

The AQUARIST AND PONDKEEPER

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Editorial

WITH the arrival of spring, it is probably true to say, most people feel that they should be participating in the natural upsurge of energies in some way or other. Gardening columnists certainly find it necessary to curb the enthusiasms of their readers at this time with warnings of the risks of setbacks if too much is done too soon. The aquarist with a garden may find his interests clashing somewhat, but not if he is a pondkeeper; and if he is without a pond—why, now is a good time to start one.

This need not be quite so much of a task as it may seem, and full-scale pondkeeping is not the only way in which the aquarist can extend his fish-keeping to the garden. Perhaps a fish house has been an ambition for some time; what better opportunity to start work on it than this spring fever? But if this, too, is more than time and resources will permit, at least consider a small temporary pond or some outdoor tanks as summer homes for fishes in the open. It is now well known that polythene sheet is a good medium with which to make a temporary pond. Those old galvanised water tanks that disfigure so many waste pieces of ground can also be sunk in the earth and used. The holes in them are easily cemented up, and with a polythene lining or an interior wash of cement and sand they will give good service for years.

The experiment of trying to keep and breed some of the tropical fishes in such garden ponds during the summer months is worth doing. The fishes will not be put out just yet, of course; June is more likely to be the right time, but now is when things can be made ready. If, after all, you never risk your tropicals in the ponds, you may discover new delights with coldwater species instead, and at the very least you will find excellent use for your ponds as water-plant nurseries and as sources of live foods.

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Breeding the Livebearers

by Dr. F. N. GHADIALLY

In last month's article the subject of breeding quality live-bearing fishes was introduced. Selective breeding procedures were discussed and the dangers of inbreeding for many generations were presented. This article is concerned with practical aspects of rearing the young of livebearers.

Judging the Time of Delivery

As the time for delivery approaches the aquarist will notice that the female livebearer increases considerably in girth, and the experienced eye can judge with reasonable accuracy in most cases from the size and shape of the abdominal region whether the fish will deliver her brood in the next day or two, or the next week or two. This is one of the things that words cannot describe adequately but must be learnt by observation and experience.

One point that may be noticed is that when delivery is imminent there is an angulation or a squaring off of the front end of the smooth rotund curve of the female, observed when she is viewed from the side. Besides this the gravid spot enlarges in size and deepens in colour as pregnancy advances.

Gravid spot is the name given to the usually black crescentic or triangular area seen near the vent of the gravid female. It is believed to be due to the black pigment on the peritoneum (a thin membrane which lines the abdominal wall and various internal organs) showing through the distended (thinned and hence rendered translucent) abdominal wall of the pregnant female. As pregnancy advances the increasing distension and thinning of the abdominal wall produces an enlargement in the size and colour intensity of the gravid spot, as an increased amount of peritoneal pigment is brought to view.

In the black molly, of course, the intense black colour of the abdominal wall even when thinned in pregnancy prevents a view of the peritoneum, and hence no gravid spot is seen. In the albinos such as the albino swordtails, the red-eyed-red swordtails, etc., the gravid spot, of course, lacks the black pigment, for no black pigment is developed anywhere in the fish. The crescentic area here presents a pinkish appearance, and just like the pink in the eye of the albino this is due to the colour of the blood seen in the vessels in this region. On closer examination, preferably with a light situated behind the fish, spherical translucent structures (eggs or developing embryos) can be seen in this area. In the wagtail platy also this area shows practically no black pigment; it presents a translucent golden-yellow appearance and fine black dots may be seen in this area when it is examined by transmitted light. These are the eyes of the developing embryos.

The gravid spot is no certain indication that a fish has been fertilised and is carrying young; even virgin females show it. Finally one may say that it is no proof of sex either, for the male platy (*Xiphophorus variatus*) shows a very well-marked dark (gravid) spot but this to my knowledge is the only exception to the rule.

Frequency of Broods

It is debatable whether frequent breeding with either livebearers or egg-layers adversely affects the health or growth of a fish. Assuming that sufficient amount of the correct food is available this is unlikely to be an important factor. However, where the diet is deficient in quantity or quality it is inevitable that the added strain of pregnancy



Photo: Laurence E. Perkins
Female green swordtail, in which the gravid spot is visible as a shaded area above and between the ventral and anal fins

will adversely affect the growth or length of life or both of a fish.

Closely related to this is the problem of producing a large livebearer male. Here numerous successful exhibitors maintain that the utmost in size can only be developed when a male is kept separate from the females, the idea being that "he does not waste his time and energy chasing females but devotes it instead to feeding and growing." As a converse corollary to this is the observation that smaller males of both livebearers and egg-layers are usually more virile and fertile than their larger and more "handsome" brothers. Would it perhaps be more accurate to state this the other way around: that the virile, fertile males lead a more active sexual life, expend more energy dashing about and hence fail to attain a good size ultimately? Be that as it may, there is, I think, some truth in the statement that smaller males are as a rule easier to breed with.

Separation of newly born Fry

Big fish eat little fish, is a saying the practical truth of which the aquarist learns very quickly. If a female livebearer delivers young in a community tank none are likely to survive for more than a few hours, often much less. In a well-planted tank an odd youngster may escape to reach maturity but this is indeed a rare event. Not only other fishes—livebearers and egg-layers—but also the mother will devour most if not all the young if she is given the time and the chance. Hence it is obvious that if we want to save the youngsters some method must be used to combat this.

These methods fall naturally into two main groups. The first comprise various mechanical devices to separate the young from the mother as soon as they are born, the other relies on separating the expectant female in a well-planted tank which provides refuge for the fry. The advantages and disadvantages of the two will be discussed after we have examined the two methods in some detail.

Breeding-trap methods. Numerous devices for separation of fry, known as breeding traps, are now available commercially. These usually take the form of a small container, partially submerged in the water, which can be attached to the side of the tank by rubber suckers or hooks over the edge of the tank. The bottom of the box is not

solid but contains numerous openings. These are provided by using either a perforated-plastic sheet or a series of glass or plastic rods or tubes arranged parallel to one another so as to provide openings between the bars in the form of tiny slits. The gravid female is introduced into this box and when the young are born they drop through the openings in the bottom out of harm's way.

A simple trap can also be improvised by fixing a sloping piece of glass in a tank. The lower edge of the glass does not touch the wall of the aquarium; a small chink (approx. 1/8 in.) is left for the fry to drop through. The glass may run either across the length or the breadth of the tank, and can be maintained in position by means of split rubber tubes slipped over the edge of the partitioning glass. The female or females about to deliver are placed in this V-shaped compartment, and the young when delivered drop through the chink between the sloping partition and the aquarium wall.

Planted-aquarium methods. If the gravid female is isolated in a well-planted tank the bigger the tank the better, but even a fairly small one (2 gallons) is usually adequate for most fishes. It is advisable to provide a fair number of fine-leaved plants such as *Cabomba*, *Myriophyllum* and *Nitella*. The young hide in this fine foliage where the adult female cannot pursue them because of her size. About a third of the tank must be left reasonably clear for the female to swim about in.

If possible the bottom of the tank should be carpeted with thickets of low-growing plants and, what is perhaps even more important, plenty of floating plants with bushy roots should be provided. The young when first born drop to the bottom of the tank and lie there for some time quite helpless. Then they begin to hop about the bottom of the tank and finally make a quick dash to the water surface. The carpet of small plants is used to protect them at this stage when they are so vulnerable to attack from the mother, and the floating plants hide them when they reach the surface. Ideally the depth of the water in the tank should be between 6 and 9 in. After the fry become truly free-swimming they usually spend most of their time at the surface of the water; at this stage also the surface plants afford valuable cover.

Another factor to consider is the appetite of the mother. It is obvious that if she is poorly fed and ravenously hungry at the time of delivery, she will hunt the youngsters with added zest and vigour. Hence it is important to have a small amount of live food such as *Daphnia* or mosquito larvae present in the tank all the time she is in it. As a matter of fact, when this can be arranged planting precautions need not be so elaborate as described, for as a rule a well-fed female will not devour any or at most only a very few youngsters. As soon as possible after delivery the female should be removed to another tank for her presence constitutes a menace to the life of the fry.

Though the above is perhaps the ideal method of delivering a female livebearer, this ideal may be difficult to attain for various reasons. Fine-leaved plants, a spare tank and live food may not all be available at a given moment. There are, however, other methods available to the aquarist.

One that is commonly employed by the aquarist with a limited number of tanks is to partition off a small portion of the tank and deliver the female in the small compartment. Yet another way is to use a large goldfish globe or a large glass jar filled with water from the tank. A handful of *Nitella* or other suitable plants weighed down with a small stone is added and the female placed in this container with some live food. The container can be kept at the correct temperature by floating it in the aquarium.

Breeding Trap versus Planted Aquarium

Let us now examine the advantages and disadvantages of the methods suggested. The mechanically minded novice

eager to build an elaborate trap should bear in mind the following points.

Most females do not take kindly to traps, particularly small ones, and there is a very real danger of losing the female. If a trap is used it should be a large one; the size will depend to some extent on the size of the female to be delivered. Most of the traps on the market are much too small for anything except guppies and small platys; something about three to four times the size would be nearer the mark for large swordtails. For a swordtail measuring approx. 3 in. a trap about 10 in. long and 6 in. wide would be, in my opinion, the minimum requirement.

Some species tolerate life in breeding traps better than others. Guppies are quite tolerant to life in a trap but mollies die so frequently or deliver young prematurely that it would be rank lunacy to attempt to breed them in this fashion. Swordtails and platys fare a bit better, particularly if the trap is a large one and the stay not too prolonged. Two factors seem to contribute to the unhappy state of the fish in the trap. One is the very small swimming space, even in what might be called a fairly large trap by usual standards, and the other is the presence of the false bottom. It will be seen on observation that the fish cannot at any time "sit down" comfortably on such a surface, and though a fish usually learns to tolerate transparent sides to its home it takes very unkindly to a transparent bottom. (For instance, when a fish is isolated in a glass jar floated in an aquarium it is found that a thin layer of gravel at the bottom of the jar adds materially to its sense of security and comfort and stops it from making frantic attempts to pass through the bottom of the jar.)

Feeding a fish in a trap is also rather complicated. When dried food is used it rapidly falls through the perforated bottom, from where it has to be removed by the aquarist or by a population of snails. In any case the fish gets very little. Live food also tends to escape through the bottom out of reach of the fish. Mosquito larvae for instance wriggle through the openings for the fry. Most of them fail to return and escape into the fry compartment. *Daphnia*, which are attracted by light, may be held in the trap by placing a small electric lamp near the surface of the water in the trap or by placing the trap near the lighted part of the aquarium, or by suitably masking the walls of the tank by brown paper. However, it must be remembered that fry are also attracted towards light and under such conditions tend to return into the trap more often than usual.

As the female cannot be fed easily in the trap, she obviously cannot be maintained there for any length of time in good health. Hence one is forced to wait till almost the last day or two before delivery to move her into the trap. Besides the difficulty of judging the date of delivery so precisely, this move in itself is a dangerous procedure, for it is unwise to move a livebearer so close to her date of delivery. It may kill her or the rough handling may result in premature delivery with resultant loss of most or even all the youngsters.

Some large-scale breeding establishments use very large wooden trays with perforated-metal bottoms, supported in large concrete tanks, for delivery of livebearers. But because of the large size of the traps and abundant supply of live foods they manage to get good results. When this idea is reproduced on a small scale by the aquarist with his little breeding trap the results are usually far from satisfactory.

In view of all this the breeding trap is not popular with the advanced aquarist. The argument raised by some against the planted tank is that it does not give such perfect and absolute protection to the fry as a trap does. This is a totally fallacious argument, for it is not uncommon to find after delivery a few youngsters floating about in the trap dangerously close to the mother. A few are probably lost in the planted tank too, but in practice it is found that when the female is well fed the losses are negligible.

However, the greatest advantage of the planted tank is that it is safe and comfortable for the mother. She can be moved to the maternity tank weeks ahead of delivery and be fed and maintained in perfect health with little trouble.

Fish confined in a goldfish globe or large jars for delivery do not fare too badly; at any rate they fare better than those confined in traps. In some large breeding establishments large numbers of livebearers are delivered in goldfish globes maintained at the correct temperature by standing them in a heated room or in heated troughs of water. The latter method on a small scale has been used by me extensively. When *Daphnia* are available the water in the globes can be maintained in good condition (for *Daphnia* are filter feeders and remove bacteria and infusoria thus checking pollution), but it becomes almost impossible to operate the scheme with dried food even with the help of snails. The fine-leaved plants (usually *Nitella*) needed to provide refuge for the fry also provides refuge for the bits of food, which soon rot and pollute the small quantity of water. Constant changes of water are required, which is very time-consuming for the aquarist and disturbing for the

gravid female.

Should green plants be in short supply, washed and boiled willow root forms a good substitute. It may be used either in the goldfish globe or in a larger container such as a tank.

Feeding Livebearer Fry

There are no special problems involved in the feeding and care of these fry. Given plenty of room and a varied diet success is assured. The development of good size and colour is dependent not only on genetics and breeding but also on good aquarium management and a varied diet. Livebearer fry are large enough to take newly hatched brine shrimp and micro worms as first food, so no feeding with Infusoria is necessary. Within a few days they can take *Cyclops* and sifted *Daphnia*. Also, powdered dried food is accepted from the very beginning if it is of the right size. This makes feeding very easy, particularly as they will accept almost anything. Most of the livebearers are algae-eaters and hence thrive in a well-illuminated tank where water turns green and a fair amount of soft green algae is produced on the sides of the tank.

HAIRGRASS

by JACK HEMS

ELEOCHARIS acicularis, better known to aquarium keepers as hairgrass, is a delightful little plant for decoration of the coldwater or tropical aquarium. It is not suitable for introducing into a tank inhabited by larger barbs, catfish, goldfish or any coldwater or tropical species given to disturbing the compost, for the plant's roots are very fine, and do not strike deeply enough to keep it anchored if disturbed.

It is invaluable for side-planting a tank housing, say, neon tetras, white-cloud-mountain minnows, livebearers or, in fact, any of the smaller, well-behaved community species.

As a spawning plant or baby-hiding plant, it ranks among the best, for it spreads all through the growing medium, and develops new plants on the runners which strike out in all directions. So it is readily realised that the needle-like stems, set so close together, offer a perfectly natural hiding place for newly born livebearer fry or newly scattered eggs.

E. acicularis is in actual fact a marsh or bog plant, and in its natural surroundings it grows in the water itself, just submerged, or above the water on the wet mud.

The plants that colonise wet mud seldom grow to more than 2 inches in height, whereas those that grow totally submerged grow to more than twice that size. Therefore, it is a tidy-looking plant for the aquarium, never growing so tall as to need any pruning. But it does need a good top light. Its temperature range is considerable, ranging from icy cold to blod heat. It does best, however, in the middle sixties or lower seventies.

It remains alive but inactive in very cold water, but tends to die down and eventually to decay if kept in too high a temperature for protracted periods. It seems to flourish in both acid or slightly alkaline conditions.

The ideal growing medium for it is a fine sandy floor covered with a thin carpet of rich brown sediment. When planting it in the aquarium, do not push the runners of separate plants too deeply because if you do this the weight of the sand will prevent the plants from growing properly; in fact, the plants will most likely disintegrate under the pressure of the sand and die.

It is best to anchor the runners to the growing medium with the aid of a few stones. In a short time new runners



Photo:

Laurence E. Perkins

Hairgrass (*Eleocharis acicularis*)

will strike out across the sand and new plants will develop. Snails do not appear to be interested in the plant as a foodstuff, and most plant-eating fishes leave it alone.

E. acicularis is found growing wild in Europe, Australia and the Americas. The plants that grow on wet soil form tiny brown spikelets at the tips of the stems.

Besides its common name of hairgrass, it is known in botanical circles as the least spike-rush. There is another species, often used in the aquarium, known as *E. palustris*. This species may attain a height of 12 inches and has slightly stronger or more rigid stems than *E. acicularis*. It is indigenous to Europe and North America.

Breeding the Rosy Barb (*Barbus conchonus*)

by E. WALLWORK

THIS attractive and colourful barb will need no introduction to the majority of aquarium lovers, and though the books often tell us that it is easily bred, some care is necessary if we are to raise a satisfactory batch of youngsters.

As with the bulk of the egg-layers, it is preferable to purchase five or six half-grown fish from a reliable source and to feed them liberally, which is a pleasant task as this is a fish which is always on view and is always ready to eat almost anything, any time. It will invariably be on view in the front of the tank and swims with agility at all levels.

Sexing this fish is not easy at first, that is when they are under 1 inch or so long. After that size, they will begin to show interest in one another, mainly between two rival males in the presence of a female, when these two males will perform a most spectacular gyrating dance, as they roll over and over one another like a pair of Chinese tumblers. If sexually mature their colours are really beautiful, being a most attractive burnished copper extending the full length of the body with the exception of the fins, which are red. The dorsal, anal and ventral fins are also overlaid with black on the outer third. An iridescent-green flush overlays the upper part of the body almost to the lateral line, and the fish positively glitters under a good top light.

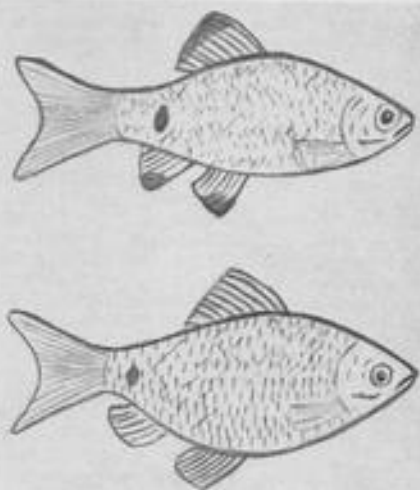
By comparison the female is much paler, although a fainter copper sheen is apparent all over. The green coloration is more noticeable in the female, her fins are practically clear, and generally she will be a little larger at the same age. If both fish are about 1½ inches long, the female will also be deeper in the body if well fed and filling with spawn.

Segregation of the sexes at this stage is recommended, if only for a week or so, as "absence makes the heart grow fonder," and the chosen pair should be ready to spawn when 1½ inches long. Fully grown specimens reach 3 inches long.

Preparation of the tank is best carried out with matured tank water or pond water raised to 78 to 80°F. Water to which the fish have been accustomed is best, and the tank should be approximately 24 inches long with a water depth of 8 to 10 inches and of similar width, though the width, within reason, is not important. One-third of the length of the tank is planted with fine-leaved plants to its full width, having at their base coarse gravel or ½ inch-round pebbles. Reaction (pH) of the water is usually 6.8 to 7.0 if old water is used, as recommended.

Plants used can include *Myriophyllum*, *Ambulia*, *Cobomba*, lesser bladderwort, *Festinalis* (willow moss) or even artificial substitutes such as nylon mops or the decorative dried "sea fern" sold by dealers. At any rate, these plants need to be fairly densely planted towards the one end, leaving room for a good spawning drive from the opposite end of the tank.

Only one breeding pair is introduced to the tank, preferably in the evening, when the pair can settle down for a rest and become acquainted with their new surroundings. Next morning, as soon as it is light, spawning should commence as the male drives the female into the plant thickets from the far end of the tank. The female is usually very willing if in good condition and the pair will nudge one another at the sides and tremble side by side in the plants, usually choosing a densely planted area.



Rosy barb (male, top; female, bottom)

After a minute or so they will be off to the other end of the tank again to start another drive into the plants, into which the eggs are expelled by the female and immediately fertilised by the male. This will be repeated for 2 to 3 hours.

The eggs as they leave the female are very tiny, faint and white, and as they enter the water they absorb moisture and swell out into small clear globules the size of a pin-head and stick to the fine-leaved plants, as they are adhesive. Some will fall to the bottom of the tank and it is here that the pebbles are of value in trapping the eggs.

After about 4 hours or so the spawning pace is less intense and then both fish are eating whatever eggs they can find. To my mind, the female is the chief offender in this respect and it is because of this that failure to raise a large batch is quite common. So remove both parents as soon as possible after spawning. Occasionally spawning is not quite so spontaneous as described and the pair should be left together for not more than 48 hours. After that time, if they have not spawned it is best to give them another opportunity after a week's separation, or to try another pair.

Assuming that you have managed to remove the parent fish and retain some eggs, it will be seen that a slight opacity is present in the eggs after about 8 hours. This is the embryo and with a reasonable magnifying glass a tiny black speck can be seen at its edge. These are the embryonic eyes. After a further 24 hours, only a few opaque eggs are to be seen and these are usually the infertile eggs, which soon become covered with fungus. Usually they are left alone as, in small quantities, they do no harm. At this stage the aquarist tends to become disappointed, thinking that the batch is lost, but careful observation with the glass will reveal minute and very transparent fry hanging from the plants, and occasionally on the front glass. Even in a good strong light they are often difficult to see but they

can be seen limping from one plant frond to another, upwards towards the light. After a further 24 hours they are swimming on an even keel and the tiny golden swim bladder can be seen; the eyes too are golden. The fry are approximately 3 to 4 mm. long.

From this stage onwards they must be continually "pushed" in growth. Infusoria is acceptable for 3 to 4 days and then rotifers, brine shrimp, micro worm, sifted *Daphnia*, minced earthworm and a good brand of dried food will complete the food cycle. As they grow rapidly

and a batch of 200 or so may be expected it will be appreciated that a fairly large tank is beneficial, or early transfer to a large tank should be arranged.

Failures occur (from personal experience) when the aquarist leaves the breeding pair in the tank too long after spawning, when a large number of eggs are eaten, or in failing to provide the large quantities of suitably graded foods required at the various stages of growth. Too small a tank is also detrimental to the success of rearing a large batch.

AQUARIST'S Notebook

by

RAYMOND YATES



I HAVE carried tropicals in all sorts of containers for many years, and undoubtedly the best is the Thermos type. Long ago I bought a secondhand quart Thermos and this did a wonderful job until last week. Water spilt when filling often seeps through into the inside of the casing, and, in time, a circular hole in the base rusts through. This does not affect the usefulness of the jar, however, and one can pack the bottom hole with newspaper, cardboard or foam rubber. The casing does not keep the water warm (the glass vacuum jar does that) but provides a shock absorber and holds up the glass jar, so that however much the outside rusts the jar can be used almost indefinitely. All good things come to an end, and last week I pulled out the packing, which was quite damp, in order to replace it with foam rubber. Unfortunately the jar fell a fraction of an inch in the container. The glass was not cracked but the blowing joint or nipple lost its extreme tip, a minute pinhead of glass. When I observed this I felt sure the vacuum was ruined and so it proved. When bottoms rust through the best packing is foam rubber because this is more or less unperishable, and needs no replacement with consequent risk of a minute breakage like mine. Thermos jars should always be warmed up before you set off for the dealer's shop. This prevents risk of chilling.

Green fly is a pest in summer in the garden, although many aquarists feed it to their fishes, which relish these tasty morsels. Green fly will float on the surface and are quickly seen by an interested fish. The other day I was surprised to see clusters of aphides on the leaves of *Vallisneria* which were lying flat on the surface of a tank in a friend's fish house. Is there nothing these plant lice will not attack?

When transferring fish from one jar to another it is a wise plan to do this over a large rubber sheet. Should a fish jump out it suffers the minimum of damage, picks up no dirt or dust and is quickly rescued. Rubber sheets are also useful when cleaning a tank; it is surprising how much water can find its way on to the lino or the carpet otherwise. In winter rubber sheeting placed over tanks at night helps to conserve heat.

I was looking the other day at the sail-finned fish (*Polypsteris senegalensis*) and also the reed fish (*Erpetoichthys calabaricus*), both of which come from tropical West Africa. These fishes are mostly quiet and are often motionless for long periods. They are very obviously one and the same except for the unusual serrated sail fin of the former. These are fishes for the specialist and are more at home in the tanks of public aquaria than in the fish houses of hobbyists.

I know several general practitioners who are keen on the hobby but have never known one who knew the name for that incurable disease from which all aquarists suffer. However, I came across something very like it recently in a

club magazine which described the disease as "ichthyoliga enthusiastica"—two simple words so fraught with meaning.

Neons are most attractive fish which are now fairly cheap. They look their best in a shoal of about a dozen, but often look unattractive at the dealers because he has them in the wrong light, mixed with other highly coloured fishes and in the wrong water. In acid water they quickly brighten up. However, they are not always easy to keep together insofar as some will keep picking at other neons. Their lightning dashes at each other can result in trouble later, either in the form of fungus or neon tetra disease.

Glowlights often mope in a tank but if neons are introduced the former fish visibly brighten . . . after all they seem to enjoy the proximity of their near relations.

There are many troubles which beset our fishes but some are of our own making. One of the worst is overfeeding. Few fishes are underfed; almost all are overfed day in, day out. This is very foolish and causes many troubles. Fishes in a natural state have to hunt for food, an exercise which keeps them healthy and alert. Overfeeding means that they get listless, lazy and fat. Are you an overfeeder?

My remarks about Dr. Alex Comfort's experiments at University College London, brought me a most interesting letter from that well-known and life-long Harrow aquarist, Mr. W. G. Phillips. He tells me that Dr. Comfort invited him to his laboratory in October, 1956 and there he saw guppies of all ages from 1 day to 4 years old, although the normal life span is usually considered as 2 years. Quite a number were born of females which had been segregated at birth, and which had at no time been in contact with males. Some fishes lacked tails but did not seem unduly handicapped; a lost fin grows rapidly at first but growth slows until normality is reached. Examples of sex changes induced by infection were also seen. One most interesting aspect of Dr. Comfort's work deals with growth retarding. Experiments show that a fish which has been retarded in growth by a restricted diet in early life rapidly increases to adult size once normal feeding is restored. It is also worth noting that in these circumstances the fish live longer. Life span of the fish is unaffected by underfeeding and longevity is possibly due to the prolongation of its childhood. Experiments with axolotls seem to have indicated that sex of offspring may be determined by the weaker or less virile of the two parents. It does seem that Dr. Comfort deserves the thanks of all connected with the hobby for such interesting research. Thanks, Mr. Phillips, for bringing this to my notice.

EUROPEAN TOADS

by ROBERT BUSTARD

THERE is considerable diversity among European toads and a number of them have long been popular vivarium pets. The smaller species are definitely best suited to life in the indoor vivarium, as they will seldom be seen in an outdoor enclosure, but all the species mentioned can be kept out of doors in this country and can be permitted to hibernate outside.

It is convenient to consider these toads in two groups, the members of each group being suitable for a community vivarium on the basis of size. This does not mean that the members of the different groups cannot be kept together, but in my opinion the arrangement described shows all the species to their best advantage.

Among the larger species are the common toad (*Bufo bufo*), the natterjack toad (*B. calamita*), sometimes called the running toad, the spade-foot toad (*Pelobates fuscus*) and the green toad (*Bufo viridis*). These toads will all do well in the outdoor reptiliary and will live happily in an enclosure in company with the frogs described in last month's article. Naturally, the enclosure should contain ample drier areas with loose flat stones arranged to provide hiding places. Feeding arrangements under such conditions are identical with those outlined for frogs.

They can also be kept indoors either in a large community vivarium or in smaller vivaria. As with all amphibians they should not be overcrowded; a 36 in. by 15 in.

by 15 in. vivarium would be suitable for up to one pair of each of the four species mentioned above.

Natterjack and Spade-foot Toads

Natterjack toads prefer drier sandy conditions and spade-foot toads spend most of their time buried in mud. For these reasons when keeping them indoors I prefer to keep these two species in separate vivaria, an 18 in. by 12 in. by 12 in. vivarium providing ample room for one or two pairs of natterjack or spade-foot toads. I provide my natterjack toads with a sandy soil with some moss and suitable hiding places. A water dish is really superfluous as they seldom enter the water except in the breeding season; however, a small pie dish can be sunk into the soil if desired. The vivarium must not be too dry and should resemble a woodland area. For the spade-foot toad a large pool should be provided and hiding places are not required as these toads will burrow down into the damp muddy earth, which should be several inches deep for this purpose.

The natterjack toad, which measures about 2½ inches, is often very attractive, being an olive green above with a prominent dorsal stripe which can be yellow, gold or reddish. This toad often progresses in a most unusual manner by short mouse-like runs, instead of by hopping like other toads.

Green and Common Toads

The green toad will live well with either the common toad or the natterjack toad. It prefers somewhat damper surroundings than the natterjack toad although it can live in quite dry surroundings. My specimens in the outdoor enclosure are often seen sitting in shallow water or damp localities. The green toad lives for a long time in captivity and is a very popular species, easily obtained during the late spring and summer months. This species is very variable in colour, some being decidedly green (especially males) whereas others are olive coloured, heavily blotched with brown. It is about 3 inches in length. The colour can, of course, be varied to suit different surroundings. Below it is a dirty white to grey.

The common toad is very often found in gardens where it does much good by eating undesirable insects. They are very much creatures of habit and will frequent the same "home," e.g. in a rockery, for years and have a regular routine in searching for food, often being found in one part of the garden at a certain time in the evening. Large females may reach 4 inches; males seldom reach 3 inches.

Amongst the smaller species are the fire- and yellow-bellied toads (*Bombina bombina* and *Bombina variegata* respectively), also the interesting if sombre midwife toad (*Alytes obstetricans*). The midwife toad is terrestrial and best suited for an indoor vivarium owing to its small size (about 2 inches). It may sometimes be induced to breed and the unusual breeding behaviour, where the male carries the strings of eggs coiled round his hind legs, was described by me in *The Aquarist* (August, 1957).

Fire- and Yellow-bellied Toads

The *Bombina* toads are also best suited for an indoor vivarium as they seldom reach 2 inches, although like the midwife toad they are hardy and will live in the outdoor reptiliary. Like the midwife toad they show a marked



Photo:

R. Bustard

Green toad (*Bufo calamita*), a popular species imported into Britain in large numbers each summer



COLDWATER FISH-KEEPING QUERIES answered by A. Boarder

I have a pet shop and wish to make a pond to breed goldfish for sale. Can you give me any advice on the subject?

The best advice I can give you is to forget your idea completely and buy fish for resale in your shop. I do not wish to appear unhelpful but if you have no previous knowledge of fish breeding you are not likely to be very successful at goldfish breeding. It is, of course, possible to breed goldfish in this country but at the moment I do not think that it would pay you. Goldfish can be imported so cheaply now. Just after the war it was possible to earn a little from breeding goldfish in this country but once imports were allowed the market was flooded with foreign fish and it was not a profitable business to breed common goldfish. Where fancy varieties are concerned it is so chancy that only a few top breeders are able to make much from their fish, and most only breed them now as a hobby. Goldfish bred out of doors in this country take such a long time to change from their original bronze to the desired gold; in Italy, for instance, this change takes place at a much earlier age. By all means make a pond and have a go at breeding some fish as a hobby, but forget the idea of making your fortune from it. Until cheap imports are forbidden there is little hope for British breeders.

I have a large open-air swimming pool which is used only for a few months of the year. Would it be possible for me to stock the pool with coarse edible fishes during the months the pool was not used for swimming, so that a little fishing for food would be provided? I know nothing of the rate of growth of fishes and whether they would grow from sardine size to something big enough to eat in a season.

Coarse fishes do not grow quickly enough for your purpose in this country. A small fish of the size you suggest would not be likely to grow more than half its size in a year. You could, of course, keep some fishes in the pond during the off-season months but they would

preferably for flies and bluebottles but will also eat gentles.

The *Bombina* toads spend much of their time in shallow water, ditches and puddles, and are good swimmers. They are therefore best kept indoors in an aquarium, which should be about half land (damp mud and moss raised above the water on bricks or stones) and half water. The water need only be about 2 inches deep and should contain some water weeds such as *Elodea canadensis*. An aquarium 18 in. by 12 in. by 12 in. provides ample room for half-a-dozen of these little toads and their amusing antics—they will soon become tame enough to take flies from the fingers—make them interesting little vivarium pets.

The colour above is olive, dark brown, or dark grey-black. Below, the fire-bellied toad is marbled with bright red whereas the yellow-bellied toad has the ventral side marbled in yellow or pale orange. This colour is also found on the ventral surfaces of the limbs. This bright colour acts as a warning to enemies and, when frightened, the fire-bellied toad arches the back and thus the undersides of the front and rear of the body and limbs are exposed, showing the bright coloration.

Fire-bellied toad (*Bombina orientalis*). This active toad is easily kept in the indoor vivarium

have to be removed when you start chlorinating the water in the summer.

I have an aquarium with three small crucian carp, a catfish and a goldfish, with plants from local ponds. The fishes appear well and are eating a variety of foods, but two of the carp have a rash of what appear to be red spots or bites. Could you give me any idea as to what this might be?

If the fishes have been bitten then it is almost certain that the catfish is the culprit. These fish can be very troublesome and I do not recommend that they are included in a community tank of coldwater fishes. If you must have a scavenger then use a tench, either a green one or a golden one (both good but the latter is more expensive). I have had many years' experience with keeping green tench with fancy goldfish and so far I have not known one of them to interfere in any way with the goldfish, although they are large enough to swallow some of the fancy fish at one gulp. The coldwater catfish must not be mistaken for the tropical kinds, which generally speaking do not reach a large size and appear to be harmless to other small fishes. The coldwater catfish can grow very large and is partly carnivorous.

I have a garden pond which holds about 1,000 gallons of water. It has been going for the last 14 years and has a good stock of water plants and fish. Suddenly for no apparent reason a green film has begun to settle on the surface of the water. I flushed this off and within 24 hours the same thing has happened. What is the cause of this?

It appears that there has been a quantity of free-floating algae in the water and that this has suddenly died. It has then floated to the top. The green algae will sometimes die off and a pond or tank which has been very green appears very clear, and the dead algae will either fall to the bottom or, as in your pond, come to the top. The algae has probably died because of a change in the pH of the water or the excess of certain gases which it dislikes. I have known this to happen in one tank among several similar tanks; it has suddenly gone quite clear after having been very green for some time. I have found that this clear tank has been rather dangerous to fish life and have changed the water completely. In this case all the dead algae fell to the bottom.

AQUARIUM PLANTS FOR THE CONNOISSEUR

The *Echinodorus*

(Illustrations supplied by Shirley Aquatics Ltd.)

by W. L. MANDEVILLE

THERE was a time when the possession of an Amazon sword plant put one among the elite of plant culturists. The rather prolific *Echinodorus paniculatus* is the species most generally available (many publications show *E. paniculatus* as *E. intermedius*, which is an error: *E. intermedius* is a much smaller plant, popularly known as the "chain sword plant," and the popular "Amazon sword" is *E. paniculatus*).

This popular name is derived from a fancied resemblance to the swords carried by those warlike females the Amazons, and has no connection with the river of that name, but bearing in mind the variation of leaf-structure within this genus of South American plants, aquarists would be well advised to memorise and use the name *Echinodorus* rather than to persist with the term Amazon sword—with some descriptive tag such as "broad-leaved," "narrow-leaved," etc.—which emphasises the leaf shape of one species (*E.*



Echinodorus rostratus (synonyms *E. cordifolius*; *Alisma rostratum*; *A. cordifolius*; *A. foliis cordatis obtusis*)



Echinodorus grandiflorus (synonym *Alisma grandiflorus*)

paniculatus) and overlooks the more spectacular and pleasing leaf shapes available within the genus.

None of the *Echinodorus* dealt with here have the slightest resemblance to a "sword" in their leaf shape; their contribution to an aquascape lies in their tendency to form bold, clearly defined aquatic foliage, from the base of the plant to the upper layers of the water, with the leaf definition emphasised by the supporting longitudinal veins. Owners of *E. paniculatus* will have experienced the tendency of that plant to throw out runners bearing plantlets, in all directions from the crown, and although this may have increased our stock of *E. paniculatus*, one had to tolerate a rather untidy aquascape whilst waiting for the plantlets to mature.

Individual Species

Most of the species mentioned here have been raised from seed at Shirley Aquatics, Ltd. This is a long process, taking from 12 to 18 months according to species, but a valuable one as the species can be identified without error. Much of the confusion now existing between *E. paniculatus* and *E. intermedius* is due to pre-war American publications being copied by subsequent writers, and perpetuation of the errors. By submitting fully cultivated plants, complete with flowers, to authoritative sources, every effort is now being made to resolve some of this confusion.

Echinodorus rostratus. This is the very attractive "cellophan plant," and during its progress towards maturity it illustrates the ease with which confusion with other species can arise. Initially, the leaves of this plant are "strap-like" in shape, pale green in colour, growing to a length



Echinodorus longistylus



Echinodorus macrophylla

of about 15 inches; but, as the plant matures, the leaves broaden and shorten until they are almost round, and gradually assume that diaphanous appearance associated with cellophan.

Having reach maturity, the plant produces surface and aerial leaves, followed by self-fertilising flowers from which the seeds develop. Unless propagation is intended, the surface, aerial and older submerged foliage should be removed to encourage the production of additional submerged leaves. This plant was listed in America under its synonym *E. cordifolius*, but in Britain it appeared under the names *E. tortillus* and *E. tortillus-martii*. Neither of these names appears in authoritative references.

Echinodorus grandiflorus. This has bold, ovate, 5-inch leaves carried on 6-inch stems, the back of each leaf having from three to five prominent longitudinal veins. Submerged leaf-production is constant and well spread, resulting in a plant about 12 inches in height, and about the same dimension across, of a pleasant mid-green. Spade-shaped bluntly pointed aerial leaves ultimately appear, and these should be removed if decorative tank effect is to be maintained.

Echinodorus longistylus. Not unlike *E. grandiflorus* at certain stages of growth, but the 6-inch leaves are pointed and ultimately carried on 12-inch stems. A plant that adds "appearance of depth" to a tank.

Echinodorus macrophylla. One of the more spectacular of the *Echinodorus*. Broad, mid-green, spade-shaped leaves carried on short stems, the backs of the leaves revealing up to 11 longitudinal veins. This plant has all the attractiveness of *E. radicans*, which it closely resembles, but can be accommodated in smaller aquaria. Overall size of plant is about 18 inches. At 12 inches the leaves of *E. macrophylla* are broader than those of *E. radicans* at the same size, and the leaves—both aerial and submerged—of *E. macrophylla* have a tendency to crinkle at the edges which is absent in *E. radicans*.

Echinodorus radicans. For those with tanks sufficiently large to accommodate it at maturity, this is one of the most spectacular aquatic plants. It has bold, oval-pointed leaves, carried on strong firm stems; mid-green in colour, resulting in a mass of undulating stems and foliage at all levels in the water. Submerged foliage is followed by surface and aerial leaves, and ultimately by white buttercup-like flowers with brilliant yellow stamens. In addition to the bisexual flowers, plantlets appear at the apices of the flower stems, which can be harvested and grown on.

Echinodorus muricatus. One of the rarer *Echinodorus*. It has spear-shaped leaves, which grow to a length of 10 inches, carried on strong 8-inch stems, and which measure 5 inches across. At maturity the plant carries about 20 fully developed leaves of a pale green, with from seven to 11 longitudinal veins supporting the leaf structure.

Echinodorus species unidentified. This appears to be a species something between *E. muricatus* and *E. grandiflorus*. Spade-shaped submerged leaves of a pale green are carried on strong stems to an overall length of 15 inches. Reproduction of submerged foliage is constant, resulting in a fine, bushy specimen plant. A mature specimen at Shirley Aquatics, Ltd. will shortly be in flower and identification will then be established.

General Notes and Cultivation

This first selection of *Echinodorus* is confined to species which have large, shapely leaves (oval, spear-shaped, round, spade-shaped, etc.), and which eventually form specimen plants for the decor of very large tanks, where the problem of finding plants with large, persistent foliage and not too fussy about precise illumination and temperature is not easily solved.

For use in smaller aquaria, the overall growth of all these species can be "checked" by confining the vigorous root

system within a concealed earthenware planting pot. All *Echinodorus* are hungry feeders, and when associated with other aquatic plants in permanent displays, the associated plants usually suffer from starvation. This does not arise when planting pots are used, for the compost within the tank continues to feed the associate plants, but the compost within the planting pot housing the *Echinodorus* is gradually denuded of nourishment, retarding the overall growth of the plant without affecting numerical leaf formations or its general appearance.

With the species so far dealt with, there are no short cuts to cultivation. Runners carrying plantlets are not constantly developing from the crown of the plant as in some others of the genus. The sequence of growth and reproduction in all the seven species under review are: first, submerged foliage, then surface and aerial leaves followed by florets. Any vegetative reproduction is carried by the flower stems, but should not be harvested until the self-fertilising flowers have ripened into seed clusters.

Germination of the seed is best carried out on shallow seed pans, fully submerged, but supported just below the surface of the water, where light and temperature are constant. From germination to a growth of saleable size can take anything from 18 months to 2 years; nourishment appears to have little effect during the early stages of growth and incurs the risk of "rotting," but when the leaf shape becomes apparent, a transference to a planting medium containing some soil or other nutrient is beneficial—but the progress to maturity is still slow.

From this it will be seen that the cultivator's minimum requirements will be a very large tank in which to house



Echinodorus muricatus



Echinodorus radicans (synonym *Sagittaria radicans*)



Unidentified species of *Echinodorus*

the parent plant, a battery of nursery tanks together with the necessary seed pans, planting pots, etc., housed for preference where diffused daylight and space-heating obtain, and unlimited patience.

The question may be asked "Should fishes be included in the cultivation tanks?" My reply would be an unqualified "No." To feed those fishes with prepared foods could lead to a water condition inimical to plant propagation. Algae can be introduced when live food is used,

and during a cultivating period of around 2 years, some netting of fishes is bound to arise, and one does not willingly wave a net around among developing plantlets of an overall value running into tens of pounds, to net a 2-shilling fish, and whilst it is true that the plants will ultimately be associated with fishes in decorative aquaria, many aquarists concerned about the condition of their water, or pestered with algal growths, would do well to give a thought to their feeding programme.

The Garden Pond in April by ASTILBES

THIS is the month most pondkeepers have been waiting for. Life will have awakened in the pond, both animal and vegetable. Most water plants will be making new growth and so now is the time to carry out any fresh planting or moving subjects from one position to another. Water plants can be moved very easily at this time of the year as long as they are not kept out of the water very long. Most water plants soon deteriorate if left out of the water and allowed to dry out. If the plant roots are kept damp there is little danger but the quicker the move is carried out the better. Remember that if your pond is concrete it is far better to plant all large growing water plants, especially water lilies, in separate containers rather than to leave them loosely on the bottom.

Green Water

Any other water plants can be divided now and they should soon make good growth. The pond water may turn very green at this time of the year. This is the green algae which is always encouraged to grow when there is very little other plant life growing rampantly in the pond. In strong light the unshaded water gives every encouragement to the algae and it is almost certain that for a time the water will turn green. This is not really a bad thing as the green is caused by an actual plant, although a tiny one, and this plant gives off oxygen in the sunlight and so assists the oxygenation of the water. Many small fishes can eat algae, and fry will find plenty of food in it—not only the actual plants but the varied tiny life which usually accompanies it.

Some pondkeepers get rid of a lot of the algae with permanganate of potash. However, provided that there are enough growing water plants in the pond the algae will soon be choked out. The trouble usually is when the algae becomes so thick that the ordinary underwater oxygenating plants have difficulty in getting enough light, and in some cases it is a good plan to change most of the water weekly in a small pond. The water will become green again for a time but whilst the water is fairly clear the other plants will have a chance to grow on more vigorously and so in a short time give the necessary shade to prevent the active growth of the algae. It is very unusual to find much green algae in a pond where the water-lily leaves cover a large portion of the surface.

There may have been many frogs and toads come to the pond for spawning. Frog tadpoles are very good food for many fishes but the toad tadpoles will not be eaten. However, they have their uses. They are one of the finest scavengers for either a pond or tank. Their little mouths are like vacuum cleaners as they suck over all the leaves of the underwater plants. They do not eat growing vegetation if decaying matter is available. This they eat avidly, either decaying plant life or animal.

On the other hand, any newts which come to the pond will do little good. They can eat small fishes and the newt tadpoles can eat small life which would have been available for the fish fry. As the newts have to come to the surface

to breathe it is not difficult to net them from the pond. If no efforts are made to breed fish in the pond then the newts may be allowed to remain, as they will all leave the water once the breeding season is over and the young ones will also leave the water once they have lost their external gills and have developed fully.

Fish Breeding

If the fish in the pond are of a good quality and it is hoped to get some youngsters, it is better to let them spawn on bunches of water plants which have been tied near the side of the pond. The bunches can be taken from the pond and placed in containers for the eggs to hatch.

If breeding is hoped for do not forget to give some extra food at this time of the year. The garden worm is still one of the finest foods for conditioning fish, but any type of food can be given as long as the fish seem eager to take it. Be careful not to give too much dried foods, which if uneaten can soon pollute the water. The amount of food can be regulated to the number and size of the fish in the pond. Always try to feed them in one spot and give only a little to see if they are ready for food or not.

The outside of the pond can be tidied up and many waterside plants can be sown directly into the ground at this time of the year. *Myosotis* (forget-me-not) is a good subject and there are many good varieties available now; another very showy plant for the water's edge is *Mimulus*, obtainable now in very bright and attractive colours. Both plants will thrive in the damp conditions near the pond.

Watch goldfish for any signs of fungus, as this trouble can be a nuisance in early spring. Take particular notice of any fish which keep by themselves and appear to mope. Such fish can be caught and examined. If any signs of fungus are present the fish can have a salt bath or any treatment with advertised cures. Do not replace the fish in the pond until it is cleared of all traces of the fungus. A little salt in the pond will do no harm but do not overdo it as the salt will remain in the water and an additional dosing can make the concentration too great. A goldfish can live in a salt solution of a tablespoonful of salt to a gallon of water for a long time, but there need be no water plants present. Some of these do not like too much salt.

Cacti in the Fish House

MOST cacti will be making active growth by now and must be watered according to the weather and the state of the soil. No hard-and-fast rule can be given about the frequency of watering, but plants will not grow without it; however, cacti are very susceptible to too much wetness at the roots. Provided that the plant is growing and the weather is not cold, the top of the pot can be filled with water and then no more water should be given at all until the soil has dried out again. Over-watering will soon kill the roots, and then the plant will rot.

THE AQUARIUM BARBS

by JOHN S. VINDEN

THE barbs belong to the Cyprinidae, a great family which embraces many other genera of aquarium fishes. The barbs, however, provide us with many of our choicest tropical fishes and, although to-day most of them are more correctly named *Puntius*, the name *Barbus* is so deeply ingrained in the minds and literature of English aquarists that it is proposed to use it in this article mainly for the sake of convenience.

The barbs range in size from the delightful dwarf barb (*Barbus pumilus*), which scarcely exceeds 1½ inches in length, to the Mahseer (*B. tor*) of India and Ceylon, which can attain a weight of over 220 lb. and reach a length of over 6 feet! They are widely distributed and live in many different environments. One member of the genus, the barbel (*B. barbus* or *flaviatilis*), is a native of Great Britain, and another, *B. callois*, is sometimes found in the hot springs of North Africa.

The barbs, with one exception (*B. vittipara* of South Africa), are all egg-layers and few of them defeat the efforts of the determined breeder. From the aquarist's point of view they have several other features that make them desirable. Most of the available species are beautiful and well-coloured, they are easy to feed, they are not shy, they are lively, good-tempered for the most part, hardy and, last but not least, inexpensive.

These fishes make an attractive show either as a community or as schools of a single species. Like all fishes they look their best in well-established planted tanks, and many of them lose their colour in thinly planted tanks of new water, although they are tolerant of a wide pH range.

Many of the barbs are solid chunky fishes and, length for length, are much heavier than the majority of characins. Consequently, it is better to allow them more space than is considered necessary for such fish as neons and glow-lights of similar length. They are omnivorous in their diet, and like a few fine-leaved plants to nibble, though only the largest species will do any appreciable damage to an established aquarium.

Aquarists can divide the barbs into two types, large ones and small ones, and although the large barbs are very attractive, they soon outgrow their companions in the ordinary community tank and are best kept with fishes of approximately their own size. A 36 in. tank can house



Spanner barb (*Barbus lateristriga*)



Photos:

Laurence E. Perkins

Nigger or ruby barbs (*Barbus nigrofasciatus*)

several of the larger species, many of which are useful from the competition point of view. Large barbs consume a considerable quantity of food and, consequently, mulm accumulates rapidly on the bottom of the tank. If this is not siphoned away, it is likely to get stirred up by the vigorous movements of the fishes and may render the water somewhat opaque. Regular attention in this respect pays good dividends to the fishkeeper who likes to see his fishes in good health and colour.

Most of the species thrive at temperatures around 75°F., though if breeding is attempted it is better to raise the temperature to about 80°F. If space is limited it is better, perhaps, to limit the species to those that do not reach a large size and, fortunately, some of the prettiest of aquarium fishes are included in this list.

Barbus cumingi, from Ceylon, is a two-spotted barb with large glistening scales. It seldom reaches 2 inches and, though not highly coloured, is pretty and gentle. The dorsal and ventral fins of the male are bright pink whereas those of the female are colourless. *B. gelius*, from India, is another dwarf with very distinctive markings; its sides are golden yellow and the dorsal and ventral surfaces are olive and silver respectively; large irregular black spots adorn the sides.

One of the most beautiful barbs, when in good condition, is *B. oligolepis*, the checker barb. This species, which comes from the East Indies, has large silvery scales which are edged with black and which form a chess-board pattern on the sides. The fins of the male are also bordered with black and are more highly coloured than those of the female.

One of the small barbs, *B. semifasciatus*, has been the

of China and is a peaceful, though not very highly coloured, old favourite, though it is not to-day kept to any large extent. Some years ago, however, a beautiful gold-and-black barb appeared on the market as *B. schuberti*, and it was said, by some, to be but a colour variety of *B. semifasciatus*. There are said to be slight anatomical differences between the two fishes and it has recently been given yet another name, *B. sachsii*. Whatever the true name of this fish is, however, it is worthy of a place in any collection of barbs.

The cherry barb, *B. titteya*, from Ceylon is another beauty, and is superficially unlike any of its family. It is slimmer in build than most of the barbs and has a black line running from nose to tail. The colours of the male are exceptional, for his body and fins are a deep glowing red unlike that seen in the other members of the group.

Before dealing with the popular species with vertical bars there are one or two other small species that are worthy of mention. *B. ticto* is, like *B. cumingi*, another two-spot barb, though the anterior spot is much smaller than the other one. The male's dorsal is edged with red. *B. terio* has one spot near the tail and *B. phantasio*, the dwarf barb, has three small spots.

Undoubtedly the most popular of all the barbs are the banded species exemplified by the tiger barb, *B. tetrazona*. There has been much confusion over the names of these barbs, and for years any barb from the Far East with vertical stripes was offered as *B. sumatranus*. The ordinary tiger barb, *B. tetrazona*, is too well known to warrant description, but some of its choicer relatives are less familiar to the ordinary aquarist. The six-banded barb, *B. hexazona*, has six deep-green vertical bands and the fins of the

is colourless. In theory they are as easy to breed as the other species and there should be a good market for the offspring, as there is for the other striped barbs. Amongst the rarer barbs are the beautiful *B. pentazona* and *B. partipentazona*, both of which are well worth acquiring.

A barb that stands by itself is *B. nigrofasciatus*, the nigger or ruby barb. To be seen at its best it must be in a well-established tank, where it will soon settle down and become deep red in colour with intense black bars. The dark dorsal of the male distinguishes it from the female, whose fins are colourless.

The following large barbs are all desirable if space can be given to them. Some are old favourites and others are comparative newcomers to the hobby. The clown barb, *B. everetti*, and the spanner barb, *B. lateristriga*, both reach a length of about 5 inches. The clown barb has more colour and is usually chosen in preference to the spanner barb, which, however, is an attractive fish. *B. arulius* and *B. filamentosus* are still larger fishes, and the rays of the dorsal fins of the adults extend beyond the margins of the fin itself. A contrast to these four fish is the tinsel barb, *B. schwanenfeldti*, a silver fish of great beauty, and one that is continually on the move.

All the species mentioned so far have been Asiatic fishes, but recently various African species have been imported in small quantities. When opportunity arises these fishes are worth seeing. Amongst them have been species such as *B. werneri*, *B. tripulus* and *B. schmeemanni*, and others which are, at present, unidentified. More barbs will arrive in time and we now know enough about the family to be sure that they will make useful and ornamental additions to the tanks of the discerning aquarist.

Unusual Imports

by ROBERT BUSTARD

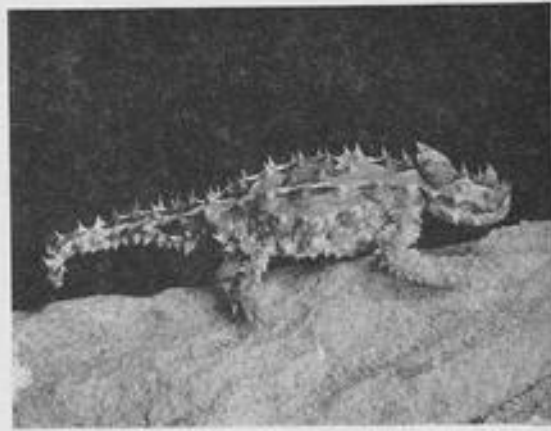
THE frilled lizard comes from the Australian outback, mainly in Northern Territories. It belongs to the family of lizards called the Agamidae, the members of which include as well as the many common *Agama* lizards, the bearded dragon (*Amphibolus barbatus*), the mastigures (*Uromastyx*), the horny devil (*Moloch horridus*) and the flying dragon (*Draco volans*).



Photos:

R. Bustard

Frilled lizard with frill partly erected



Australian mountain devil or horny devil

This large lizard measures about 3 feet, much of which is the long tail, and it has an enormous Elizabethan ruff (round the neck) which can be erected at will. This is a form of bluff to deter would-be aggressors. The frill, which measures about 10 inches in diameter, is a brilliant orange-yellow with black edgings and splashing, but the body is a sombre blackish brown. This lizard can run on its hind legs, using its tail as a balance; the resemblance to the prehistoric monsters of the Age of Reptiles is therefore complete.

(Please turn to page 19)

our readers



write

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

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

Plant Disinfectant

THERE seems to be controversy as to which is the right disinfectant to use for plants to be used in breeding aquariums. A German aquarist I know uses soda-water, and thus sterilises his plants for breeding neon tetras, harlequin fish and *Rasbora maculata*.

D. BODART,
Crowthorne, Berks.

Correspondents Wanted

I HAVE often criticised and been criticised in these columns, but now I have an illness that will keep me in hospital quite some time. May I therefore appeal to any readers who can drop me a line and have a chat about fishkeeping to do so? I would be only too glad to hear from anybody and every letter would receive a prompt reply.

There are quite a few fishkeepers here, even among the nursing staff, and if anybody has any books, magazines or even society bulletins then I can assure them that they will be avidly read. I will refund postage if requested. We would be most grateful for any received as reading is the main occupation here.

J. KELLY,
Ward 6A, Cubicle 1, Baguley Hospital,
Baguley, Manchester.

Calling Scotland

IN the August, 1958 issue of *The Aquarist* a letter was published from Miss Margaret Corvelli of Stranraer. Communications sent to the address given in the letter have been returned by the Post Office as undeliverable. Will Miss Corvelli please write to let the Editor know her present address so that letters for her can be forwarded?

Binding *The Aquarist*

WE shall be grateful if you will kindly bring to the notice of your readers our Book-Binding Service. In past years this has been a great help to us.

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The Sir Robert Jones Memorial Workshops,
74, Upper Parliament Street,
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We are pleased to commend this service to readers wishing to have their copies of "*The Aquarist*" or any other books or journals bound.—EDITOR.

Scientific Studies with Aquaria

I WAS surprised and disturbed to read the articles of Mr. N. E. Perkins and Mr. J. Kelly in your February issue. Mr. Perkins amazed me by his use of invalid generalisations of the very type which give birth to the problems he was claiming to solve. Surely it is as evident to Mr. Perkins as to the biologists who work on these problems that our knowledge of the inter-related physical and chemical factors in aquatic life is so scanty as to make any suggestion of understanding the precise needs of a fish or plant nothing more than ludicrous. Our studies of structure, physiology and what Mr. Perkins glibly calls "the environment," have enabled us to realise the adaptability of fishes and other animals to certain ranges of temperature, organic and inorganic nutrient concentrations, and so we manage to provide suitable conditions for their continued existence in captivity. But he who suggests that some people can understand the precise "needs" of an organism merely from an arbitrary, and usually qualitative, study of its habitat is a bold man indeed!

I dispute Mr. Perkins' use of the word "toxic"; the chemicals used in prevention and cure of diseases of fish are toxic only when used in high concentrations or other unsuitable conditions. Since Mr. Perkins mentioned not one compound, but spoke only in general terms I cannot intelligently expect to disprove his general thesis that the use of inorganic compounds and antibiotics in treating fish diseases is a mistake. I do earnestly say, however, that no one will question the excellent effects of any such compound if it is used with accurate attention to the detailed conditions of dosage, concentration, temperature and isolation of the "patient."

Mr. Perkins' sole example in this direction was disastrous; and in commenting on the disease experiment thus described I make the following points:

(a) How is it possible to make such an illogical conclusion from one experiment, as that "... the diseases of captive fishes stem largely from the restricted space and poor conditions under which we keep them," when in the experiment described the six later fish were introduced, *already 'very diseased,'* into a tank which Mr. Perkins earlier has said is '*easily capable of holding a dozen such fish?*'

(b) Contrary to what Mr. Perkins suggests, the experiment has no value, not only because of the absurd conclusion but also because (i) the nature of the disease is not stated; (ii) the physical conditions, temperature, oxygen and carbon dioxide concentrations are not mentioned; (iii) it is not stated whether these conditions were kept constant through the experiment; (iv) no idea is given of the times involved; (v) description is only qualitative throughout;

was performed.

I should now like to join issue with Mr. Perkins on the subject of aeration in aquaria and pools. It is assumed, but I would hasten to add, that because of obvious analytical difficulties, not proved, that a negligible volume of oxygen from the air pumped through the diffusing stone dissolves in the water. In fact I think that probably more dissolves than Mr. Perkins thinks, since this same aeration technique is used with great success and convenience in experimental plant physiology when it is desired to keep tissues in well-oxygenated water or solutions. While suggesting that a fine bubble stream may be more effective than is at present thought by many people I agree with Mr. Perkins in emphasising that it is the circulation of the surface water which facilitates oxygenation. The value is quite unimpaired in an aquarium covered by floating plants; circulation still occurs and gas exchange with the air beneath and between the plants continues.

Many floating plants break the surface tension and in doing so, trap air amongst submerged organs, and the rate of disappearance of this trapped air roughly confirms the long-known fact that even when circulation is good, the oxygen dissolves in the water very slowly. In a later statement Mr. Perkins implies that carbon dioxide and oxygen are evolved by the aquatic plants by night and by day respectively, and thus that at night the oxygen supply is not replenished. The main fallacy in this argument, and it is a common one, is that gases produced within the plant are passed out into the water; this is most definitely not so for those plants studied, and it has been known for many years that in *Elodea* spp., *Myriophyllum* spp., *Potamogeton* spp., *Pistia stratiotes* and others, gases, particularly oxygen, are retained within the intercellular lacunae of the stems, roots and leaves, from where they diffuse to other parts with a lower concentration, thus circulating within the plant and incidentally giving it buoyancy.

Mr. Perkins concludes by suggesting that while the solution of problems may be interesting and amusing the enormous field of knowledge thereby entered is too forbidding, and advises hobbyists to concentrate on beauty and pleasure rather than a quest for scientific data. Mr. Perkins is obviously not one of those fortunate people, now happily increasing in number amongst aquarists, who get their pleasure, not from glassy-eyed ignorance but from a little more effort to learn about nature. It is these people who, in the contented pursuit of their pastime, develop by natural inclination a habit of studying the objects of their interest. These hobbyists are the most valuable since they gradually start to enjoy adding to existing scientific data, and are usually quite critical of their own results.

Mr. Perkins' mild distaste for scientific data is paralleled by Mr. Kelly's distaste for scientific names of specimens, which he says are 'meaningless to everyone except the fish's owner and the secretary who had to look it up to find how it's spelt.' Why, oh! why are people so intolerant of names in Latin?—names which have been bestowed with a view to conveying those main points of structure or habitat or relationship which Mr. Kelly seeks to convey to people by the use of verbose, locally different and often idiotic English names, and by the use of long-winded notes and remarks. It is surely not asking very much for such scientific names to be grasped as they are encountered, and most books and periodicals—this journal is an example—also append the derivation of the names from the Latin or Greek. Mr. Kelly may surely take comfort in the fact that the biologists who bestow these names and become the objects of scorn for so doing, encounter as much difficulty in learning them as Mr. Kelly does.

C. D. SCULTHORPE,
Trinity Hall, Cambridge.

M (The Aquarist, February) publicises the feelings of many ordinary aquarists, held for several years past. The almost unending rows of small, undecorated tanks appeal to a very small minority of people—but, unfortunately, that small minority is also the group with enough enthusiasm to provide workers and organisers for such shows.

This lack of general appeal is the reason why the shows are not supported neither by the majority of fishkeepers nor by the general public, and therefore fail financially. The large show is dying, and an example is the annual show of the Association of South London Aquarist Societies which degenerated into a small series of faintly supported, private Table Shows vaguely backed by specialist lectures, etc. It should be further noted that shows centred some miles away from their home area are not likely to have much appeal to the smaller societies, for the publicity benefits only those societies close to the show's venue.

In fairness to London groups, however, there is a point which hits them badly and which gets rare mention in discussion, a point which bears closely upon initial costs and difficulty. Most decent halls owe something to London County Council fire and accident precautions, which means that materials, drapes and practices adopted outside this area would often cause fits among London caretakers and inspectors. Flame-proof hardboard and drapes, rigorous electrical and other safeguards push costs into the realms of the impossible, for the several hundred pounds required are simply not there for the various groups to gamble with, and few small societies can afford the £10 to £15 needed to build stands at such shows.

For the time being, here in South London at any rate, societies should consider other means of prolonging their lives. Stronger groups could be formed by amalgamation though *esprit de corps* is a problem and local publicity gained by seeking to exhibit at shows organised by horticultural societies, local authorities and so on.

When the time comes for larger shows, then the small tanks must take the place afforded them by their supporters while the main show is devoted to wider issues. Whether the hobby should re-appraise its aims in other directions is a further point which must soon be considered, for it appears that, in general, we are losing ground fast.

H. J. VOSE,
Secretary, Brockley and District
Breeders Circle.

Albino Frog

I THOUGHT that you would be interested to know that we have an albino specimen of the common frog (*Rana temporaria*) at this Museum. This frog was found in his garden by Mr. L. Gentry of Blacksmith Hill, Sanderstead, on the 22nd February, and was presented to us by him. It is now living in the Museum Aquarium.

The skin is an orange yellow and the eyes are bright red. The specimen is a male, but the thumb pads are not black but are dark brown. There have been very few records of albino frogs.

G. E. WILLIAMS,
Deputy Curator, The Horniman Museum,
Forest Hill, London, S.E.23.

Goldfish Enthusiasts

I AM very interested in fancy goldfish, and during the last few years I have kept and bred a few of the most popular types. I have now moved into a new house and have built a pond in the garden, also I have converted a garden shed into a small fish house. I would like to contact anyone near to me who is also interested in breeding goldfish, with the view of forming a breeders' group, so as to compare notes, and perhaps to attend shows, etc. If anyone would

like to write to me, I would be delighted to hear from them, as I am practically cut off from other aquarists. The only thing I can look forward to is my copy of *The Aquarist*. I tried joining our local aquarist society, but find practically no interest in coldwater fishes. In fact most of the meetings, I find, are taken up with club business and red tape. All letters will be answered.

FRANK BUTTERS,
57, Conway Road, Knypersley, Biddulph,
Stoke-on-Trent
(Telephone: Biddulph 2028).

Resuscitation of Frozen Fish

IN relating the following incident, I do so in order that I might help our readers who have garden pools, to save fish which appear to be quite dead. Despite keeping an ice-free area on my 9 ft.-diameter pool I noticed a 9 in. golden carp lying on its side under 2½ in. of ice. Chipping the ice away with an ice pick I took the fish into the house, turned it about from hand to hand, but as its mouth was wide open, I decided it was dead, and threw it on the fire.

Later, I saw another one, the same size, lying on its side. So once more chipping the ice, I brought it into the house. But as this particular fish has been in the pool since 1945, and named "Callosus," I was very anxious to make sure that it was dead. So, holding the fish upright, I poured tepid water from a jug into its wide open and rigid mouth. Within a few seconds its tail began to twitch, I continued to pour in the water until it became impossible to hold the fish any longer.

Until I could fill a larger aquarium tank I put it in the sink bowl in tepid water, where it began to roll from side to side. Within 15 minutes it had regained its equilibrium and was put into the tank where it is now fully recovered. Would that I had tried this remedy with the other fish, which was bought only last summer.

It was the fact that "Callosus" was tame, and an old friend, that made me try to save him.

So, if any readers find fish appearing to be dead it might pay to try my remedy.

(Mrs.) OLIVE M. MATTHEWS,
Lymm, Cheshire.

Fancy Goldfish

MR. N. E. PERKINS' article on celestial goldfish in the January issue of *The Aquarist* once again brought to light the fact that several of to-day's coldwater judges and the pointing systems used are completely out of touch with the difficulties met in producing the higher types of goldfish. They do not seem to realise that the further away from nature the creature is removed, the harder it is to retain the mutation. As fancy goldfish are usually shown in mixed classes, fantails and veiltails have an advantage over lionheads, bubble eyes, celestials and even moors.

Surely there is a need here for a system of pointing to be brought into operation whereby points are given to a variety based upon the difficulty in producing it?

R. D. ESSON,
Willesden, London, N.W.10.

Cacti in the Fish House

I HAVE been interested in your recent short articles on growing cacti in the fish house. I do not agree with growing cacti in the humid atmosphere of the average fish house as cacti need a very dry atmosphere to succeed.

I would like to suggest to any aquarist who has a heated fish house to try orchids; the warm humid conditions are ideal for the growing of these plants. Contrary to general opinion the growing of orchids is no more difficult than growing cacti or any other pot plant. Given a reasonable amount of daylight and shading from the direct rays of the

sun in summer, these exotic plants will give a wonderful display with very little attention.

Orchid plants range in price from a few shillings to several pounds, and are divided into three main classes: cold house, intermediate and hot house; there are dozens of varieties to suit all pockets and various degrees of heating.

E. A. CARLESS,
Portsmouth, Hants.

Our contributor to the series of notes on cacti is considered to be one of the leading experts on growing cacti in this country, and he writes:

The statement that cacti need a very dry atmosphere to succeed is not correct for all species. Contrary to general belief, many cacti are found in Brazil, some even growing as epiphytes on trees in the forests in company with some of the orchids. Even some of the Mexican cacti must be given some shade as they grow in the shade of shrubs and long grasses in their native habitat. Many genera grow better in a fish house than they would in a sunny greenhouse. Such genera are "Epiphyllum," "Zygocactus," "Schlumbergera," "Rhipsalis," "Pereskia," "Nopalxochia" and many species of other genera. Fish-house conditions are also ideal for raising cacti from seed, the conditions being those most favoured by the leading growers. Most cacti growers prefer them to orchids as most are much more interesting and spectacular when not in flower than orchids.

Most Valuable Snake in the World?

MR. P. RHYINER, the famous animal collector, has deposited his white python for a short season at Paignton Zoo. This white python is the first white snake ever known in zoology. It is milk-white with blue eyes and is nearly 7 feet long; it is valued at £5,000.

The snake was first heard of by Mr. Rhyiner 4 years before he actually secured it. Owing to the folklore attached to the white snake there was a tremendous amount of opposition to the capture and removal of the snake from East Bengal. One of the legends comes from China, where the snake is known as "Pie-su-Chang" or "Lady White Snake." The story is that a white snake was once picked up by a student and kept in his desk at school and later taken home at holiday time. The student later took pity on the snake and released it. Sixteen years later the snake turned into a beautiful maiden who sought out the youth and expressed her gratitude and later married him. The Gods, however, were so wrathful that she should have married a human being that they changed her back into a white snake.

Another legend emanating from India is that the snake is really the Goddess Kali, the Goddess of Destruction, and that she appears once in a thousand years in the form of a white snake. It is interesting to note that geneticists estimate that it would require one thousand years for a combination of genes to produce a pure white snake.

As already stated, there was great opposition to the removal of the snake and after lengthy consultations with the High Priests, it was resolved to perform a ceremony of appeasement to the Gods. The ceremony commenced at sundown and went on throughout the night to sunrise. There was a sacrifice of a white cock to the Gods and the loosing of many white pigeons. At dawn, Mr. Rhyiner handed over a considerable sum of money to the Temple and was then allowed to remove the snake. In addition to the sacrifices, there were lengthy incantations by the High Priests and Local Elders.

News 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.

ZOO CLUB FOR YOUNG ZOOLOGISTS

ABOUT a year ago the Zoological Society of London instituted, with the co-operation of the educational authorities of the Greater London area, regular lecture-demonstrations for school children. Now the Society has started a Young Zoologists' Club, the XYZ Club, for children between the ages of 11 and 18 who are interested in zoology, in natural history and in animals. The Club will be based on the London Zoo and its purpose is to increase young peoples' knowledge and understanding of animal life and zoology.

For 10 shillings a year (there are, as well, reduced subscription rates for schools, clubs and natural-history societies) the membership includes the Club badge, free admission tickets, competitions with substantial cash prizes, meetings, an Information Bureau and the Zoo Magazine, which for the present is being published three times a year.

Through the free admission tickets to the London Zoo, Whipsnade Park, the Aquarium and the Children's Zoos, members of the XYZ Club will be able to visit the Zoos frequently and to get to know them and the animals that live there really well; competitions, by being based on animal observation, will encourage the children to learn from the animals they see around them. There will be nine competitions a year and the subjects set will vary from short essays on Zoo animals, to animal painting and drawing and animal photography. There will also be a special annual field-study competition consisting of a detailed study of one particular animal, group of animals or district. The winner will receive £10 and a medal. The first Club meeting is being held on the 9th April at 3 p.m. and will consist of a talk and film show by Desmond Morris, the new Curator of Mammals at the London Zoo. Later it is planned to have discussions among members at the meetings. By writing to the Information Bureau, members can have their questions about animals answered by Zoo experts.

For further information about the XYZ Club, write to: XYZ Club, The London Zoo, Regent's Park, London, N.W.1.

At the recent annual general meeting of the Chester & District A.S. the following officers were elected: President, Mr. O. S. Mothershead; chairman, Mr. F. Oldbury; secretary/treasurer, Mr. J. Bowyer; committee, Messrs. R. Osborne, H. Evans, K. Parry, K. Weigh, D. Peak, L. Moulding, W. Griffiths.

A varied programme has been enjoyed by the members during the past year and future plans are under discussion. The club is sound financially and new members are welcome at the meetings on the second Thursday in each month at 46, Upper Northgate Street, Chester, or can contact the secretary at 27, Chichester Street, Chester, for information.

The following officers were elected at the annual general meeting of the Uxbridge and District A.S.: Chairman, Mr. H. Moore; treasurer, Mrs. G. Filmer; secretary, Mr. S. March, 36, Parkfield Avenue, Hillingdon Heath; show secretary, Mr. A. Ferrin. At the last

meeting, Mr. L. Povey of the Slough, Windsor and District A.S. gave a very interesting talk on the "Characteristics of Water." Meetings are held as before, on alternate Wednesdays at The Falcon, High Street, Uxbridge.

At a joint meeting of the Merseyside Naturalists' Association and of the Merseyside A.S., held at Liverpool University recently, Mr. L. Connell (chairman of the Aquarist Society), spoke on "Fishkeeping as a Hobby," and illustrated his lecture with a large series of his excellent natural colour slides. Beginning first with the valley of the Dee, and the story of salmon, he showed the fish being stripped of eggs and milt at the salmon-trap and observation tanks on the tributary Alwen, then the salmon-hatchery at Maerdy, and scenes along the river. After illustrating various members' garden fish-pools and fish-houses, he concluded with a series on tropical fish species.

Officers elected at the Bedford and District A.S. annual general meeting, were as follows: Chairman, Mr. W. B. Donnelly; vice-chairman, Mr. E. Gentle; hon. secretary, Mr. K. Joy, 44, Moulton Avenue, Bedford; hon. treasurer, Mr. G. Booth; show secretary, Mr. R. Pope, 51, Aylesbury Road, Bedford. The summary of table shows during the year



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

gives the following pointings: 1, Mr. B. Abraham; 2, Mr. J. Bell; 3, Mr. R. Pope. The club meets on the second Thursday of each month at the Trades Club Hall, Alexandra Road, Bedford, and all visitors are welcome. Plans are being made to hold an open show again this year, and further details will be announced later.

MEETINGS of the Hull and District Pond and Aquarium Society are held on the first Thursday of each month at 7.30 p.m. in the Liberal Headquarters, Spring Street, Hull. At the last meeting a talk entitled "Conditioning, Breeding and Rearing Fish," was given by the Society's chairman, Mr. J. H. Warcup. The members' table show "Any variety tropical," was judged by Mr. P. A. Thompson, and results were as follows: 1, Mr. G. Sanders (tiger barb); 2, Master B. Shaw (male red-eyed swordtail); 3, Mr. W. Hall (pearl gourami).

THE annual open show has been fixed by Bethnal Green A.S. for the 4th and 5th September, and the annual social will be held on the evening of Saturday, the 25th April at 229, Bethnal Green Road, London, E.2. The Essex, North and East London Aquarists' Association table show Points Cup has been regained by the Society after a close contest with Walthamstow who were beaten by only 9 points. Club meetings are held every Tuesday evening at 7.45 p.m. at the above address, and enthusiasts interested in learning more about the hobby should contact the secretary, Mr. A. H. Scott, 80, Ellerman Street, Poplar, London, E.14.

THE March/April edition of "The Guppy," published by the Federation of Guppy Breeders' Societies, contains its usual wealth of information and interesting articles. The hon. secretary of the Society is Mr. B. G. Ashman, 19, Keighorn Road, Romford.

AT the annual general meeting of the Guildford and District Aquarists' Club the following officers were elected: Chairman, Mr. W. F. Golby; vice-chairman, Mr. W. E. Coveney; hon. secretary, Mrs. D. A. Patrick, 98, Nightingale Road, Guildford; treasurer, Mr. Bassell. Mr. Charles Way is the president, and Dr. R. Lang continues as vice-president. At the 8th April meeting there will be a talk by Mr. D. B. McInery.

AT the last meeting of Wolverhampton and District A.S. three films were shown by members of the society.

One, "Facts about Fish," dealt with a series of little-known facts about various fishes. The second was a detailed record by a well-known northern aquarist of the breeding habits and procedure for tank breeding of the brown acara, one of the larger fishes kept by home aquarists.

The third film was a technical survey, "The Anatomy of the Dog Fish," which was also the title of the reel and dealt in detail with the subject from a scientific point of view.

IN the second members' show this year of Sheffield and District A.S., G. Asby was first, M. Willoughby and N. Wright runners-up. Also placed were A. Abdy, J. Beaumont, F. Smith and D. Morton. Judges were Messrs. E. Chapman and E. Caulton. There were 23 entries.

THE first dinner of the Tamworth and District A.S. was held recently. Guests of honour were the Mayor and Mayoress, Councillor and Mrs. K. A. Muggleston and the cups and trophies were presented by the Mayoress.

Show winners were: Best tropical fish, Mr. E. R. Wood; best furnished tropical aquaria, Mr. E. Wood; best furnished tropical aquaria (junior class), Master I. Hulme; best furnished coldwater aquaria, Mr. Barber; best furnished coldwater aquaria (junior class), Master G. A. Dix; best coldwater fish, Mr. J. Saunders.

FEDERATION OF SCOTTISH AQUARIST SOCIETIES

A VERY successful meeting of the Federation of Scottish Aquarist Societies was held recently at which 80 aquarists from all over Scotland were present. At the business session the Constitution of the Federation was unanimously adopted. Various suggestions from affiliated societies were discussed and were referred to the committee for further consideration.

There were 85 entries for the table show and the winners were: Sweettails (16 entries): 1, Hector Kerr, Edinburgh A.S. (red-eyed red); 2, Mrs. J. Taggart, East Fife A.S. (green); 3, Alex. Cross, Dundee A.S. (black); 4, D. Mackenzie, Kirkcaldy A.S. (red-eyed red); Characins (40 entries): 1, Ian Clark, Inverness A.S. (*Hyphessobrycon rubrivittatus*); 2, Walter S. Bisset, Jr., Edinburgh A.S. (*Hyphessobrycon flavescens*); 3, Gordon Ritchie, Kirkcaldy A.S. (*Moenkhausia pittieri*); 4, E. J. Seymour, Dundee A.S. (*Hyphessobrycon rubrivittatus*). Gouramis (23 entries): 1 and 2, Alex. Cross, Dundee A.S. (*Helostoma rufidors*); 3, N. Kennedy, Edinburgh A.S. (*Colisa labiosa*); 4, W. Spark, East of Fife A.S. (*Trichogaster trichopterus*). Dwarf Cichlids (six entries): 1, J. Rawlings, Inverness A.S. (*Palmatichromis kribia*); 2, Ian Clark, Inverness A.S. (*Palmatichromis kribia*); 3, J. Rawlings, Inverness A.S. (*Palmatichromis kribia*); 4, D. Oxley, Edinburgh A.S. (*Apinogramma ornatum*). Best Fish on show: This award went to Ian Clark, Inverness A.S., for his very fine *Hyphessobrycon rubrivittatus*.

The next full meeting of the Federation, which will also be the annual general meeting, will be held in Inverness on Sunday, 6th September, 1959. Full details will be issued in due course.

GOLDFISH SOCIETY OF GREAT BRITAIN

A QUARTERLY meeting of the Goldfish Society of Great Britain was held on the 7th March at the Friends House, Euston Road, London, N. Welcome guests were three members of the Bristol Coldwater Fish Breeders Group. Capt. L. C. Betts explained the G.S.G.B. approach and principles regarding judging goldfish. Members were issued with judging sheets and joined in a judging exercise by appraising seven singletails staged for this purpose. Mr. R. J. Affleck then described the result of some research which had been undertaken by the Technical Committee into the question of body length in singletails, and said that a publication giving full details was being prepared for G.S.G.B. members.

The final item on the programme was the presentation of a casket of cutlery to Capt. L. C. Betts in recognition of his services to the Society and to the goldfish fancy prior to his retiring from the chairmanship after 10 years. The next meeting will be held at Kingsway

Hall on 6th June, when it is hoped to formalise standards for pearl scales, celestials, bubble-eyes and perhaps pom poms. Visitors will be welcome.

SOME recent show results are reported from Friends Aquarist Society and these are as follows: Inter-club with Catford—1st leg: Catford 1,293 points; Friends 1,241 points. The classes were Anabantids, Characins, A.O.V., Livebearers. Highest pointed fish was a bleeding heart tetra with 92½ points, belonging to E. Angus (Catford). The 2nd leg resulted as follows: Friends 1,378 points; Catford 1,147 points. The classes were: Barbs, Cichlids, Jiggling Toothcarps. Highest pointed fish was a tiger barb with 84 points belonging to E. Spooner (Friends). The Cats and Loaches competition held recently was won by C. Ford with 87 points. This club who meet in Brixton would welcome more new members and the secretary is Mr. E. H. Barfoot, 378, Grove Road, Mitcham, Surrey. Telephone: Mit. 3839J.

PLANS are well advanced for the Catford A.S. first annual open show, which will be held on Friday, 22nd May and Saturday, 23rd May next. Entries are now pouring in for this event in which many excellent trophies may be won including the London Tooth Carp Championship Trophy. Any show secretaries who may be interested should write for show schedules to Mr. S. N. Cornock (show secretary), 33, Howard Road, Bromley, Kent. Secretaries are advised not to delay as a large entry is anticipated in all events.

DESPITE a slight decline in support at the beginning of the year, the Hampstead Aquatic Society ended the year with an increase in members, it was announced at the annual meeting.

The Mayor of Hampstead, Lieut.-Colonel H. Ashley-Scarlett is president and George Cassdale, vice-president; Mr. P. B. Utton is chairman, Mr. L. Coatsman, secretary and Mr. K. J. A. Pye, the treasurer. Mr. K. Walker was elected show manager and Mr. R. Crier show secretary.

A TABLE show for two classes of tropical fish was the main feature of the last meeting of the Hounslow and District A.S. The classes were for Livebearers and Pairs, and the results were as follows:

Livebearer class: 1, Mr. B. Boush, double sword guppy; 2, Miss Carter, green swordtail; 3, Mr. Woodward, red wagtail sword.

Pair class: 1, Mr. Worms, three-spot gourami; 2, Mr. Luff, black sword; 3 tie, Mr. Woodward, neon tetras and pearl gourami, and Mr. Worms, three-spot gourami.

While the show was being judged, Mr. R. Luff gave a short talk and also answered questions on fishkeeping.

MEMBERS of the Walsall Aquarium and Pool Society are fortunate in that their president, Mr. S. Mills-Clark, is an expert colour photographer. At the March assembly of the Society, Mr. Mills-Clark presented a large number of his slides depicting his beautiful garden and pools. Besides having a flair for finding just the right angle for the unusual photograph, Mr. Mills-Clark is also an authority on garden pools and the members were given many useful ideas for improving their ponds.

The Society's programme for May includes a table show of livebearers and an outing to the Severn Wildfowl Trust.

THE clubroom at the Wirral Aquarist Association—formerly Birkenhead and District—resembled a horticultural stand at a flower show at the earlier meeting of the month. Mr. Jones, a commercial grower of cactus who is also a club member, gave an informative talk on the growing, propagation and keeping of cacti and succulents.

He brought about 100 specimens to illustrate various points in his talk, and answered many queries put to him on the subject, during the course of the evening. Second meeting was the annual general meeting when election of officers took place, after the main committee meeting and reports had been read.

MEMBERS of the Bradford and District A.S. recently enjoyed an excellent illustrated lecture by Dr. Elliott of Leeds. The slides were very good and showed a wide variety and selection of pond life. Arrangements are already in hand for this year's show.

THE annual general meeting of the Reading and District A.S. was held recently when the following officers were elected: Chairman, Mr. Pitts; hon. secretary, Mr. G. Thompson, 57, Royal Avenue, Calcot, Nr. Reading, Berks.; treasurer, Mr. I. Golden. President for several years past, Mr. A. Crisp has consented to hold office once again. Meetings are held on the first and third Friday in the month at the Elephant Hotel, and new members will be welcomed.

A MONTHLY newsletter is now being published by the Wirral Aquarists Association. The club meets on the second and last Wednesday every month at 7.30 p.m. at the Conservative Club Rooms, Bedford Road East, Rock Ferry, and the secretary is Mr. L. Fidal, 5, Buttermere Avenue, Nocton, Birkenhead.

AMALGAMATION

THE Prestwich and District Aquarist Society and the Bury Aquarist Society have now amalgamated, and the new title is the Prestwich and Bury Aquarist Society. The chairman is Mr. N. J. Boardman; vice-chairman, Mr. L. Barnes and the secretary is Mr. N. Dyson, 60, Wilton Street, Whitefield, Manchester. The meeting night is the second Tuesday in the month at the Junction Hotel, Whitefield.

UNUSUAL IMPORTS

(continued from page 14)

The frilled lizard is very rare and the specimen shown in the photograph formed part of an import from an expedition by friends of mine. It is possibly the first specimen to reach Britain since the 1930's.

The mountain devil or horny devil (*Moloch horridus*), illustrated here, is a heavily armoured lizard also from Australia and feeds entirely on certain species of ants.

As the photograph shows, the spines on the body and tail are continued on to the limbs; small horns are present

on the head and the neck is protected by a large protuberance surmounted by two spines. This spiny nature seems to be characteristic of certain desert lizards and is well shown in the American horned lizard (*Phrynosoma cornutum*), which will be familiar to many readers. It is a member of the Iguanidae, and the close resemblance to the horny devil is an example of "parallelism" or parallel development. This is often seen in unrelated groups where members of the various groups have superficial similarities occasioned by their adaptation to the same type of environment.

The horny devil is seldom seen in Britain owing to its rarity and the difficulty in providing it with food. Two specimens which I kept laid four and five eggs respectively.