

The AQUARIST AND PONDKEEPER

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Editorial

ONE of the most impressive stories of animal migration is that of the eel, which (it has been written and told for nearly 40 years), before it can satisfy its breeding urge must travel 3,500 miles to the Sargasso Sea. It is now suggested that this is not the true story; instead of making a romantic journey to far-off spawning grounds the European eel may, in fact, never succeed in reproducing itself at all. Dr. Denys W. Tucker, of the British Museum of Natural History, has given a reasoned and full account of the facts which lead to this conclusion in a paper in *Nature* last month.

American and European eels are not distinct species, says Dr. Tucker, but only varieties of one species. Larval stages of eels hatched in the Sargasso Sea are from the spawnings of the American variety, that is, from eels which have migrated to the area from the rivers of America. Many of the young developing eels, caught in easterly currents, arrive at British and Continental waters, to as far south as North Africa, and there mature into the European form. Although this variety in due course descends the rivers to the sea again, this, according to Dr. Tucker, is a fruitless journey and the eels die without breeding. Those young eel larvae which reach American coasts from the Sargasso, however, mature in American rivers and will complete the cycle by becoming the parents of another generation of eels when they return to the Sargasso spawning grounds. Thus the American eels are held to be constantly replenishing the eel populations of European and Mediterranean as well as American waters.

Included in the detailed evidence presented by Dr. Tucker are the facts that specimens of adult European eels have not been seen naturally in their pre-breeding state, nor have any been caught in the Atlantic during their supposed return journey to the Sargasso, and that direction of sea currents renders unlikely the possibility of eels ever reaching the Sargasso from this side of the Atlantic. It seems fortunate that one female eel can produce 10 million or so eggs, for only by such prolificacy can the biologically senseless European migration be subsidised!

AQUARIUM PLANTS FOR THE CONNOISSEUR

The Aponogetons

by W. L. MANDEVILLE

WITHOUT a shadow of doubt, the appearance of home aquaria and display tanks throughout the country has been improved by the high standard of artistic arrangement seen in competitive events, but even in this fiercely competitive field, one often sees attempts to transpose purely terrestrial motifs into an aquatic medium: walling, rockeries, bye-ways and lanes make an attractive picture to the superficial observer, but a careful analysis of the leading tanks will reveal that the artists have not only built in an attractive picture, but also maintained an aquatic connotation throughout the aquascape.

Rockwork is not only waterworn, but appears to have been worn by the water in the position in which it stands. Compost is arranged as if currents of water had spread it there; and whilst some plants, by their size, colour or leaf structure may be used to emphasise depth or distance, others will certainly be displayed to indicate currents of water, in what would otherwise be a well-arranged but static picture. It is in the simulation of water movement that the true aquascapist excels, and his medium is often one or other of the aponogetons.

Aponogetons

The half-dozen or so aponogetons generally available to the tropical aquarist all have elongated leaves which are crimped or crinkled as if activated by currents of water. The forms from which all leaves spring vary in size according to species, but are no sure guide to identity, and although forms from native sources are often offered for sale, cross-pollination in native Asiatic stock is very common, giving rise to indeterminate crosses between *Aponogeton natans* and *A. undulatus*, *A. undulatus* and *A. crispus* or *A. crispus* and *A. natans*. If true specimens are needed, it is wiser to purchase stock from cultivated sources, in an immature stage, but with the leaf form showing.

Aponogeton fenestralis. (Origin: Madagascar.) Is generally considered to be the aristocrat of aquatic plants;

but this is a matter of opinion. Certainly the distinctive feature of the skeletonised leaves, emphasised in its popular name "Madagascar lace plant," makes recognition certain, but cultivation is slow, and after-care is not easy. The precise light control, necessary to prevent algal infestation, is not conducive to the growth of associated plants, and sudden changes in water consistency are detrimental to the plant, making transference problematical. Acidity or alkalinity of water would appear to be less important than a satisfactory density.

It is a plant for those determined to have something different, and prepared to consider its maintenance as paramount. Associates best with *Cryptocoryne*, and the resultant water conditions are suitable for characin fishes.

Aponogeton ulvaceus has a superficial resemblance to *A. fenestralis*, the lattice-work leaf structure being apparent but is filled with tissue in this species, not exposed as in *fenestralis*. Not so temperamental as *fenestralis* but a plant that appreciates space and light. It is best used to form an "island" of foliage in the larger tank. Its broad, translucent, pale-green leaves undulate throughout their length, and curl at the edges, giving an appearance of gentle water movement unapproached by any other decorative aquatic plant. It is apt to get damaged where constant netting occurs, and "concealed pot" culture is advisable as otherwise the corm position may be overlooked when servicing the tank during the plant's period of rest.

Aponogeton cordatus. (Origin: S.E. Asia.) This has long strap-like pale-green leaves carried on short petioles, attaining an overall length of 12-18 in., varying according to water depth. Leaf edges ripple from bases to the points of leaves, which "frond" through the water in many varying directions. Multiplicity of leaves should be the objective of the culturist for decorative effect, and this is achieved by a rigorous removal of surface leaves. An ideal plant with which to break up the rectangular lines of a tank and to conceal equipment. Will hold its own in growth rate when



Photos 1

Species of *Aponogeton* (left to right): *A. crispus*; *A. cordatus*; *A. undulatus*; unidentified species from Siam

Shirley Aquatics Ltd.



Left, *Aponogeton fenestralis*; right, *Aponogeton ulvaceus*

associated with many plants of differing characteristics provided that a good quality of light is available throughout the water.

Aponogeton crispus. (Origin: Ceylon, India.) The long narrow leaves of *A. crispus* are carried on short stems which tend to hold the leaves of immature plants rather more erect than obtains in other aponogetons, but in mature plants, the crinkle-edged leaves frond in varied directions according to the direction of light. Pale green in colour, almost translucent, but with the strong parallel veins showing in relief; both in leaf structure and plant formation, this aponogeton is a decorative asset. Where rising rockwork is used it is ideal for breaking the line and softening the edges. A plant for mid-distance corners rather than as a centrepiece.

Aponogeton undulatus. (Origin: E. Asia.) Often confused with *A. crispus*, but not when pure stocks are viewed together. *A. undulatus* has mid-green leaves, the edges of which "undulate" rather than crinkle, and are somewhat longer than those of *A. crispus* at maturity, growing to 18 in. In all stages of growth, the leaves are very "light-directional," resulting in a less orderly and more "bushy" appearance than obtains with *A. crispus*. It is an effective space-filler. The undulated foliage provides an effective aquatic design which would be very difficult to obtain by "arrangement." From compost level to water surface, the plant consists of leaves seeming to wave in non-existent currents of water.

Aponogeton natans. (Origin: Asia.) Immature forms and corms of this plant often come on to the market described as *A. ulvaceus*, but the resemblance in mature stock is very slight, and in cultivation considerably different. *A. ulvaceus* carries the typical U-shaped flower carried by African species, whereas *A. natans* has the single flower spike usual in aponogetons of Asiatic origin. The main structure of the plant consists of pale-green narrow leaves, about 6 in. in length, soft in texture, but without the attractive haphazard "flow" of *A. ulvaceus*. In addition to its submerged leaves, the plant has a strong tendency to produce leaves carried on long stems to the surface of the water. These should be removed regularly from the base, to avoid over-shading the water and to encourage submerged foliage. An accommodating aponogeton so far as association with other plants is concerned, but one inclined to be

rampant in surface foliage, and has an almost complete "die-back" during the rest period.

General Notes and Cultivation

It is generally agreed that the aponogetons have a seasonal rest period, but where artificial light and heat are controlled by the culturist it does not follow that this seasonal rest is annual. With some species under cultivation, the rest period is only a cessation of leaf formation with a little disintegration of older leaves, synchronising with the appearance of new ones.

A. ulvaceus is often reported as "dying down in December and January." At Shirley Aquatics Ltd., during these months, plants of *A. ulvaceus* and of *A. undulatus* can be seen not only in full leaf but also carrying flowers, and with these two species having origins as diverse as Madagascar and Asia, it would appear that no set period such as "annual" can be expected, but that a "rhythm" of growth and rest occurs, depending on the conditions of culture and the maturity of the plants.

Whereas some species of aponogetons are prone to form surface leaves, this genus of plants is truly aquatic; leaf formation, flower production and pollination all occur within the water. Temperature requirements of those mentioned in this article are identical, being within the range obtaining in the average tropical tank of good dimensions, size of tank being mentioned only because the rapid heating and cooling obtaining in many small tanks is not satisfactory for culture.

Intensity of light would seem to be as important as duration of light, the criteria being that illumination from above should envelop the entire plant if "reaching" for light is to be avoided; this gives the spread of foliage which is such an attractive feature of these plants.

Mention was made of characins as satisfactory inhabitants of a tank containing *A. fenestralis* and *Cryptocoryne*—the conditions satisfactory for the plants being suitable for the fishes. Much of the failure with aponogetons can be traced to association with fish life tending to produce nutrient water for algae, either because of the necessary heavy feeding programme, or because of the nitrogenous excretory products from certain fishes. In all tanks designed for

(Continued overpage)

Microscopy for the Aquarist—47 by C. E. C. COLE

I HOPE that those of you who attempted to make the ringing table I told you about last month were successful and that you have tested its performance.

You are now equipped to seal permanently your own slides whenever you feel so inclined. Remember, when sealing, use a number of successive rings of compound rather than try one thick application. As with painting, this short, "easy" way leads to a poor appearance in the finished product. "Finished," did I say—"done-in" would perhaps be more appropriate; the thick ring flattens and widens, oozing in all directions over cover slip and glass slide.

It is now time to give more specific instructions for the preserving, preparation and mounting of particular animals or parts of animals.

First we will take an easy example, easy to obtain, easy to prepare and which reveals the efficacy of some of the materials I have advised you to obtain.

The "raw material" is an aquatic snail (any species). The part we want to examine is one it is impossible to inspect while the animal is alive or dead owing to the creature's opacity and slipperiness. I refer to its dentures. Why should we bother? Well, if you've never seen them before, and have no idea what they are like, you are in for a surprise indeed.

To kill the snail, and facilitate removal of it from its shell, drop it into boiling water. Death is instantaneous. After a moment or two pour the hot water away, pick up the shell and remove the snail complete as you would a wrinkle, with the aid of a pin or needle. Quite a simple operation.

Have handy a small glass phial (a specimen tube about 1 in. by 3 in. is ideal) with a few cubic centimetres of 5 or 10 per cent. potassium hydroxide in it.

You will remember that we used this "caustic potash" in preparing the external parts of beetles.

Drop the snail into the caustic solution and hold the phial over a flame in a pair of long tweezers. Move it about so as to more evenly distribute the application of heat. Tilt it away from your face and clothes. Within a few seconds the caustic will begin to boil. Just keep it bubbling, but not too violently, as it is likely to spit drops out of the tube, and boiling caustic is not the best thing to spread around.

It begins to discolour and the snail begins to disappear—it is actually dissolving before our eyes. The creature has no protective skeleton and the hydroxide is acting directly upon its soft tissues.

Within a minute or so, depending upon the size of the snail, there appears to be nothing left at all but a dirty, muddy-looking liquid. Remove it from the heat and allow it to cool a little—then gently pour it away straight down the sink until only perhaps a trace remains. The operative word is "gently"—too violent an action will result in the loss of what we have been trying to obtain—the palate of the snail with teeth intact. This will not dissolve, even if you continue to boil the liquid until the phial is dry.

There is no vestige of dark colour to reveal the position of the palate, however, and that is why we use such a small container—to enable it more easily to be spotted.

If you have taken a large *Limnaea stagnalis*, for example, the complete set of dentures, the radula, is almost a quarter of an inch in length and about an eighth in width.

Leave it in the phial and add distilled water. Put in the stopper and shake the tube back and forth to remove traces of caustic. Give the radula time to settle before again gently pouring away the water. Repeat this operation several times before lifting the palate out of the phial with a small brush and placing it upon a clean glass slide. Drop a clean cover slip over it, and place the slide upon the



Views of teeth of the radula of *Limnaea stagnalis*

microscope and examine through a 2 in. objective. The light needs careful adjustment and should not be too strong, for the radula is almost completely transparent, presenting little contrast and consequently revealing little detail without some help from us.

At first glance it looks like a piece of fine gauze, but as the eye becomes accustomed to conditions, further detail can be made out, and it is now seen as a piece of material covered completely with row after row of small, sharp-pointed teeth. I once attempted to count the teeth, but had to give up as it made my eyes dance after a second or two. I think there must be many hundreds. I have, however, sketched a row or two.

When you see them you no longer feel surprised at the havoc these creatures can wreak among choice plants, rasping through the stems with nature's file.

Borax carmine can be used to get further definition of the outline of individual teeth. Dehydrate the radula to the strength of carmine, and then place the radula in a staining pot and leave it. Only a little stain will remain on the radula even if left for an appreciable time.

As a matter of interest, obtain several different species of snails and prepare the various radulae separately, mounting them side by side for purposes of comparison. The mountant can be Canada balsam or Euparal. Don't forget to make sure which radula is which and label accordingly.

The Aponogetons

(continued from page 243)

permanent display, this plant-fish relationship should be considered.

Propagation from seed is very slow; the florets are allowed to ripen and the resultant seeds are germinated in submerged shallow dishes under good light, in a medium of coarse sand with an admixture of soil. Some "identical" plants can be harvested from the off-sets, which occur at the union of stem and floret, but any temptation to divide corms should be resisted, as disintegration of divisions is frequent. Corms are the initial reservoirs of food for the plants, and complete corms are necessary if the plant is to reach full maturity.

Many aquarists object to the inclusion of planting pots in their tanks, but pot culture is necessary with aponogetons, where removal for competitive work is intended, for mature plants do not tolerate disturbance of their roots. The nature of the leaves will indicate that carrying in water is advisable.

Even in a tank reserved for the cultivation of aponogetons, sudden alterations of water quality can be disastrous, and should be avoided when aponogetons are used in a temporary display, if the plants are to continue to flourish. Immature plants obtained as initial stock will transport well, when packing and transport are arranged by cultivators versed in their work, but otherwise, if mature specimens are needed, personal carriage is favoured.

The Fishes Called Tetras

MANY aquarists are puzzled by the use of the name tetra for so many differing genera and species of tropical fishes. They are so very popular, and rightly so, that it is worthwhile to try to clarify the position. Most of the tetras are brightly coloured active fishes which increase the beauty of the tropical tank. They are mostly small types and good mixers as a rule.

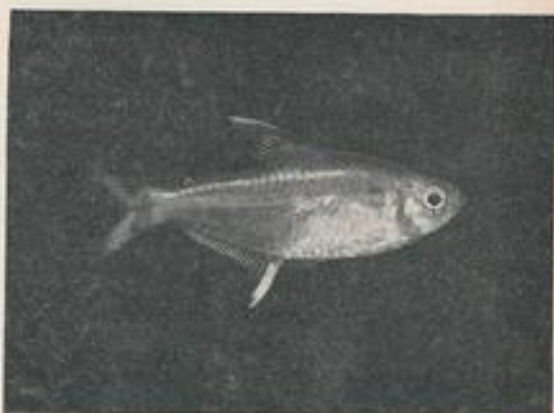
One is perhaps inclined to the belief that the "tetras" may all be members of the genus *Tetragonopterus*, but this is not so; the best known of that genus is *T. chalcus*, which is not usually called a tetra at all! The name tetra cannot then be taken for an abbreviation of the genus *Tetragonopterus*, but there is one feature of *T. chalcus* which is found on most of those fishes commonly called tetras, and that is the adipose fin. The adipose fin is that small and apparently useless fin behind the dorsal fin and just above the caudal peduncle. However, it will be seen that fishes which are usually called tetras belong to genera other than the one quoted. It would not do to class all those fishes as tetras which have the adipose fin; if that was so the Salmonidae could also be included.

Tetras belong to the family Characidae and are generally grouped as characins. Their common names are usually significant of certain marks or colours; thus we have the blue tetra, the silver tetra, the black-line tetra and the one-line tetra. Although most of them can be recognised by these common names it is not always wise to depend entirely on such nomenclature. Difficulties may arise when the same fish is known under two or more differing names in Great Britain and America. For instance, the red-nosed tetra is also known as the red-mouthed tetra and the flag tetra is also known as the striped tetra; the silver-blue tetra in America is the fish known as the croaking tetra here.

Some of the fishes known as tetras in America may not be so called at all in Great Britain; one of these is *Pristella riddlei*, known in America as Riddle's tetra, but usually as the X-ray fish or the water goldfinch in this country.

Instead of finding that all the fishes known to most aquarists as tetras belong to one genus it will be seen that these fishes are from at least 13 genera including *Aphyocharax*, *Astyanax*, *Ctenobrycon*, *Gephyrocharax*, *Glandulocauda*, *Gymnocorymbus*, *Hemigrammus*, *Hyphessobrycon*, *Mimogoniates*, *Moenkhausia*, *Nannaethiops*, *Pristella* and *Roeboides*.

Geographically their range is quite wide, too. Many tetras are found in the Amazon Basin, and others range from



Photos: Laurence E. Perkins
Lemon tetra (*Hyphessobrycon pulchripinnis*)

Texas to southern Argentina. Riddle's tetra is found on the island of Trinidad and in British Guiana.

This then is the explanation of the general confusion over the name tetra. The names of all the kinds which are usually met are given below, but it is not suggested that some of the fishes may not have other popular names in various parts of the world.

Genus	Species	Popular name of "tetra"
<i>Aphyocharax</i>	<i>rubripinnis</i>	Blood-fin; red-fin.
<i>Astyanax</i>	<i>bimaculatus</i>	Two-spotted.
<i>Astyanax</i>	<i>fasciatus</i>	Black-striped.
<i>Ctenobrycon</i>	<i>spilurus</i>	Silver.
<i>Gephyrocharax</i>	<i>atracaudatus</i>	Platinum.
<i>Glandulocauda</i>	<i>inequalis</i>	Silver-blue; croaking.
<i>Gymnocorymbus</i>	<i>ternetzi</i>	Black.
<i>Hemigrammus</i>	<i>caudovittatus</i>	Buenos Aires.
<i>Hemigrammus</i>	<i>ocellifer</i>	Head and tail light.
<i>Hemigrammus</i>	<i>pulcher</i>	Pretty; diamond.
<i>Hemigrammus</i>	<i>rhodostomus</i>	red-nosed; red-mouthed.
<i>Hemigrammus</i>	<i>rodwayi</i>	Rodway's.
<i>Hemigrammus</i>	<i>ulreyi</i>	Ulrey's.
<i>Hemigrammus</i>	<i>umlineatus</i>	One-lined; lined.
<i>Hyphessobrycon</i>	<i>bifasciatus</i>	Yellow.
<i>Hyphessobrycon</i>	<i>bifasciatus</i> var.	Brass; bronze.
<i>Hyphessobrycon</i>	<i>costello</i>	Costello's.
<i>Hyphessobrycon</i>	<i>eos</i>	Dawn.
<i>Hyphessobrycon</i>	<i>erythrozonus</i>	Glowlight.
<i>Hyphessobrycon</i>	<i>erythrurus</i>	Red-tailed.
<i>Hyphessobrycon</i>	<i>flammeus</i>	Flame; red, from Rio.
<i>Hyphessobrycon</i>	<i>heterorhabdus</i>	Striped; flag.
<i>Hyphessobrycon</i>	<i>innesi</i>	Neon.
<i>Hyphessobrycon</i>	<i>minimus</i>	Dwarf.
<i>Hyphessobrycon</i>	<i>rosaceus</i>	Rosy; black-flag.
<i>Hyphessobrycon</i>	<i>scholzei</i>	Black-line.
<i>Hyphessobrycon</i>	<i>serpae</i>	Spot.
<i>Hyphessobrycon</i>	<i>axelrodi</i>	Cardinal.
<i>Hyphessobrycon</i>	<i>pulchripinnis</i>	Lemon.
<i>Mimogoniates</i>	<i>microlepis</i>	Blue.
<i>Moenkhausia</i>	<i>oligolepis</i>	Glass.
<i>Nannaethiops</i>	<i>unitaeniatus</i>	African.
<i>Pristella</i>	<i>riddlei</i>	Riddle's; X-ray.
<i>Roeboides</i>	<i>microlepis</i>	Glass.



Black widow (*Gymnocorymbus ternetzi*).
The adipose fin in front of the tail is clearly shown

For the guidance of any aquarists who would like to know the suitability of the various tetras for the community tank,

the following list may be of use, although it is not suggested that even all fish of the same species will always act alike. One occasionally finds the bully among many species which hold a good name for being peaceable. The usually quiet ones are the blue, bloodfin, flag, dwarf, lined, red-mouthed, red, Riddle's and spot tetras. Some with rather bad dispositions are Buenos Aires, black-striped, glass, two-spotted and yellow tetras.

All are egg-layers, and although some are quite easy to breed others are rather difficult. The general temperature of the water for these fishes should be about 75° F., and

raised to 80° F. for breeding. The eggs are laid during the chasing and are fertilised by the males as they fall. As many eggs are eaten by the parents it is well to remove them from the spawning tank when most of the eggs appear to have been laid. This is usually when the females lose their plumpness and the fish cease chasing and take an interest in the eggs. The fry are very small and only tiny Infusoria are likely to be taken once the yolk sac has been consumed. Most of the tetras are not fussy over food but if a mixture of dried and live foods can be given this will be appreciated by the fishes.

The Livebearers—by Dr. F. N. GHADIALLY

LIVEBEARERS are believed to be the easiest of aquarium fishes to breed, but this is only partly true. Although it is easy to breed a few odd usually indifferent fish, the breeding of quality specimens of good size and colour, the line-breeding of fish to develop some desired character or experiments in hybridisation to produce new varieties demand the utmost in skill and knowledge from the aquarist. The purpose of this article is to examine the problem of rearing quality livebearers in some detail.

We shall concentrate our attention on four popular varieties of livebearers: guppies, platys, swordtails and mollies. As their name implies, the livebearers are viviparous: they do not lay eggs but give birth to live little fish which are capable of swimming on their own power almost immediately after birth. However, in spite of the apparent similarity between this and the birth of the young of more highly evolved vertebrates, e.g., man, the internal mechanisms of reproduction are very different.

In these fishes there is no uterus (womb); the eggs of the female are fertilised by the sperms from the male in the ovary (organ producing the eggs) itself. The pregnancy continues to develop at this site but at no time is a special organ such as the placenta of the higher vertebrates formed. The placenta (commonly called "the afterbirth") is an organ which is developed within the uterus where the maternal blood and blood of the growing youngster (foetus) in the womb are brought into close proximity with each other, so as to allow for the passage of food and oxygen to the foetus from the mother and passage of waste products and carbon dioxide from the foetus to the mother.

The period of gestation, that is the time interval elapsing between the fertilisation of the egg and the delivery of the young, is very variable in livebearing fishes, in sharp contrast with the more definite gestation period of the higher vertebrates. One of the main factors influencing the period of gestation in these fishes appears to be temperature. The time taken also varies, of course, in different species and with other factors, but as a broad generalisation one could say that the gestation period is usually 4 to 6 weeks at a temperature of 78°-80° F.; but it is extended to as long as 8-10 weeks or more at a temperature of about 70° F. A constantly too-high or a too-low temperature are both undesirable as they tend to produce somewhat weaker youngsters. In most cases it is best to aim at a gestation period of just about 6 weeks. This means providing a temperature of about 75° F.

Variation in gestation time is also seen between species. Thus of the four common livebearers at a given temperature, guppies have the shortest gestation time and mollies the longest. The gestation times of platys and swordtails lie between these two.

Method of Fertilisation

The anal fin of the male in livebearers is modified into a special rod-like structure called the gonopodium. This

organ is very mobile and is capable of movement in both horizontal and vertical planes, i.e., it can be moved upwards, downwards and sideways. By means of this organ the male introduces the sperms into the genitalium of the female, from whence the sperms travel upwards to the ovary and fertilise the eggs.

Exactly how the sperms are introduced into the genitalium of the female has been the subject of much controversy in the past, but research workers have now shown that in the guppy physical contact is made between the male and the female. The males' gonopodium is introduced into the genitalium of the female and this intimate contact lasts for one to several seconds. It is during this contact that sperms are transferred from the male to the female.

Maturation and Changes of Sex

All livebearer fry show the external characters of a female at birth and for a considerable time afterwards. That is to say, no rod-like gonopodium can be seen in the early stages of developing males. This change, when it begins, starts in the lower rays of the anal fin, which becomes thickened and elongated, producing a small pointed projection on the anal fin which can be taken as a sign that the fish



Photo:

Laurence E. Perkins

Varieties of guppies with overdeveloped finnage produced by line-breeding



Photos:

Robert Bustard

Edible frog (*Rana esculenta*). This attractively coloured and active species seldom strays far from water.

Hardy Frogs for the Vivarium

by ROBERT BUSTARD

IN the category of hardy frogs we find the three species which occur in Britain, namely the common frog (*Rana temporaria*), the edible frog (*Rana esculenta*) and the larger and recently introduced (1935) marsh frog (*Rana ridibunda*), which is now well established in the Romney Marshes. As these species are easily obtained they are likely to form the nucleus of the beginner's collection.

There are a number of ways of housing these frogs, since all can live in the outdoor reptiliary as well as in the indoor vivarium. If an outdoor enclosure is available I think that it is definitely preferable.

Outdoor Reptiliary

It should be in a shady part of the garden and have a surrounding wall 3 to 3½ ft. high, and even then it is best to have an overhang on the inner side. This wall must be smooth, especially if toads are to share the enclosure since they are excellent climbers. The enclosure, which should be well planted with grass and damp-loving plants, must contain a roomy pool. This is particularly important for the marsh and edible frogs, as they are both largely aquatic and in a wild state seldom venture far from water.

An outdoor reptiliary has the additional advantage that the frogs will be able to find much of their food during the summer months. In addition they will soon learn the location of a tin sunk into the surrounding earth if it is filled regularly with gentles or mealworms. During summer small pieces of raw meat can be put into the enclosure to attract flies and bluebottles, which the inmates will catch with great agility. Marsh and edible frogs are also suitable inmates for an ornamental pond; however, the difficulty of keeping them within bounds can be quite a problem and the erection of a surrounding wall can spoil the whole effect. Usually they can be relied upon not to venture far

from the pond, but unless it has good surrounding cover some frogs will undoubtedly stray and become lost.

Indoor Vivarium for Frogs

Alternatively these frogs can be kept in the indoor vivarium. The common frog will do well in a moist vivarium with a small water dish, in which it can sit when it feels inclined, and a piece of flowerpot or arrangement of stones under which it can hide. The vivarium should contain a good layer of earth covered by moss. Marsh and edible frogs require a rather larger water container, and do well in a converted aquarium where three-quarters of the available space is taken up by water. The vivarium should not be less than 24 in. by 12 in. by 12 in., and for the two last-named species should be roomier if possible, since they are great jumpers. The food can consist of earthworms, gentles, mealworms and bluebottles. Gentles and mealworms should be placed in tins sunk into the soil to prevent their escape before being eaten.

The common frog is too well known to require any description and is very variable in colour; some extremely attractive specimens are found in certain localities, my favourites being a rich reddish-brown colour with black markings.

The edible frog is somewhat larger than the common frog and has a more pointed snout. Large females may reach a snout to vent measurement of 4 inches. The coloration is greenish or brownish above, with or without bright leaf green, making the frog very handsome indeed.

The marsh frog, which is about 4 to 5 inches, the females always being somewhat larger than the males, is olive-brown and olive-green. Like the edible frog the limbs are barred with black and similar markings occur on the body. The marsh frog can be differentiated from the edible frog

as it invariably lacks the light vertebral stripe so characteristic of *R. esculenta*.

In the winter these frogs are best left to hibernate in the mud at the base of the pond if they are kept in the outdoor enclosure. This can only be done if the pond has a depth of about 2 feet in parts. If kept indoors the vivarium or aquarium should be moved to a cool frost-proof shed or garage and left there until the spring. The marsh and edible frogs will hibernate under the water, where they may be joined by the common frogs, or these may burrow under the moss and into the damp earth.

There are a number of other frogs belonging to the genus *Rana*, several of which occur in Europe but are seldom available. The North American leopard frog (*Rana pipiens*) is quite often available and is a very attractive species. The general body outline is similar to that of the edible frog although generally somewhat slimmer. The ground colour is olive-grey with dominant black bars and blotches. This frog does very well either indoors or outdoors and is a great jumper. The accuracy with which it can catch bluebottles and other insects by jumping at them from a distance of several feet has to be seen to be believed. It will accept the food mentioned above.

These hardy frogs discussed in this article will live for years in captivity, where, provided that they are allowed to



Leopard frog (*Rana pipiens*), a North American amphibian

hibernate and given access to a pond, they will breed each spring. They are ideal species for the beginner to gain experience with before progressing to the more difficult sub-tropical species.

Breeding the Pearl Danio (*Brachydanio albolineatus*)

by E. WALLWORK

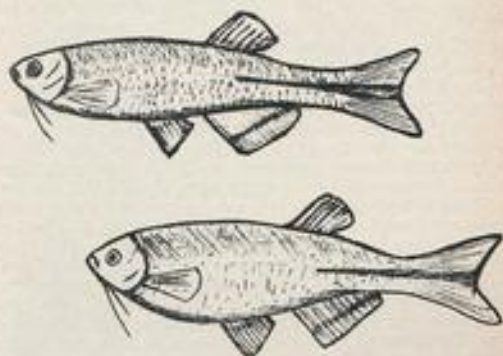
THE colour varieties of this beautiful little fish are usually available to aquarists. The customary one is silver-grey and overlaid with a most attractive mother-of-pearl sheen, with a broad orange-red stripe running from the centre of the caudal fin forwards to a position below the dorsal fin. This line is approximately two scales in depth and half of this depth is situated above and below the lateral line. In certain lights this line is also bordered by a violet colour.

The other colour variety of this fish is the golden pearl danio, which is basically the same fish, but overlaid with a uniform gold flush and the mother-of-pearl and lateral stripe are much less in evidence. It breeds the same as the usual type and is most likely a result of selective breeding, as this variety does not occur in nature.

It is often stated that the breeding of this fish follows similar lines to that of the zebra fish. There are, however, one or two important differences.

On average an adult pearl danio is $\frac{1}{2}$ inch longer (male or female) than the zebra fish when adult, reaching about 2 in. long in the male and 2½ in. in the female. They are best bred when younger and at about three-quarters of their adult size. For considerations of size alone the pearl danio is easier to bring to breeding condition in a medium-sized tank than in a small one.

Pearl danios are preferably separated as soon as their sex becomes obvious, as unlike the zebra fish they cannot be brought into satisfactory breeding condition in a com-



Pearl danio; male above, female below

munity. Female pearl danios soon lose all their eggs in the company of vigorous males. Shape is the only reliable guide to sex in this fish. The female, naturally a little larger than the male, equally colourful, soon shows distension of the abdomen at its keel, extending evenly as far as the anal fin.

Feeding presents no problem, as they will eat almost

anything that is offered to other tropicals, on condition that it is small enough for their mouths and can be eaten in mid water or at the surface. Dried foods, *Daphnia*, white worms, *Tubifex*, mussel, brine shrimps, chopped earthworms and odd bits of crab, fish and liver from the dining table give an acceptable and varied diet.

Breeding this fish presents the aquarist with the problem of making conditions in which the breeding stock cannot eat their own eggs as they fall during the spawning action. Many methods are available in which the tank is set up to offset this natural tendency in the parent fish.

Plant thickets are used by several successful breeders, but they invariably use a coarse pebble layer in their tanks, into which the eggs can fall during the spawning drive, which is usually in a depth of not more than 3 in. of water. Water depth is most important, as any depths greater than this give the breeding stock an opportunity to eat the eggs before they can fall to the bottom where they are safe in the crevices. A mat of glass rods or tubes raised about 1 in. above the base of the tank can also be used as an egg-trap, but the spawning fish drive very fast and are much stronger than might be supposed, and it is usually not very long before the glass rods are rattling and the parent fish are swimming below the glass mat. To recover the parent fish is a time-consuming operation and sets back your intentions by a few days, as the fish are usually distressed by repeated attempts to net them.

For this reason, a double layer of glass marbles or suitably rounded pebbles is used on the base of the tank, with not more than 3 in. of water above them. To reduce the swimming depth and keep the parent fish closer to the marbles a light floating cover of *Riccia* or bladderwort can be used on the surface.

Water used is taken from the surface of a large, healthy planted tank and siphoned into the breeding tank, where it is brought up to the correct temperature (76 to 78°F), over a period of 24 hours. This will eliminate hot and cold spots due to preliminary absorption of heat by the cold marbles and convection currents from the heater. Observations with thermometers placed in various areas of the tank have proved to me that this waiting period is very valuable. Especially so in view of the shape of the tank (24 in. by 6 in. by 6 in.) which I find is most suitable. To use a small tank (say 12 in. by 8 in. by 8 in.) does not give the pearl danio a good area for the spawning drive, though this size is suitable for the zebra fish, which is, of course, smaller, and not so fast.

The pH of the water (recorded only as a matter of interest) has been 6.9 to 7.2 over a number of spawnings.

Introduction of the breeding stock is best done in the evening, after the hours of daylight, to allow time for the fish to accommodate themselves to the new surroundings. Some aquarists use two or three pairs of fish, but my personal preference is to use one pair or two males to a really well-conditioned female. Newspaper is often attached to the front glass by adhesive strip at its top edge. This gives the fish more privacy and more confidence. Early next morning, as soon as it is light, spawning should commence. This is a very rapid driving of the female by the male (and sometimes vice versa), which will continue, with only short rests, for about 24 to 36 hours. After that time, the female will look much thinner if spawning has been successful. The breeding pairs are then removed to their respective tanks.

Perhaps the next phase is the longest from the fish breeder's point of view. After 3 to 4 days, tiny fry should be seen clinging to the sides of the glass just above the marbles, and always head upwards. These fry resemble tiny splinters, widest at the head (about $\frac{1}{4}$ millimetre), tapering down to the tail, the overall length being about 4 millimetres. On occasions the hatching time may be as

long as 5 days, so some degree of vigilance and patience is called for. Usually, however, by the seventh day they are free-swimming little fish (150 to 300 of them).

Raising them gives a good deal of pleasure. Starting with Infusoria, or a professionally supplied substitute, growth is very satisfactory for the first 7 to 10 days. After that time they are graduated to micro worms, brine shrimp and white worms and dried foods. They have been satisfactorily raised on dust-fine dried foods but finely divided animal foods are to be preferred.

At the age of 3 weeks the baby fish are very attractive, as the lateral stripe shows as a thin golden line, and careful netting into a larger final tank is best carried out 1 week later—that is, at the age of 1 month, following the micro-worm and brine-shrimp stage.

FRIENDS & FOES No. 75

Jenkins' Spire-Shell Snail



Two shells of Jenkins' spire-shell snail (*Hydrobia jenkinsi*), the right-hand one showing a keel

Mollusca (continued)

I REFER to this snail by the above name because its specific name seems largely undecided. It seems we have a choice of four specific names—all tongue twisters—as follows: *Hydrobia jenkinsi* (roughly translated—living in water); *Paludetrina jenkinsi* (possibly marsh-dweller with a rasp—doubtful); *Potamopyrgus jenkinsi* (river dweller in a tower); *Potamopyrgus crystallinus carinatus* (river dweller in a tower, which is transparent and keeled). Take your choice—I'll stick to Jenkins' spire-shell snail!

It's such a little snail, too, not exceeding $\frac{1}{2}$ in. in shell length. It is greyish, with tapering tentacles. The shell may be plain or may possess a keel, which is sometimes spiny. Possibly the differences in the shells led to differences in name for an identical species. It is an operculate, that is it possesses an operculum with which to close its shell, and a live-bearer, but this time a parthenogenetic live-bearer; it is independent of any other specimen for the production of 20 to 30 fully developed youngsters.

Such being the case, a single specimen transported by accident or design to any suitable water is capable of colonising it. By suitable water I mean running water, from fast to slow moving. It is unlikely to do well in aquaria or ponds which are stagnant, or in strongly alkaline waters.

They are of such a size that any fish capable of breaking their shells are likely to partake of them, but for the average aquarium fish, crushing of the shell first by the aquarist is likely to be essential except with newly emerged young snails.

C. E. C. Cole

THE AQUARIST

AQUARIST'S Notebook



by

RAYMOND YATES

THE black shark is not a common fish among hobbyists in general, mainly because of its still high price and the fact that it has not yet been bred. This means that all specimens in captivity are wild fish and quite a sizeable number of fanciers are put off by a fish which is a breeding enigma. Then again so many stories have been told about this variety, often to its discredit, that possible purchasers are put off as they do not wish to run the risk of introducing a trouble-maker into their tanks. Wild fish cannot be expected to behave like fish which have been bred for generations in aquaria. The facts are that we only hear of those instances where trouble occurs and have no knowledge of the many instances where these fish live blameless tank lives.

By and large it seems to be agreed that these fish are divided into two main types, the all-black (*Labeo chrysophekadion*) and the others with red tails and sometimes other finnage also, commonly described as *Labeo bicolor*. It is impossible to lay down any hard-and-fast rules because too few hobbyists have kept them for long enough and few have kept records of how they react in all sorts of conditions. However, many leading aquarists take the view that the all-black variety can be a great trouble-maker. This is usually due to a habit they have of chasing other sizeable fishes. They appear to delight in making other fishes miserable, although no actual damage results, only the long-term results which must follow being bullied, having to hide and being prevented from getting food. Not all of these black variety do this but it seems an ingrained instinct with most, and they will even do it with each other as if one is trying to prove that he is the boss of the tank. This habit, once noticed, is incurable. All you can do is remove the black shark and keep him on his own or with fishes he will not bother such as large cichlids or diminutive inch-long specimens which seem to be beneath his notice. Sometimes these fish seem to suck at the sides of fishes, which is probably rather frightening, although my pal fish also used to do this years ago. The black variety grows quite large, and I have seen plenty over 12 in. long in captivity. At this size they are not over active and like to hide in caves or the darkened parts of the tank.

The coloured varieties are undoubtedly the best, and, of course, the more expensive. I have not found the bullying instinct so strong in these, although they like to swim hard up and down the tank with fast and sizeable swimmers such as the larger barbs. Coloured varieties are grand because the intense black is offset with the vivid red of the tail or fins or both, which are frequently tipped with enamel white giving a very handsome effect. The frontal black of the fish is often suffused with a pinkish glow. The red of the tail tends to be thin and weak in young specimens but intensifies as the fish grows.

Black sharks eat just about anything, and that means anything from algae to *Tubifex* or dried food. They are always on the lookout for food, either on the bottom, on the rockery, on the plants or in mid-tank. However, I have yet to see one eating from the surface. A likeable quality with this fish is the way it keeps its fins well spread, particularly the dorsal, which enhances its appearance. Specimens of 2-4 in. make excellent tank inhabitants, forever foraging and always in the picture. Other fishes seem to get on well with them and show no fear. When kept in the dark for some hours their colours dim but soon return. Some authorities suggest that their colours lighten when they are out of condition. Personally I have never seen a black shark out of condition; they seem to enjoy the very best of health and are so hardy that they will withstand ill-treatment

which would be fatal to many tropicals. However, they seem to dislike water which contains a lot of sediment or where bacterial content is high because of decomposing food on the bottom. This fish is a great favourite of mine.

A close relative of the paradise fish is the combtail (*Belontiia signata*). These large fish (up to 5 in.) are most intelligent and interesting to keep and hardy beyond belief. They quickly learn to recognise their owner and are always ready for any food he cares to offer. No matter where they are in the tank when food is introduced they are first to reach it, as they can move like greased lightning when they want. Their general habits are those of the paradise fish which they closely resemble, and being rather predacious, they should only be kept with fishes of their own size. I have never found them bullies with large fishes, and they can live quite peacefully with smaller inmates of their tank. There is always a risk, though, and they cannot be recommended for a community tank.

Their colour is reddish-brown, which varies with conditions and mood. At times they show a beautiful mottled effect when they resemble the shades affected by *Badiis badiis*. Coming from Ceylon they can put up with any temperature between 60° and 90° F., but for breeding purposes about 75° F. is needed. A rough-and-ready floating bubble nest is built and the breeding is completed without fuss or bother, both the parents helping to present their owner with a large brood. A special feature with this fish is the eye, which is large and very beautiful and quite liquid as fish eyes go. The males have long flowing finnage compared with the shorter-finned females.

Once I had to move a pair of these fish and had nowhere suitable except a tank containing two large terrapins. I felt they would not survive long and regretted the circumstances. In fact they quickly discovered how to hide away from the reach of the terrapins and before long I began to witness a quite amazing sight. One or other of the combtails would dash out of concealment and wrestle with a piece of meat, the other end of which was being swallowed by a terrapin. Knowing how fast terrapins of size can put food away I feared at first for the combtails but they always knew when to let go. The fish shared their dangerous quarters for about a month before I was able to provide them with alternative accommodation, but were none the worse for their stay with quite dangerous bedfellows.

Like the paradise fish combtails rarely suffer from illness or disease and prove most adaptable. I remember one instance where the water from their container drained away and left them flat out on the bottom gravel for 10 minutes or so. As soon as fresh water was introduced they swam away quite unconcernedly as if it were an everyday occurrence. These fish, when available, are in the lower price ranges, grow very quickly, however small to start with, and will breed at 3 in.

The Merseyside club, who have a good club library, loan the books out to members at a charge of 6d. a fortnight. This fee is quite reasonable for the type of books obtainable, and the money so received is used solely for the purchase of new books for the club library. There is no doubt that where books are lent out without charge they are often hard to get back for months on end. I think this Liverpool idea will recommend itself to other club librarians.

The acme of perfection with most aquarists is the noiseless pump. This usually means the piston pump. However, these can and do make a noise on occasion, possibly because they need oiling or are too choked with oil, require a clean out with carbon tetrachloride or just because wear and tear is making itself evident. There is another source of trouble, however. Piston pumps must be absolutely flat and on a level keel. If they are not the flywheel tends to be thrown slightly sideways and it is not long before the pump announces its dissatisfaction. Pumps with rubber feet should be checked from time to time to see these are all present, for if not the alignment of the pump is affected.

My clown loach have passed on, and it has not been a nice passing because they appeared to starve themselves to death. These fish are supposed to be rather tricky but I have never found them so. On the contrary they seemed to stand up to life in a community tank very well. They are not nervous of other fishes and are quite oblivious of bullies. Disease and chemicals never seemed to worry them and their only fault is the way they love to hide out of sight most of the day. In a large community tank this hiding means that they may not get sufficient food, because they hardly ever make any attempt to eat food as it is falling through the water. They have excellent eyesight but are not the type to entertain you by eating more or less out of your hand. After dark they forage and by then much of the food has gone. Over a long period this may have a cumulative effect. My fish at long last began to lie near the surface and I noticed how thin they were. No food was ever taken and their bodies gradually became even thinner until they were little more than paper thickness. They lingered in this condition many weeks (about 10) before death at last took its toll. They are best kept alone or at least with fishes that will allow them a fair share of food after dark.

For many years the old fort at the mouth of the Mersey at New Brighton has been merely a museum piece. Now it is to be useful again—to anglers of all people. At high water the fort is surrounded and the idea is to fit it up as an angling centre for those interested in sea-fishing. About 60 anglers are likely to be catered for at any one time, and the centre will contain cabins to sleep in, refreshment and recreational facilities for which a small charge will be made. Aquarists will be particularly interested in the novel idea of installing large tanks or aquaria at the centre, in which suitable specimens caught from the fort will be on view. It is some years now since the last Aquarium at New Brighton closed down, and it is pleasant to record the Wallasey area as being again on the map.

Harlequins are touchy fish and need watching. The addition of a small quantity of salt to their tank water helps to keep them in condition. A friend of mine has no trouble with them and puts this down to the presence of an inch or so of copper wire which he keeps in the water!

Not long ago I mentioned my surprise to see tinned snails on sale and I reflected what a pity it was that aquarists couldn't cash in on their own unwanted snail populations. It seems I am rather behind the times as, since then, I have had quite a lot of other unusual tinned delicacies brought to my notice, including frogs' legs, chocolate-covered ants, roasted caterpillars, fried grasshoppers, mussels, octopus, silk worms and locusts. I have tried only two of these myself: chocolate-covered ants and octopus, and I must admit they are quite palatable. Who knows, perhaps even our hobby will soon be furnishing tinned delights for the gourmet. Can you visualise stewed algae, pickled brine shrimp, jellied tubifex, roasted white worm, curried daph-

nia? Perhaps it is hard, but then who would ever have thought of fried grasshoppers or roasted caterpillars, to-day an accomplished fact.

During the past year far and away the most popular matters with which I have dealt (to judge from letters received) have been the coldwater hobby in the north and polythene ponds. When I made my own pond last spring it was undertaken quite on the spur of the moment. I knew something in this line was possible and had been mooted elsewhere, but I had never seen one, nor for that matter did I know where one existed. Fortunately I already had the excavation half dug out and it was little extra work to enlarge it, obtain the sheeting and make my own attempt at a polythene pond. Naturally I knew exactly what it would look like in my mind, and in effect, realisation did not disappoint me. I did not know what other drawbacks there might be, but took the chance. Apart from external interference I have found this method of pond-building perfect for those who want quick results. However, winter has still to prove that this type can stand up to all our climate can do.

A trouble experienced in urban areas is the film of soot which falls on the pond for about 7 months in the year. This is negligible in summer but once the colder weather comes it becomes all too obvious. This unsightly scum must be removed regularly by drawing sheets of newspaper across the surface every 2 or 3 days.

In winter the pond-side vegetation dies down and the pond is more easily seen and reached by cats. Make no mistake about it, cats are no. 1 on this list of a pondkeeper's troubles. They rarely come when you are about, they prefer early morning and moonlight nights. The fishes often help them to bring heartache to the hobbyist, because large goldfish will insist on lying at the surface for hours on end, often in the middle of a bunch of water plants, a few inches from the edge of the pond. You can plant vast masses of plants all round the edge to force the fish into the centre area, out of harm's way, and I have found starwort far and away the best for this purpose because it is fairly bright and green in the winter and forms tangled masses which defeat the attentions of puss. I have also found it helpful to put a pea-netting frame over the pond, which makes it doubly safe from cats and birds during the long winter weeks when one never really sees the pond in proper light owing to the short daylight hours.

In recent years vast numbers of seagulls (herring-gulls) have made their homes inland and would appear to present some danger to private fish ponds. I remember years ago the Happy Valley Garden pond on the Great Orme at Llandudno seemed immune from trouble although countless thousands of seagulls lived in its vicinity. However, the time came when I found the pond covered with wire-netting, which spoilt the charm and proved that everything comes to those who wait. Has any reader experienced trouble with gulls?

Apart from large pond goldfish most coldwater fishes look after themselves. Smaller goldfish, shubunkins particularly, never seem to bask at the surface, and orfe for fleeting moments only. Many varieties keep to the middle and bottom reaches and are mostly out of danger. It seems to me from the many enquiries I have received that a large body of fishkeepers would like a pond but have been put off in the past by the size of the job, and the waiting period with concrete types. Polythene seems to be the answer for these, and they should go on and construct their own ready for the spring start to the season. In this way they will enjoy the full pleasure of a pond throughout the best part of the year. Correspondents give me the impression that they fear all sorts of hidden snags, that polythene is too good to be true. Conquer these fears; once you have your pond you'll be sorry you didn't try one sooner.

The Garden Pond in March by ASTILBES

There should be signs of spring this month, and this will naturally turn the pondkeeper's thoughts to water plants, especially the lilies. The pond can now be visualised as it should appear during the summer and any replanting or additions can be either made or planned. Although towards the end of April may be time enough to plant new water plants there is no time to be lost if they are to be ordered. When planning to introduce new subjects do try to visualise how the pond will look when all the leaves and stems have grown up strongly. Remember at the same time that it is not usually difficult to get pond plants to grow but rather to restrict their growth in accordance with the size of the pond.

Overcrowded ponds never look well and most pondkeepers will be familiar with the lily pond which shows a luxuriant growth of green leaves, many well above the water, but no sign of any water, let alone fishes. This indicates bad planning, as no pond should be allowed to get in such a state that the water cannot be seen. Once half the water surface is covered with leaves it will be necessary to watch carefully and remove any which become too crowded. I consider that as soon as water-lily leaves are forced to leave the top of the water and grow up into the air, much of the beauty of the plant is lost. Some of the water-lily leaves are so colourful, with patches of red or brown on them, that they can be a delight to see as long as they lie flat on the surface.

When a pond has a few lily leaves spread out over some of its surface, no one leaf touching another, and then a few fine flowers showing among them, the whole will become a thing of beauty and an attraction unsurpassed by any other feature of the garden. For any pond with a surface area of not more than 20 square feet, one water lily is enough. Should the pond be long and narrow, say 8 ft. by 3 ft., it would be possible to grow two small types of water lily, one near each end, but far enough away to prevent the leaves from crowding up the sides. Although some water lilies will grow in water no more than a foot in depth, it is advisable to see that at least 18 inches of water can cover the root-stock.

Dealers' lists of water lilies usually give the depth of water which each species requires, but it must be realised that a great deal will depend on the way the lily is planted and grown. For instance, a type of medium growth like some of the *marliacea* species can cover an area of 20 square feet in 2 or 3 years if given good growing conditions. The same type of plant, if placed in a small pond with little soil or mulm in which to grow, may not cover more than 6 square feet. Another point is that the lily growing under bad conditions will have very small leaves and flowers.

For a fair-sized pond there is no need to look further than the *marliacea* types of lilies. Several colours are available and most of them are very handsome both in leaf and flower. The following will be found quite pleasing and hardy: *Nymphaea marliacea alba*, a strong-growing white-flowered species which can be given from 18 to 24 in. of depth and will cover from 6 to 8 square feet of surface area; *N. marliacea carnea*, rather similar to the former but with a pinkish tinge to the flower; *N. marliacea chromatella* has prettily marked foliage and a canary-yellow flower, not quite as strong growing as the lilies described before; *N. marliacea flammea* has its foliage flecked with brownish markings and the flower is almost a purple with flecks of white; *N. marliacea ignea* has leaves of a darkish green and bronze, and the flowers are almost 5 inches across and a fine carmine colour. The last two named can be successfully grown in shallower water, 12 to 18 in. will do, and they can cover about 4 square feet. *N. marliacea rosea* is a



Photo:

Laurence E. Perkins

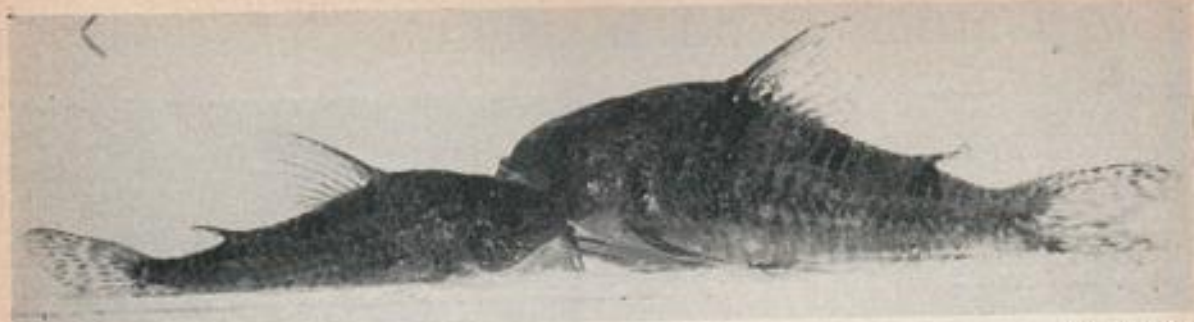
Flower of *Nymphaea escarboucle*

stronger type with rose-coloured flowers which will last well when cut, and *N. marliacea rubra punctata* has a globular flower of a deep rosy-carmine colour.

Although it is a very good plan to order any of these lilies according to your particular fancies, the newcomer to the hobby will be well advised to rely a good deal on the judgment of the dealer. Make up your mind about which colours you would like and then send to the dealer this information together with the size and depth of the pond and the area it is hoped to cover. He will know what plants will suit you best and send accordingly.

If the pond to be planted is a fairly large natural one with a mud or mulm bottom, the planting will be fairly easy. The lily can be weighted down and thrown into the pond in the required position. The only trouble will be that the depth of the water may be too much for the plant in its early stages of growth. If possible the level of the water can be lowered for a time until the plant gets growing well. Many lilies take a long time to become established if they are introduced at once into a deep pond.

When planting in a concrete pond it is necessary and preferable to plant all water plants in separate containers. This makes it easier to move them if necessary later on, and enables one to control the growth of the plant far more easily. A good-sized pot can be used, and one which has drainage holes in the side of the pot near the base will be ideal. I think that the safest and most nutritious soil in which to plant the lilies is old turves from a meadow. The turf need not be chopped up small as long as it can be inserted into the pot with the root-stock of the lily. Leave the crown of the plant above the soil or it may not do well. Take care not to break any of the tender shoots on the crown as some may well be the buds of forthcoming flowers. See that the root-stock is secured to the pot with plastic string, or later on when many leaves have formed they can drag all the root system out of the pot and the whole will be found floating on the top of the water.



Photos :

Laurence E. Perkins

AQUARIUM CATFISHES

by JOHN S. VINDEN

ALL the catfishes of the world belong to the sub-order Siluroidea. They are characterized by their having either a naked body or one covered with bony plates. Scales, in the ordinary sense, are absent.

There are representatives of the group in every continent though few of these fishes live in the seas. Some catfish reach a great size, for the European species, *Silurus glanis*, can attain a length of 9 feet and is reported to be able to swallow a poodle dog. The largest catfish yet recorded is the Siamese genus *Pangasius*, which sometimes reaches 10 feet in length.

Some catfish are vegetarians, some are carnivorous, some will eat almost anything, and one species, the South American candiru (*Vandellia cirrhosa*), is parasitic and lives in the gill cavities of other fishes, and feeds upon their blood.

Many species of catfish are available to aquarists to-day. The word catfish, however, usually signifies *Corydoras* to the average tropical enthusiast. *Corydoras* species are kept for several reasons. They are quiet and efficient scavengers, many of them have an attractive appearance, they offer a challenge to the serious breeder and they are fishes that have personality.

There are over 30 species in the genus and, though all are suitable for the home aquarium, it is doubtful whether more than ten species are ever available through commercial channels.

The requirements of the *Corydoras* catfish are simple. They need temperatures around 75°F, somewhere to live and suitable food. Since they have an accessory breathing organ, they can tolerate fairly foul conditions, although like all fishes they do better in healthy, hygienic surroundings. Although they have a well-deserved reputation as scavengers, this does not mean that they can live on mulm and such food that other fishes will not touch, and to keep them in health it is advisable to make sure that they receive their fair share of such delicacies as white worms and other non-floating foods.

The *Corydoras* species are intolerant of salt and should not be kept in tanks to which salt has been added for any reason. Although they are said to be immune to white-spot disease, this does not mean that quarantine precautions can be relaxed. Although the catfish may not suffer from the disease, they may carry the white-spot parasites from one tank to another and infect healthy fishes.

Most of the species spend most of their time on the bottom of the aquarium, apart from an occasional dash to

the surface for a bubble of fresh air, but the pretty little *C. hastatus* hovers about in mid-water and is more active than many of the other available species. Owing to its small size and habits, this dainty catfish should not be kept with large boisterous fishes.

The two commonest species of *Corydoras* appear to be *C. paleatus* and *C. aeneus*, the bronze catfish. Although these are both useful species, there are others whose markings are more attractive and which combine beauty with utility. Some of these are spotted and some have a broad black stripe down the back or sides. Species frequently available include *Corydoras melanistius*, *C. arcuatus*, *C. julii* and *C. punctatus*. From time to time rarer species are imported in small numbers and catfish enthusiasts usually snap them up as soon as they are advertised. Synonyms exist for some of the names so it is possible that one species may be offered by two establishments under different names.

Although it is difficult to sex young catfish, the dorsal fin of an adult male is more pointed than that of the female and, viewed from above, the male is slimmer. Breeding catfishes is possible, though they are far from being the easiest of egg-layers. Obviously it is no use trying to breed them in the community aquarium in which they are usually kept, and they should be given a well-established, snail-free tank planted with broad-leaved species such as Amazon sword plants, and giant *Sagittaria*. The fish should be well fed to condition them, and then the temperature should be raised to about 80°F. The adhesive eggs are laid a few at a time and placed by the female on the selected plant (or sometimes on the glass side of the aquarium). After the spawning is over it is wise to remove the parents. Although they do not usually eat their own eggs or fry, it is possible for the young catfish to be swallowed by mistake. Two days after hatching the fry become free-swimming and need very fine food for a few days. After a week there should be no difficulty in rearing the youngsters.

Successful breeding has been reported with many species, but it would appear that *C. paleatus* and *C. aeneus* spawn more readily than some of the others, so beginners in catfish-breeding are advised to try one of these species.

Another group of catfishes are more useful than decorative. These are the sucker catfishes of different kinds that do such good work cleaning algae from the plants and sides of the aquarium. They will even eat the pestiferous blue-green alga that is such a problem to some fishkeepers. For large tanks the giant sucker catfish *Plecostomus plecostomus* is recommended, and one or two medium specimens

should keep the algae in a 36 in. tank well under control. Two species suitable for the smaller tank are the dwarf sucker catfish *Otocinclus*, and the whip tail, *Loricaria*.

None of the sucker catfish should be placed in a newly set-up aquarium. Such a tank does not contain sufficient natural food and, although some of the species will eat both live and dried foods, it seems that a proportion of algae is necessary for their welfare.

Aquarists who like something out of the usual frequently keep other species of catfish, for some of the real oddities of the animal kingdom are found within this group.

A fish that is really transparent is the glass catfish, *Kryptopterus bicirrhus*, from the East Indies. The body, fins and barbels are almost as transparent as glass. Although

not active, it usually waves its fins and body while at rest. It is harmless to other fishes and will eat most normal foods. Another oddity is the talking catfish, *Acanthodoras spinosissimus*, which grunts when taken in the net, but the upside-down catfishes of the genus *Synodontis*, from Africa, must surely be numbered amongst the freaks of nature. As the English name implies, these fish live in an inverted position. Zoologists are not agreed about the reason for this though it is known that their brains differ from those of normally swimming other members of the same genus. The fish have indulged in this habit for so long that the normal fish colour-pattern is reversed: its abdomen is dark and its dorsal surface is light. A truly remarkable example of adaptive coloration.



Corydoras punctatus

COLDWATER OR TROPICAL?

by A. BOARDER

A SHORT time ago I was judging a class of coldwater fishes at a large show. There were over 20 entries in the class and among them was a sunfish, and in its tank was an electric heater which was keeping the temperature of the water up to about 74°F. Here was a problem I had not met before. Could I judge the fish as a coldwater fish, to comply with the schedule, when it had a heater in the tank? I felt disinclined to do so, but as I was in a district rather out of my usual one, and not wishing to offend anyone, I made a few enquiries of other judges and authorities for different opinions.

All except one were of the opinion with me that the fish could not be included in a class of coldwater fishes if it had to have a heater in the tank. The only one who thought that it was quite in order to have a heater in this tank was a dealer who had, I found out afterwards, supplied the fish and told the owner to use a heater! I never like to disqualify a fish if I can help it, and so I compromised by

telling a steward that if the heater was removed I would judge the fish with the others after some time had elapsed. This I did. Whether I was justified in this course I cannot say, but one often has to make a decision on the spot which one might have altered after long consideration.

A point which was brought to my notice was that many so-called coldwater fishes had to have some artificial heat, and that practically all the fancy goldfish now being imported into this country would have to have some artificial warmth if they were to remain healthy and free from fin congestion, etc. Now I know that such fishes are bred under almost tropical conditions in China and other countries, but where are we going to draw the line when it comes to exhibiting fish? It is a fact that most recognised breeders of fancy goldfish use some form of artificial heating for hatching and rearing the fry, but once the youngsters are reaching a mature size such heating should be unnecessary. After all, surely there must be a dividing

line somewhere between what is a tropical fish and what is a coldwater fish, and my interpretation is that a fish which is normally kept only in an artificially heated tank is a tropical and one which does not have artificial heating is a coldwater one.

There are several fishes which are usually classed as tropical, such as paradise fish, mountain minnows, etc., which can stand temperatures as low as many fancy goldfish, and so the dividing line must be rather elastic. I remember many years ago when I was keeping tropicals finding a pair of platys (*Xiphophorus variatus*) in my outdoor pond in November, when the temperature of the water was under 50°F; they must have got there with some water plants, but they were in perfect condition and health, as can be verified by my old aquarist friend Mr. W. Webley, of Nottingham, who saw the fish in the pond before I did.

Whilst considering the sunfish with a heater in its tank I was not unmindful of a very fine veiltail in the display

which would undoubtedly have received an award if it had been in better condition. It is probable that if this veiltail had had a small heater in its tank to have taken off the chill it would have displayed its points far better than it did. If one fish could have a heater, why not all in the same class? Then where would the schedule be able to indicate any particular class for coldwater fishes?

There is one point which arises out of my problem, and that is when any fancy goldfish are purchased from dealers it would be an advantage to enquire if the fish had been kept with some artificial warmth, as if this was not known and such fish were put into cold water, they would probably soon be in trouble with fin congestion, fin rot and fungus. It would be possible to accustom the fish to cooler water gradually but this is best done in the summer when the water would naturally be warmer. As the weather cooled the heater could be dispensed with and the fish would become adapted to the change and be none the worse for it.

TROPICAL FISHKEEPERS' REFRESHER COURSE:

by *Pisces*

Sailfin Mollie

(*Mollienisia velifera*)

ORDER: Microcyprini, from Greek *mikros*—small, and *kyprino*—a kind of carp.

FAMILY: Poeciliidae, from Greek *poikalo*—many coloured.

SPECIES: *Mollienisia*—after M. Mollien, and *velifera*, from Latin *vel*—veil (? sail) and Latin *fero*—bear.

MANY years ago I fell under the spell of mollies. I purchased every variety available, kept them in tanks of their own and bred them in quantity.

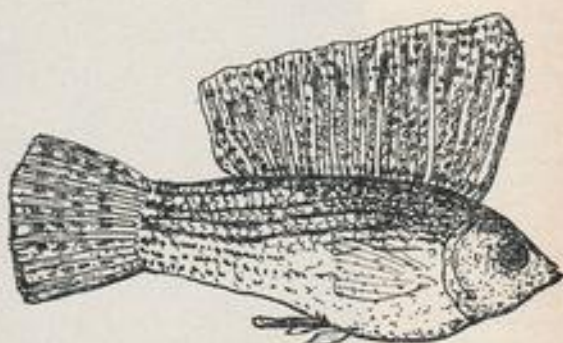
During World War 2 a number of species disappeared from this country. For 10 long years, no sailfin mollies, and then they came back and I could enjoy their beauty once again. To my mind, hardly anything can exceed the beauty of a large aquarium containing a number of these magnificent livebearers, provided always that they are in first-class condition.

What a great pity it is that the dorsal fin of the female bears no comparison with the gorgeous counterpart of her partner. Still, one cannot have everything, and, perhaps, by some genetic upset a female will ultimately be produced with an equally fine dorsal.

Sailfin mollies grow to a maximum size of 5 inches. All mollies need plenty of room to stretch their fins, for they are active species, and I suggest a minimum size of 3 ft. by 15 in. by 15 in. for an aquarium for half a dozen specimens. The aquarium should possess many such fuzzy-leaved plants as *Cabomba*, *Ambulia*, *Myriophyllum*, Indian fern, and a thick surface layer of *Riccia*, *Salvinia* or lesser bladderwort. This last-named is to partially block out excess of light and to form a hiding place for the youngsters. Temperature should be rather high—from 75° to 80°F. Lower temperatures for any length of time will chill the fish and may result in untimely deaths. Some aquarists advise the addition of sea salt to the aquarium water, but this is not essential. Do not layer the bottom with peat, for this tends to acidify the water and mollies prefer slight alkalinity.

Like all livebearers, the males are ardent suitors and pay continuous court to the females in their surroundings. They are entirely promiscuous—even old and ugly females are not left unmolested! The females seem to do nothing to encourage the attention of the males, and appear supremely indifferent to their love play.

In favourable conditions young are born at intervals of from 3 to 5 weeks. A word of caution here: a gravid



Male sailfin molly

female should never be netted out of a tank and transferred elsewhere when she is expected to give birth in a day or two. Results of such a move are frequently tragic, resulting in death of both parent and youngsters.

In sailfin mollies the young are fairly large—about 1/2-inch—and they dive for cover immediately upon emerging from the female and unfolding. That is the reason for the thick covering of floating plants, which also serves as an excellent place of concealment of numerous small live foods.

A fair amount of vegetable matter is required to keep both young and adults healthy. In the absence of soft algae, chopped lettuce or spinach, a dry food consisting of Bemax and duckweed can be pounded into a paste, and will be much appreciated once the fish have got used to its flavour.

Uneaten lettuce or the uneaten portions of paste food should be removed after a time to prevent pollution. At the temperature of a molly tank, vegetable food, and animal food for that matter, will decompose very rapidly, with a very real risk of poisoning all the inhabitants.

With liberal feeding, hygienic surroundings and plenty of room, the young grow rapidly and soon swim around with their parents, safe from molestation. If breeding is to be undertaken seriously, separate the sexes at the earliest opportunity, or every female will be gravid before she is even half grown. Under such circumstances it is impossible to tell what sort of a fish she will become or whether she is suitable to maintain the quality of your stock. This too-early breeding is, in my opinion, the reason why so many livebearers are indifferent specimens.

Simplified Tablet Tests for Aquarium Water

by Dr. A. T. PALIN, B.Sc., F.R.I.C.

TROPICAL fishes require water of suitable chemical characteristics. The suitability of the water can be ensured only by carrying out regular tests. Obviously such tests should be as simple as possible and yet at the same time there must be no doubt about their reliability and the results obtained. Simple tablet tests developed by the author for water testing have met with an enthusiastic response in the waterworks, swimming-pool and boiler-water fields and they clearly have applications in the control of aquarium-water quality. With these Palin tablets the aim is to eliminate all expensive apparatus, glassware and chemicals and to combine all reagents for a given test in a single tablet of standardised weight.

For the aquarist it appears that the hardness and pH determinations are of greatest importance but there may be occasions when it is useful also to know the alkalinity of the water and, where salt-water fishes are concerned, the chloride content may not be without importance. There may, in addition, be occasions when a check on the free chlorine content of the tap water is desirable in those cases where the water supply is known to be chlorinated.

Hardness Test

Fishes in general seem to prefer a moderately soft to a slightly hard water, that is, between say 5 and 10 degrees of hardness or, in terms of parts per million (which is the recommended scale at the present time) between 70 and 140.

The hardness-test tablets are based upon the new ethylenediaminetetra-acetic acid method. The end-point is indicated by a distinct colour change.

One tablet is added to 100 millilitres (ml.) of the sample contained in a stoppered bottle, which is shaken, and the procedure repeated until the last trace of reddish tinge has disappeared. The number of tablets used is then multiplied by 20.

From this result deduct 10 to obtain the final answer, which is given in parts per million. If the hardness is very high it may be advantageous to take only 50 ml. of sample, in which case the final result obtained from the above calculation is multiplied by 2.

As a simple rule it may be accepted that for most fishes the hardness will be satisfactory if the number of tablets required for a 100 ml. sample of the water is between four and eight.

Reaction of Water

The reaction of the water, which is measured on the pH scale, should generally be neutral to slightly alkaline, that is, the pH value should be 7 or slightly over. A pH below 7 would indicate that the water was on the acid side.

The new pH tablets give greater simplicity and convenience in testing and only one tablet is required per test. Various indicators are available but it is thought that bromothymol blue is likely to be most suitable for aquarium control. The colours produced with the water may be matched against the existing standard colour discs in a Lovibond comparator instrument.

A simple modification of the test which requires no comparator is to mix one tablet with a small quantity of the water, say about 10 ml., and observe the colour pro-

duced, which will then indicate as follows: yellow—acid; greenish yellow—slightly acid; green—neutral; greenish-blue—slightly alkaline; blue—alkaline.

Alkalinity Test

This test is a measure of the total content of alkaline substances present in the water and is performed in a manner similar to that of the hardness test. The end-point of this test is a colour change from yellow to a definite bright pink. The tablets most suitable for aquarium testing are those described as Alkalinity (Low Range).

The procedure is to add one tablet at a time, shaking after each one, to 100 ml. of the water sample contained in a stoppered bottle. The calculation is similar to that used for the hardness determination, the final answer being alkalinity in terms of parts per million.

Chloride Test

This test again is extremely simple, nothing more being required than a bottle of Chloride Test Tablets and a bottle to hold the sample of water. The colour change at the end of the test is yellow to reddish-brown, and when 100 ml. of sample water is used deduct one from the number of tablets used and multiply by 10 to get the answer in terms of parts per million (as chloride). For high chloride concentrations a smaller amount of sample may be taken, when the answer is multiplied by the appropriate factor.

Free Chlorine Test

A recently developed D.P.D. test is now available for testing waters for the various chlorine and chloramine compounds that may be formed after the chlorination process. This test has been developed for use with standard colour discs in the Lovibond comparator. It seems unlikely that the aquarist when testing tap water would require the full comprehensive procedure since he is mainly concerned to check for the absence of free chlorine.

For this simple test it is recommended that the "D.P.D. no. 4 Tablet" be used, since estimation with this includes all free chlorine and similar chlorine compounds. The procedure, when the colour disc is not used, is to add one tablet to a small volume of the water, say about 10 ml., and if no definite pink colour can be seen when the tablet has dissolved, that is, after about 2 minutes, the water may be regarded as free from chlorine. Alternatively, tablets for the *ortho*-tolidine test are available, in which case if no yellow colour is produced after standing for 15 minutes chlorine is absent.

Wilkinson & Simpson, Ltd. (Manufacturing Chemists, Low Friar Street, Newcastle upon Tyne), who collaborated in the development of the tableted reagents, have undertaken to manufacture and supply all tablets required for the performance of the above-described tests: D.P.D. Chlorine Test Tablets (no. 4); *ortho*-Tolidine Tablets (Comparator-type); pH Tablets (Bromothymol blue Comparator-type); Hardness Test Tablets; Alkalinity Test Tablets (Low Range).

This firm will supply details of prices and will also supply any further information that might be required in connection with the use of the tablets in the above or in any other tests, or about the Lovibond comparators and colour discs.



from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 12th of the month preceding the month of publication.

THE officers elected at the annual general meeting of the **Burnley Aquarists and Zoological Society**, were as follows:—Chairman, Mr. J. A. Preston; secretary, Mrs. B. Preston, 55, Carlton Street, Brierfield; show secretary, Mr. L. Lewis.

RECENT activities of the **Friends' Aquarist Society**, have included an inter-club show with Casford, who were the winners by 1,293 points to 1,241. The best fish of the show was a bleeding heart tetra which gained 92 points and belonged to E. Angus.

AT the annual general meeting of the **Rugby Aquarists' Society**, it was proposed to run the society on more informal lines to reduce the paperwork. The new officers are:—Chairman, Mr. E. Bennett; secretary, Mr. T. Peters, 58, Regent Street, Rugby. The highlight of the evening was the presentation of "The Herbert Cup" for tropical and "The Bedford Cup" for coldwater fish. Both were won by Mr. Wilf Smith—a worthy winner. The runners-up were tropical section, Mr. E. Bennett and coldwater section, Miss E. Capel.

THE President of **Grimsby and District Aquarists' Society**, Mr. J. A. Cullum, reported that the Society had had a fairly successful year. There had been an increase in membership which was a very good sign. Officers elected:—President, Mr. J. A. Cullum; chairman, Mr. R. Mackley; vice-chairman, M. A. G. Kennington; Secretary, Mr. A. E. Parker; treasurer, P. W. Bird. Elected to Committee:—Messrs. H. Shaw; H. H. Purl; J. Stead. Publicity Officer, R. J. Truscott.

APPOINTMENTS at the annual general meeting of the **Chingford and District Aquarist Society** were as follows:—Chairman, L. Roberts; president, W. Wrenn; treasurer, Mrs. M. B. Self; secretary, H. Sumner, 111, New Road, Chingford, E.4. Show secretary, R. J. F. Self, 94, Drysdale Avenue, Chingford, E.4. Tel. 511. 3595.

THE secretary of the **Lambeth Aquarist Society** is still Mrs. C. Rundle, 7, Luxor Street, Camberwell, S.E.5., but the treasurer is now Mr. W. Niblock, 78, Thornlaw Road, S.E.27. The club meets every Friday at 27, Beckwith Road, S.E.24. All visitors welcomed.

IT was reported at the recent annual general meeting of **Wolverhampton and District Aquarists Society** that there had been an increase in membership to 40 during the year. Having regard to the extremely difficult position at the beginning of the year this could be considered quite satisfactory, particularly as the income had kept pace with the increase. The officials elected for the year were:—Chairman, E. H. Jephcott; Secretary, J. E. Foley, 62, Leslie Road, Park Village, Wolverhampton; and treasurer, F. V. Law. "Aquatic Knowhow" was the title of the programme for the first of the year's monthly meetings. A demonstration of glazing a tank was given by the chairman, followed by short talks by Mr. Law on plants and foods, both usual and unusual. Mr. E. Wallwork spoke on home-made equipment and short cuts, and also

gave an introduction to tank biology as it affects aquarists to round off a successful evening. Meetings are held monthly at 7.30 p.m. on the third Friday each month in the Y.M.C.A., Stafford Street, when newcomers and visitors are always welcome.

THE officers elected at the annual general meeting of **Southampton and District Aquarists Society** were:—Chairman, Mr. A. Long; Vice-chairman, Mr. M. Davidson; hon. secretary, Mrs. M. Gilbert; hon. treasurer, Mr. C. Speinks; hon. show secretary, Mr. F. Feed; librarian, Mr. K. Poole. Committee:—Messrs. Yetman, Prosser, Garnett and King. The assembly approved the committee's report and Statement of Accounts which showed that 1958 had been a very successful year. It was decided to put on the annual show, of which more details will be made available later.

THE final leg of the N.W.L.G.A.S. Competition year 1958/59 was held at **Hendon and District A.S.** in February. The results were as follows:—Angels: 1, Mr. Prince (Willesden A. S.); 2, Mr. Atkinson (Hendon A.S.); 3, Mr. Patch (Willesden A. S.); 4, Mr. Powell (Willesden A. S.). Siamese Fighters: 1, Mr. L. Dare (Independent A. S.); 2, Mr. A. Stevens (Hendon A. S.); 3, Mr. Prince (Willesden A. S.); 4, Mr. A. Peppitt (Arnold A. S.). A.O.V. Livebearer:—1, Mr. Walker (Willesden

A. S.); 2 & 3, Mr. J. Haynes (Hendon A. S.); 4, Mr. J. Maurice (Hendon A. S.); A.O.V. Tropical Igglayer:—1, Mr. L. Coatsman (Hampstead A. S.); 2, Mr. A. Peppitt (Arnold A. S.); 3, Mr. Prince (Willesden A. S.); 4, Mr. F. Tomkins (Independent A. S.). Willesden were the winners of the N.W.L.G.A.S. shield the final points being:—Willesden A. S. 88; Hendon A. S. 67; Independent A. S. 45; Arnold A. S. 29; Hampstead A. S. 20; Harrow A. S. 14. Next meeting of the N.W.L.G.A.S. will be at Independent in April. The shield will be presented to Willesden at this meeting.

THE annual general meeting of the **East London Aquarists and Pondkeepers' Association** was held recently when some 40 members attended.

Mr. Corby, the retiring chairman, when addressing the meeting, stated that the club was in a most strong and prosperous position, new members were still coming in, and it was an organisation of which all could be proud and was going from strength to strength in every way. Financially the club stood in a very strong and healthy position.

The meeting decided that the annual show should be held on 8th to 12th September this year, at the Central Hall, Barking Road, East Ham, E.6. The following were elected as officers for the ensuing year:—President, Mr. P. Campkin; chairman, Mr. W. Hylton, vice chairman, Mr. Fairweather; secretary, Mr. F. Petro. Assistant Secretary, Mr. T. King; Treasurer, Mr. A. Field; Librarian, Mrs. Fairweather; show organiser, Mr. D. Mayhew; show secretary, Mr. J. Bryden; equipment officer, Mr. L. Hoopell; Press and social secretary, Mr. S. R. Learey; Committee: Mr. B. Newman, Mr. M. Gray, Mrs. J. G. Learey.

Mr. Hylton, the newly-elected chairman, took the chair and thanked all present for their support and stressed that new members are always welcomed on club nights that are held at the Ripple School, Ripple Road, on the first Friday and third Tuesday of each month at 8 p.m.

AT the first annual general meeting of the **Atherstone Aquarists' Society** the following officers were elected:—President, Mr. J. T. Adcock; chairman and treasurer, Mr. W. A. Wainwright; vice-chairman, Mr. H. E. Jones; secretary, Mr. E. A. Davis, 4, Ambien Road, Atherstone.

It is now 10 months since the society was founded and there are 20 members. The society has been accepted also as member of M.A.A.S.

MR. W. P. BRADLEY, who left this country last year to reside in Western Australia, is now the overseas correspondent to the **Aquarium Society of Western Australia** and would welcome any enquiries regarding the hobby in that country. Mr. Bradley's address is 5, Park Lane, Claremont, Western Australia. Satisfactory expansion is reported by the Society and the new President is Mr. Joe Baker, who is one of the most experienced aquarists in Western Australia and a pillar of the recently formed Guppy section.

NEW members would be welcomed by the **Riverside Aquarium Society** and are invited to contact Mr. J. G. Rowe, 14, Cunningham Street, Acton Green, London, W.4. Tel. CH1 1145. At the recent annual meeting the following officers were elected:—Chairman, Mr. Barnes; secretary, Mr. Taggart; Treasurer, Miss Watson; Show secretary, Mr. Daynes. Social Committee: Mrs. Barnes, Mrs. Owen, Mr. Hill and Mr. Rowe.

THE March Table Show of the **Nottingham and District Aquarists' Society** will be for the *Hyphessobrycon* species. Recent events have included talks by Mr. G. A. Atkins and Mr. T. Ballard, both of Leicester.

IN future the **Bexhill Society** will be known as the **Bexhill and District Aquarium Society**.



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 cost price 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 xii, to **Aquarist's Badge, The Aquarist, The Butts, Half Acre, Brentford, Middlesex**, and please specify which type of fitting you require.

It has been found that the word Aquatic has too wide a meaning as the Society has been mistaken for a swimming club, angling club and even a fishermen's convention. At the annual meeting Mr. W. G. Bradbrook Chisell was elected chairman, Mr. N. Dengate vice-chairman and Mr. A. McCormick, treasurer. The new secretary is Mr. D. Jolliffe, 17, Albany Road, Bexhill-on-Sea.

IN recognition of his services to the club Mr. R. Offerd was made life vice-president of the **Leyton Aquaria Society**. At the annual meeting the following officers were elected:—chairman, Mr. R. Offerd; vice-chairman, Mr. R. Watt; Secretary, Mr. F. E. Bland, 121, Forest Lane, Forest Gate, London, E.7.; treasurer, Mr. Kanon; show secretary, Mr. Watson, Sr.; assistant show secretary, Mr. Watson, Jr. Details of meetings and society activities can be obtained from the secretary, and new members will be welcomed.

IN order to avoid the clashing of dates for open shows it has been decided that the annual open show of the **Southend, Leigh and District Aquarist Society** will be held this year from the 1st to the 9th August. This period has been chosen because to the best of the club's knowledge no show has been staged on this date since the club last did in 1954.

AT the last meeting of the **Bristol Coldwater Fish Breeders' Group** the characteristics of the Bristol Shubunkin were discussed, also details concerning breeding this year. Several good specimens were on view, and there was plenty of good and constructive criticism.

GREAT interest was caused among visiting aquarists and the general public alike by the **Independent Aquarists' Society's** fine show at the recent "Daily Express" Furniture Exhibition at Earls Court. The aquarists were in living-room settings, incorporated in wall fittings, dividers, and picture frames, and showed community tanks, and separately babies, angels and guppies. As a result, new members have been recruited for the Society, which meets every Monday at Montem School, Hornsey Road, 8 p.m., and newcomers are very welcome. The secretary is Mr. L. Dare, 17, Lady Somerset Road, N.W.5. Tel.: Gul 6709, evenings.

AT the February meeting of the **Sunderland and District Aquarists' Club** an illustrated talk on Plants, given by Mr. A. Brunton, proved extremely interesting. Prizes were also presented at this meeting for the "Best Fish bred in 1958," and the Best Breeder, and these went to Mr. A. Brunton. Best Furnished Aquaria was won by Mr. A. Thomas, and the trophy for most points in Table Shows was presented to Mr. Adamson. A film show is being held in conjunction with the April meeting.

THE main item at the **Biford and District Aquarists' and Pondkeepers' Society's** was an auction of fish and aquarist's accessories. There was a very good attendance and the Table Show was well supported. This was for any variety of catfish and Mexican swordtails and the winners were:—Swordtails: 1st and 2nd, Mr. Hunter; 3rd, Mr. Stebbing. Catfish: 1st, Mr. Hunter; 2nd, Mr. Moore.

At this meeting awards were made to the winners of the 1958 competitions. The next meeting of the Society will be on Monday evening, 9th March, at Newbury Hall, and on this occasion Mr. Mason Smith, of Cambridge, will be showing a series of his underwater films, commencing at 8.30 p.m. Members of local aquarist's societies will be invited to attend and, of course, anyone interested will be welcome. The table show will be for fighters and any variety gouramis. Further information regarding his society may be obtained from the secretary, Mr. V. Price, 1a, Hoeace Road, Barkingside Road.

"INTERESTING Facts about Fishes" was the title of a talk given to the February assembly of

the **Walsall Aquarium and Pool Society**. The speaker was Mr. E. Wallwork, a founder member of the Wolverhampton Aquarist Society. Mr. Wallwork dealt extensively with the physiology of fishes and illustrated the positions of the various organs with the aid of X-ray photographs.

Aquarists who are interested in joining the Walsall Society may obtain details of the 1959 programme from the secretary, Mrs. E. Lamburn, 21, Poplar Road, Wednesbury, Staffs.

THE **Birkenhead and District A. and H.S.** have decided, due to increase in members outside the area, to change their title to the Wirral Aquarists' Association, thus encompassing the full Wirral area.

Meetings recently were well attended, there being a quiz on Breeding Egg Layers, and two informal discussions, the latter being concerned with proposals for the forthcoming annual general meeting. Future lecture plans were put forward to members and the new "Monthly News Bulletin" was well received.

THE first open show of **Canford A.S.** will be a two-day exhibition, commencing on Friday the 22nd May, at Canford Secondary School for Boys, Brownhill Road, London, S.E.6. There will be 20 classes, and there are many excellent trophies to be won, including the "Iles Cup," to be awarded in the Canford Characin Championship, and the "Evans Cup" for the London Egg-layering Tooth Carp Championship. A record entry is anticipated in this event. The F.B.A.S. Trophy is being awarded for the best labyrinth in the show, and the "Bancroft Cup" goes to the club with the highest points in the inter-club contest. All other classes will be awarded plaques for the 1st and 2nd prize-winners: 3rd prize-winners receive a medal. The Breeders Class for Egg-layers will be split into two classes. One for fish with 10-14 points for difficulty of breeding, the other for fish that qualify for 15-20 points. This idea was tried out last year in the Annual Breeders Show and as so many people were impressed with the idea it is being included in this show. Schedules can be obtained from the show secretary, Mr. S. Cornock, 33, Howard Road, Bromley, Kent.

A RECENT quiz held by the **Brockley and District Breeders' Circle** held one or two aspects which might be of interest to other groups—though no doubt others have used similar systems. The majority of questions were based on talks given to the group during the past few months or that have been published in the group's periodical. Some questions were in the form of familiar objects in the hobby whose inner workings were possibly a closed book to some members and finally there were questions which depended upon diagrams being drawn to illustrate the answer.

A one-tank member was recently embarrassed by the spawning of Paradise fish in the community tank. A measure of protection was given the fry by the introduction of a nylon-wood "curtain" across the tank, the whole being guarded by the valiant efforts of the male parent. Although many eggs and young were lost before the erection of the curtain, it now seems that a good number of the fry may be successfully reared in the tank.

AT the monthly meeting of **Northampton and District A.S.**, Mr. and Mrs. G. Twisleton gave a talk on the "Practical aspects of Herpetology." Among specimens demonstrated were a South American giant toad, some fire salamanders and a South American iguana.

Prize-winners in the table show for plants and coldwater fish were: Plants: 1, Mr. L. W. Roy; 2, Master P. Daley; 3, Mr. N. E. Lyon. Fish: 1, Mr. J. A. Catterall; 2, Mr. J. Stead; 3, Mr. N. E. Lyon.

THE programme for the **Kingston and District Aquarist Society** for this year will be as full and varied as ever. The show date has

not been fixed but will take place probably in June or July. A film show has been held and looking further ahead Mr. George Camdale will pay the club a visit on the 4th June to show, among other things, colour slides of his visit to Ghana. McInerney's Aquarium will also be visited.

AT the **Mansfield and District Aquarist's Society's** third annual dinner, the Society's annually awarded Challenge Shield for the highest number of points awarded at table shows throughout the year was presented to Dr. D. Porter, Jackdale, by Mr. E. Harrison.

Mr. E. Harrison spoke on "Keeping British Native Fishes in Small Aquaria". Many types of British fishes were illustrated. Dr. D. Porter was chairman, and Mr. C. Hughes voiced thanks.

DISPITE the inclement weather there was a good attendance at the annual meeting of the **Aylesbury Aquarist Association**. The Secretary reported an increase in membership during the year including many new juniors. A varied and enterprising programme has been arranged for the current year and the secretary is Mr. C. L. Stephens, 79, Abbey Road, Aylesbury.

THE Table Show of the **Dundee Aquarist Society** was for Gouramis (A.S.) and the results were as follows:—1 & 2, A. Cross (Kissing Gourami); 3, A. Cross (Thick-lipped Gourami); 4, A. Fiskin (Pearl Gourami). Scott Trophy placings:—11 points, A. Cross; 5 points, A. R. Bell, A. Fiskin; 4 points, E. Seymour, G. B. Kirkland; 3 points, K. Webster. The next Scott Trophy Table Show will be for Platies (A.V.) single fish, either sex.

This season's Home-furnished Aquaria competition will be held during the month of April which gives prospective entrants plenty of time to prepare their tanks. Full details will be announced nearer the time.

AT the recent annual general meeting of the **North Birmingham Pond and Aquarist Society** the following were elected:—Chairman, Mr. C. E. Fields; hon. treasurer, Mr. T. Peacock; hon. secretary, Mr. L. W. Male; Committee, Mrs. M. Orton and Mr. T. Hodge; vice-chairman, Mr. S. Swadling. Meetings are held on the last Wednesday of the month at Greenhalme Road School, Kingsstanding, Birmingham, 22.

SECRETARY CHANGES

CHANGES of secretaries and addresses have been reported from the following societies:—Canford A.S. (Mr. P. Evans, 14, Tubbenden Drive, Orpington, Kent). Dunstable & District Aquarists' Society (Mr. J. Dixon, 24, Crowland Road, Luton). Glenrothes Aquarist Society (D. Henderson, 80, Woodside Way Glenrothes, Fife). Leicester Aquarist Society (B. M. Payne, 37, Rutland Drive, Thurston). Rugby & District Aquarists' Society (T. Peters, 58, Regent Street, Rugby). Southampton and District Aquarist Society (Mrs. M. Gilbert, 16, Yew Road, Bitterne, Southampton). Stirling Aquarium Society (J. Ritchie, 63, Johnstone Avenue, Cornton, Stirling).

NEW SOCIETY

IN January the **Hartlepool Aquarist Society** was inaugurated and numbered 18 members. The chairman is Mr. Heywood; secretary, Mr. G. O. Kellert, 113, Catcote Road, West Hartlepool; Treasurer, Mr. S. Saint, West Hartlepool. The secretary would like to hear from any other clubs in North East interested in inter-club relations, shows, etc.

DO YOU KNOW THE NAMES? (Solution)

From above downwards the generic names are *Abramites*, *Charax*, *Gastrophysicus*, *Gobius*, *Eleotus*, *Ethiops* and *Elanus*. The third vertical column thus reads *Rasbora*.