of ephippia is merely a stage in the life history of *Daphnia*. In each sample taken from the wild in which ephippia-carrying females were present there were also present larger and smaller specimens of the same species, carrying parthenogenetic eggs. I think it is reasonable to assume that in the same body of water the food supply at any one time is the same for all the *Daphnia*. Why, then, should all those of a particular size be unable suddenly to get sufficient food, as Mr. Smyly suggests, and produce ephippia as a result, while the others obtained more and produced ordinary eggs? And why should identical conditions obtain in ponds 40 miles apart—the same-sized females of the same species producing ephippia during the same period?

I have never, so far, seen a female produce more than one ephippium, and in each case she has continued to grow afterwards and produce parthenogenetic eggs. Ephippia were produced whether or not males were present.

In this connection Mr. Smyly writes: "viable young are produced as a general rule only if they (the resting eggs) are fertilised." As a general rule! Are there known cases, then, when viable young are produced without fertilisation? If so, let us hear about them.

Finally, Mr. Smyly may be correct when he suggests that a female ready to lay resting eggs is less vigorous than a parthenogenetic female, but there is no way of proving it. It might be equally correct to say that these females, being ready, deliberately encourage the males if they are present, inviting their attentions by offering no resistance.

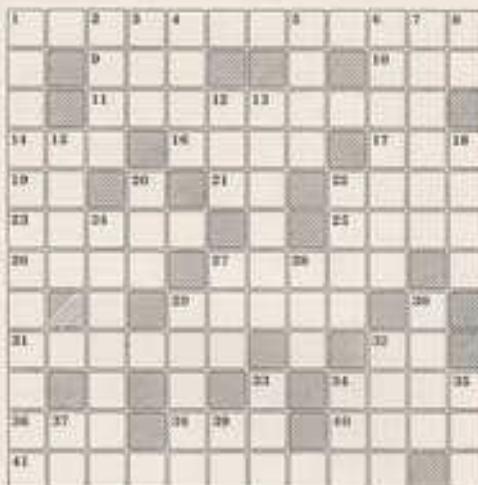
Whatever the facts, there is no doubt that females not ready to lay resting eggs are most vigorous in their efforts to dislodge "amorous" males, shaking themselves and turning somersaults in the process. The males are either finally dislodged by force, or "take a hint" and release their hold.

One interesting and thought-provoking occurrence is the very frequent attachment of two males at the same time to a female, one hanging either side of the base of her carapace. What occurs then I have been unable to make out.

C. E. C. COLL,
Ilford, Essex.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1. *Ceratostyris granulata* (8, 4)
9. Tuna from — (3)
10. Not gross part of aquarist's equipment (3)
11. *Hyphessobrycon lineat* (5, 4)
14. Oris (3)
16. Very hard of hearing (4)
17. Before marriage (3)
19. Nona loses sense of direction on returning, yes? (2)
21. Briefly near (2)
22. False god (4)
23. *Labeo reticulatus* (3)
25. Is our hobby one of these or is it a science? Ask a star (4)
26. Unhappily fan may do this, or be the result of it (4)
27. Picked the hose after a hundred (5)
29. Very important safety valves for electrically heated tanks. Better blow one than be fried yourself (5)
31. Clarify by letting sediment sink (6)
32. At 10 percent for you, mind you don't overlook 80 (2)
34. Parthod (4)
36. Give birth (3)
38. One-spot (3)
40. Misd (4)
41. Aquarium grass (10)

CLUES DOWN

1. "On the Road to Mandalay where the — — play" (6, 6)
2. Lde (4)
3. Sicken (3)
4. Of Toid Hall (4)
5. Implements for landing big fish (4)
6. Use a fish trap, perhaps (7)
7. Warm again (6)
8. North Territory (1, 1)
12. Humours grossly (3)
13. See 29 Across and take great care (8)
15. Reserved in the Scots way (4)
18. Bats are otherwise (4)
20. Snappy but low sleep (3)
22. Drink, fish, voice or nature (4)
24. Fish that are doing this may be in foul water (7)
27. Wand (3)
28. Over the poetic way (3)
29. Be suspended in water (5)
30. Agitate with a stick, for instance (4)
32. Operatic solo, nearly all wild (4)
33. The cup that cheers (3)
34. My French friend (3)
35. Welsh salmon river (3)
37. Monocelis' organisation (1, 1)
39. Measure for goldfish? (2)

(Solution on page 134)



from AQUARISTS' SOCIETIES

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

AT a recent meeting of the **Ilford and District A.S.** and P.K.S. Mr. B. Arnold lectured on worm culture—whiteworm, isopod worm and macro worms—and also dealt fully with the production of euglena.

The table show was for any variety of water plants including or tropical and the winners were: Tropical, 1, 2 and 3, Mr. Scobling; Cichlids, 1, 2 and 3, Mr. Berger. The secretary is Mr. V. Price, 11, Hance Road, Barkingside, Ilford, Essex, and new members will be welcome.

THE speaker at the monthly meeting of the **Bradford and District A.S.** was Mr. George Cooke of Dewsbury. There was a talk on the breeding of glowfish and also a discussion on the British Aquarists' Festival which is to be held at Belle Vue, Manchester in October. The table show A.O.V. including Cichlids, resulted in a win for Mr. A. Whitford. Mr. G. Robinson was second and Mr. G. Holmes, third.

RESULTS of the open show of the **Messydale A.S.** were as follows: **Furnished aquaria**—1, L. Coart; 2, W. Barre; 3, H. Roe. **Live-bearing (general)**—1, Mrs. B. Swanson; 2, H. Swanson; 3, R. Bennett. **Live-bearing (special)**—1 and 2, M. E. Kevill; 3, F. Holloway. **Live-bearing (cichlids)**—1, H. Swanson; 2, D. Jones; 3, F. Holloway. **Live-bearing (non-cichlids)**—1 and 2, H. Stanger; 3, L. Lewis. **Labyrinth (Burmese Fighting fish)**—1 and 2, H. Stanger; 3, L. Lewis. **Labyrinth (other)**—1, L. Coart; 2, L. Coart and T. Turner (tie); **Characin (small)**—1, Mrs. B. Swanson; 2, J. Threlkeld; 3, B. Moore. **Characin (large)**—1, A. Ashton; 2, L. Lewis; 3, J. Tinker. **Barbs**—1, A. Ashton; 2, H. Stanger; 3, H. L. Lee. **Cichlids (small)**—1, L. Lewis; 2, B. Moore; 3, F. Holloway. **Cichlids (A.O.V.)**—1, L. Coart; 2, H. L. Lee; 3, H. Stanger. **Top-Monks**—1, H. Swanson; 2, J. Hodgson; 3, J. Steel. **A.O.V.**—1, J. Hodgson; 2, F. Holloway; 3, J. Hodgson. The Liverpool show which was won by Messydale with 123 points, Burnley being second with 28 points and Derby third with 14 points.

THE **Southampton A.S.** held its annual open show recently. The fixtures of the show this year was a 4 ft. tank containing 200 open tetras. Also displayed were 12 Club and Individual Furnished Aquaria. However, the course of attraction this year, appeared to be the Schools Furnished class of Tropical and Coldwater furnished aquaria, and there were ten entries in all. The judges were Mr. and Mrs. Meadows and Mr. Crowl. The full details are as follows: **Club Tropical Furnished**—1, Southampton; 2, Portsmouth Aquarists; **Individual Tropical Furnished**—1, C. Sprinks; 2, D. E. King; 3, C. Sprinks; 4, D. E. King; **Club Furnished Coldwater**—1, Portsmouth Aquarists; 2, Southampton Aquarists; **Individual Club Furnished**—1, Miss W. Ryder; 2, Miss W. Ryder; 3, W. Ryder; 4, R. V. Fish; **Non-Club Furnished**—1, J. Will; 2, Miss F. Verney; **Senior Schools Furnished**—1, 2 and 3, St. Anne's; 4, Winton Park; **Junior Schools Furnished**—1, Aspatria; 2, and 3, Tattenbrook; **Guppies (small)**—1 and 2, Master G. B. Price; 3, J. A. Garner; 4, A. E. Smith; **Guppies (female)**—1, J. Scott-Morgan; 2, A. E. Smith; 3, J. Scott-Morgan; 4, J. A. Garner; **Swordtails**—1, J. Scott-Morgan; 2, D. V. Jones; 3, J. Scott-

Morgan; 4, Master Peter and Lindsay Scott-Morgan; **Mollies**—1, J. Scott-Morgan; 2, R. A. Keating; 3, D. E. King; 4, R. Steady; **Fishes**—1, J. Scott-Morgan; 2, A. Brown; 3, Peter and Lindsay Scott-Morgan; 4, R. V. Fish; **Barbs**—1, J. Stillwell; 2, C. Sprinks; 3, F. Poole; 4, J. Scott-Morgan; **Rambos, Danios, Minnows**—1, J. Stillwell; 2, J. Scott-Morgan; 3, E. Twidmore; 4, V. H. Voysey; **Stemless Fishes**—1 and 2, J. Scott-Morgan; 3, C. E. Yerman; 4, J. Scott-Morgan; **A.O.V. (bary-nema)**—1, A. Long; 2, J. Scott-Morgan; 3, V. P. Voysey; 4, R. V. Fish; **Characins**—1, 2 and 3, J. Scott-Morgan; 4, D. V. Jones; **Cichlids**—1, A. Brown; 2, J. Stillwell; 3 and 4, J. Scott-Morgan; **Catfish**—1 and 2, R. A. Keating; 3, J. Scott-Morgan; 4, R. Poole; **A.O.V. Tropical**—1, J. Scott-Morgan; 2, R. V. Fish; 3, J. Stillwell; 4, J. Scott-Morgan; **Breeder—Livebearers**—1 and 2, J. Scott-Morgan; 3, D. V. Jones; 4, D. V. King; **Breeder—Guppies**—1, V. P. Voysey; 2, C. Sprinks; 3, J. Scott-Morgan; 4, J. Scott-Morgan; **Common Goldfish**—1 and 2, G. Arton; 3, D. V. Jones; **Shubunkins**—1 and 2, R. Goodwin; 3, E. Levey; **Fantails**—1, R. V. Fish; 2, B. Goodwin; 3, W. W. Angell; **A.O.V. Fancy Goldfish**—1 and 2, W. W. Angell; 1 and 4, R. V. Fish; **A.O.V. Coldwater**—1, G. Aston; 2 and 3, J. Stillwell; 4, Miss W. Ryder; **Fishes**—1, K. Poole; 2, 3 and 4, D. E. King. **Best tropical fish in show**—A.

Brown (Angel fish), 88 points. **Best coldwater fish in the show**—G. Aston (Common Goldfish), 81 points.

FOR the second time this year the **Independent A.S.** had a day out. This time the society went to Brighton on the occasion of the fifth anniversary. In the morning a visit was made to the Kingfisheries at Beckenham in Kent, where the members and their friends, purchased a few new specimens for their collection of tropical fish, also plants. The party of 41 included Councilor G. A. Barwood and Mrs. G. Barwood, also Mr. G. Dewhurst, Borough Entertainment Manager of Brighton. The society recommence their activities early in September at Mission School, Upper Hamner Road, N.T.

AT the July meeting of the **Bristol Tropical Fish Club**, Mr. H. C. B. Thomas gave a very interesting talk on "Balanced Aquaria," and answered questions put to him by members in connection with this subject.

With two heats completed in the Bristol Tropical Fish Club inter-club table show competition, the points position is B.T. Fish Club 41 pts., Bristol A.S. 244 pts., Keynsham A.S. 10 pts., Bath A.S. 6 pts. The remaining heats will be held at Keynsham in September and Bath in October. Considerable interest and keen competition has been aroused amongst local aquarists in this competition, and the eight classes of fish so far exhibited have produced 184 entries. This club will be again exhibiting furnished aquaria at the Bristol Flower show to be held in September.

MEMBERS of the **Kingston and District A.S.** continue to take prizes at the top shows. The Kingfisheries Cup was won by D. W. Ellis at the Catford show for best pair of live-bearers (Veltiers mollies) and the same fish took 1st and 2nd places at the A.S.L.A.S. show. Kingston are now leading A.S.L.A.S. after the second leg. Mr. George Cavendish will be visiting the society on the 7th November, and the annual show will be held on the 24th September.

HARDNESS of the water in the district and the difficulty of breeding certain types of tropical fish was one of the items discussed at a recent meeting of the **Hounslow and District A.S.**

A table show was also held for fishes of "any other variety," the winner of which was Mr. Woodward's chaper with 70 pts.; second was Mr. R. Cole's spotted danio, 76 pts. Then there was a tie with 75 pts. between Mr. Bush's rostrum, Mr. Patrick's harlequin, Mr. Pratt's blue snail, and Mr. Reynolds's silver catfish.

THE magic name in fish-breeding, "Neon Tetra," was the subject of the talk at a meeting of the **Blackpool A.S.**

The chairman was Mr. L. A. Childs and the speaker, Mr. J. R. Gibb from the Scottish A.S. It was announced that the results of the competition for the new badge design were to hand. It had been very difficult to reach a decision but after careful thought the committee had decided that the most suitable design had been submitted by Mr. R. E. Lagg, curator of the Tower Zoo and Aquarium. The table show results were: **Robinson Trophy**—1, B. B. Simons; 2, Mrs. B. Dore; and Mrs. G. Crowther; 3, Master B. Crowther. **Quarterly show results**—1, B. Dore; 2, Mrs. G. Crowther.

THE results of the table show for **Anthonis held recently by the Goods and District A.S.** were as follows: 1, J. N. Banks (Kissing gourami); 2, F. Hill (Lates gourami); 3, J. N. Banks (Dwarf gourami); 4, G. Appleby (Three spot blue gourami). The outing to Hemingham and Leicester was very satisfactory, all 35 seats being taken. The next table show is for Cichlids.

AT a show for Barbs and A.O.V. at the **Keighley and District A.S.** meeting the results were: Barbs—1, F. Ayer; 2, H.



The Aquarist's Badge

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

To obtain your badge send a postal order for 2s. 6d. together with the *Aquarist's Badge Token cut from page six*, to *Aquarist's Badge, 7th Avenue, The Basin, Half Acre, Brentford, Middlesex*, and please specify which type of fitting you require.

Remix: A. R. Ebbison; A. M. Jamison. Any other variety: I. E. Hanson; J. R. Warwick; A. R. Ebbison; A. M. Jamison.

TONQUAY Aquarium has received its most unusual exhibit—a sucker fish.

It was found attached to a blue shark taken off Torbay by visiting anglers, Mr. and Mrs. Gibson, of Halifax, and was brought back in a bucket of sea water.

The shark was the biggest taken so far in Torbay's shark fishing season. Weighing 126 lb., it was 9 ft. 1 in. in length.

At a meeting of the **Hampstead A.S.**, Mr. Dyson (President) of the Dorothea A.S. was the principal guest. An interesting and enjoyable evening was had, discussing and comparing experiences with Yorkshire friends.

On 20th September, Hampstead will be the hosts for the North West London Group of Aquarists Societies when a coldwater show will be held. The society's annual show will be held on Saturday, 26th September.

Visitors are welcome to these events and details may be obtained from Mr. P. B. Utton, 126, Mansfield Road, N.W.3.

AQUARIST'S CALENDAR

20th-24th September: Leeds and District Annual Open Show at Trinity Hall, Rose Lane, Leeds. Entry form from Mr. L. Greenhaw, 28a Dawson Road, York Road, Leeds, 9.

23rd-24th September: Macclesfield Aquarists Society annual show.

24th September: Kingston open show. Details and Schedule from Mr. C. Henty, 120 Cradocks Avenue, Ashford, Surrey.

22nd October: Herdon and District A.S. annual convention, 6-9 p.m. at Whitefield Secondary Modern School, Clarendon Road, Herdon, London, N.W.2. Applications for tickets should be made out to the secretary, Mrs. B. Robertson, Buck Cottage, 45, Buck Lane, London, N.W.5.

22nd-23rd October: British Aquarists' Festival, Belle Vue Zoological Gardens, Manchester. Schedule from Mr. Geo. W. Cooke, Spring Grove, Fairbairn, Batley, Yorks.

4th-5th November: Bristol Aquarists' Society annual open show at Bishopston Parish Hall, Bristol.

Crossword Solution

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

Breeding *Otocinclus affinis*—by E. FOSTER

THE quaint and interesting little catfish *Otocinclus affinis* deserves much more popularity than it has attained. I think that the majority of aquarists misunderstand its requirements, give it the wrong conditions and meet early failure. It seems to be a general belief that this is a high-temperature fish, and this may be due to the fact that it is capable of taking in atmospheric air.

Actually, it does not take advantage of this. In its natural habitat it is found in more or less swift running waters which could indicate its desire for a lower temperature range and well-oxygenated water. My first experience with these fish ended disastrously, but after careful study of them I was successful, and hope to convince the aquarist that they are easy to keep and not too difficult to breed.

Once established they will give hours of endless pleasure and indeed amusement, both to the one community-tank owner and the fish-house owner, who will also find a few of these fish a great asset, for unlike their cousin *Plecostomus pleurocercus* they are dainty fishes and do not stir the tank up when on the move.

Otocinclus affinis is a member of the family Loricariidae and is a native of South-Eastern Brazil, being found as stated before in fast-running waters. Adult specimens are between 1½ and 2 in. in length; colour is greyish brown and the fish is covered with dark spots, a black band running from the nose over the eye and along the body to the tail. The fish has no adipose fin and has no scales, but is instead covered with bony plates. The mouth is perfectly ventral and the lips form a sucker with which it can adhere to almost anything. Owing to the fact that its swim bladder does not properly develop it is a very poor swimmer, hence its habit of moving about in short darts. As mentioned earlier, it can breathe from the atmosphere, but does not use this capability to advantage and will not thrive in poorly oxygenated water. However, one does see it occasionally dart to the surface and return to the exact spot it has just left.

Otocinclus affinis is a very peaceful and industrious fish. In fact, it ignores all other aquarium life and carries on "working" throughout the day, as it is not nocturnal as some may believe. It rests just like other fishes during darkness.

By means of its sucker it attaches itself to the leaves of plants, moving along them and taking off any algae, also

using its ventral fins as if they were hands. This operation is carried out without disturbing the plants in any way. Occasionally it can be seen swimming upside down on the surface of the water, presumably taking in any food from the surface film. Apart from algae, which are its staple diet, it will eat almost anything. Sex is rather difficult to distinguish, although as a rule the female is slightly larger than the male and has a more rounded body.

My first experience of breeding these fish was purely accidental, and I can take no credit whatsoever. I had a couple (I did not even know they were a pair) in a large tank that contained some young White Cloud Mountain minnows. One day I casually glanced in the tank and was amazed to see about a dozen young fishes about ½ in. long actually adhering to the leaves of some *Cryptocoryne beckettii*. After a couple of days I removed the parents and placed them in another tank with similar conditions. However, they showed no interest in one another, and went their own separate ways, working the tank over. After a month or so I noticed they were keeping company again, so I fed them with mashed white worm, salmon and dried *Daphnia*, and also placed a large stone in the tank. They showed great interest in this and about a week later they spawned, not on the stone, but on the aquarium side. There were about 60 to 70 eggs set close together, the male seemed to be on guard and the female was happily working away as usual. The eggs hatched in about 4 days and like so many other fry the young clung to the glass. Surprisingly enough, up to that moment I had given no thought to the feeding of the fry, so I resorted to the squeeze-bag containing the yolk of a hard-boiled egg. The fry grew quickly and within a week had taken to the plants and were feeding on algae.

It seems they are born with the ventral mouth fully developed and are well equipped for feeding for themselves almost from birth. In no way at all were they bothered by the parents. Since that time I have had several spawnings, not large ones, but enough to give me the feeling of success.

If I may recount, I feel that the aquarist will be successful with *Otocinclus affinis* provided that he gives the fish their ideal conditions, i.e.: (1) temperature not above 74°F; (2) plenty of sunlight; (3) a well-planted and oxygenated tank.

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THERMOMETERS

Dunlop Compact	4 4
Comet Plastic Back (mercury)	4 4
Fluorite (spirit)	2 4
Parquet Aqu.	5 4
Sock on (spirit)	5 0

PUBLICATIONS

Handbook of Tropical Fishes	105 0
The Encyclopedia of Tropical Fish	40 0
Tropical Fish	39 0
Exotic Aquarium Fishes	84 0
All about Tropical Fish (1950 series)	71 0

Shirley Aquatics Ltd.

WATER PLANT NURSERIES AND FISH HATCHERIES—Phone: SHIRLEY 134

Stratford Road, Monkspath, Shirley, Solihull, Warwickshire

Tropical Fishes in wonderful variety

At 2/6 Widows, Flames, Beacorns, Bloodfins, Pistella, Neons, Tiger barbs, Cherry barbs, Nigger barbs, Checker barbs, Arulius, Zebras, Scissortails, White clouds, Blue and Green fighters (unsexed), Red platy, Moon platy, Black platy, Red swordtails, Angels, Blue gouramis, Dwarf gouramis, Thicklip gouramis, Australian rainbows, Swordtail characins, Kribia loach, Harlequins, Golden barbs, Spotted danio, Pearl danio, Giant danio, Black molly, Jordanelia, Lace guppy, Paradise fish, Glowlights. All the above well-grown fishes.

5/- Specials Large rosy tetras, Lyretails, Apistogramma Ramirezi, Good firmmouths, Hatchet fishes, Copeius arnoldi, Golden dawn tetras, Nannostomus marginatus, Veiltail Angels, Giant Gouramis.

Sexed pairs of interesting species Notobranchius Rasborei 25/- pair, N. Guntheri 20/- pair, Dwarf gourami in colour 10/- pair, Thicklips 12/6 pair, Shirley blue fighters 15/- pair, Green fighters 12/6 pair, Lyretails 10/- pair, A. bivittatum 15/- pair, Paradise fishes 10/- pair, Panchax Lineatus 12/6 pair.

Special high grade fishes Large Black Angels 12/6 each, Lace Veiltail Angels 7/6 each, Male velifera molly 10/- each, Loricaria Parva (Whiptails) 17/6 each, large aquarium reared.

MANY OTHER INTERESTING FISHES FOR CALLERS

Shirley Special this month

Plants! (UNTIL OCTOBER 14th ONLY)

Giant Vallisneria 2/- each, 6 for 10/-
New Marbled Vallisneria 2/6 each, 5 for 10/-
Spatterdocks 3/6 each, 4 for 10/-
Ambulia 1/- each, 10/- dozen
Cabomba 1/- each, 10/- dozen
Pistia (Water Lettuce) 1/6 each, 10/- dozen
Eichornia (Water Hyacinths) 2/6 each, 5 for 10/-

Fishes

FOR POND

6" Golden Orfe 10/- each, 12 for £5
Bright Golden Comet-tailed Goldfish 5/- each, 12 for 50/-

Aquarium Plants

(Send S.A.E. for lists)

Tropical (T)	Coldwater (C)
Ancistrus granatinus (Japanese Bush) (T & C)	2/6 & 3/6
Agonostemon undulatus (T)	2/6
Anolla caroliniana (T)	2/-
Bacopa (Dwarf Bacopa)	3/6, each, 2/6 doz.
Bacopa (T & C) (giant)	6/6, each, 5/- doz.
Cabomba (T)	1/6
Cardamine lyrata (Bunch) (T)	2/6
Cryptocorynes (For 26 species see plant list)	
Echinodorus paniculatus (T) (Amazon sword)	7/6
Echinodorus (For 15 species see our list)	
Flourea Densa (T & C)	6/6, each, 4/- doz.
Floucharis aculeata (Dwarf grass) (T & C)	2/-
Flourea culticoides (T & C)	2/6 bunch
Laguncularia Maritima (Formerly Flourea Crispus)	
	6/6, each, 4/- doz.
Linnopeltis ovaliflora (umbrella) (T)	2/-
Ludwigia arvensis (T & C) (needle)	3/6, each, 6/- doz.
Ludwigia linearis (T & C)	6/6, each, 5/- doz.
Myriophyllum elaeagnoides (T & C)	1/- each, 10/- doz.
Nepenthes mirabilis (Spotterdock) (T & C)	5/-
Sagittaria natans (T & C)	3/6, each, 6/- doz.
Sagittaria imensis (Giant Sag.) (T & C)	2/6
Salvinia auriculata (ponytail)	2/-
Saxifraga hypnifolia (Water Rose) (T)	2/6
Synonyms triflorum (Water Wieria) (T)	2/6
Vallisneria spiralis (T & C)	3/6, each, 6/- doz.
Vallisneria spiralis (T & C)	3/6, each, 9/- doz.

AND MANY OTHER SPECIES

See our list

SHIRLEY SPECIAL PLANT PARCELS

30 plants in variety 10/-
50 plants including unusual species 30/-
Please add 1/6 post & packing

Over 120 plants illustrated
in our book
A MANUAL OF
AQUARIUM PLANTS
7/6 post paid

PLEASE NOTE.—All enquiries requiring a reply MUST be accompanied by S.A.E. Our premises are situated on the main Stratford-Birmingham road, 1 mile from Birmingham, Midland "Red" Bus No. 130 from Bull Ring, Birmingham, passes the door, sign at "The Crown", Monkspath.
HOURS OF BUSINESS.—Weekdays 10 a.m.—6 p.m., Sundays 10 a.m.—12 noon, May—July Sunday afternoon also.
TERMS OF BUSINESS.—Cash with order please. Fish sent by rail. Typical minimum order £5, insulated container and carriage 10/-. Cold-water minimum order £2 plus 10/- van and carriage. Plants by post (minimum order 10/-) please add 1/6 post and packing.