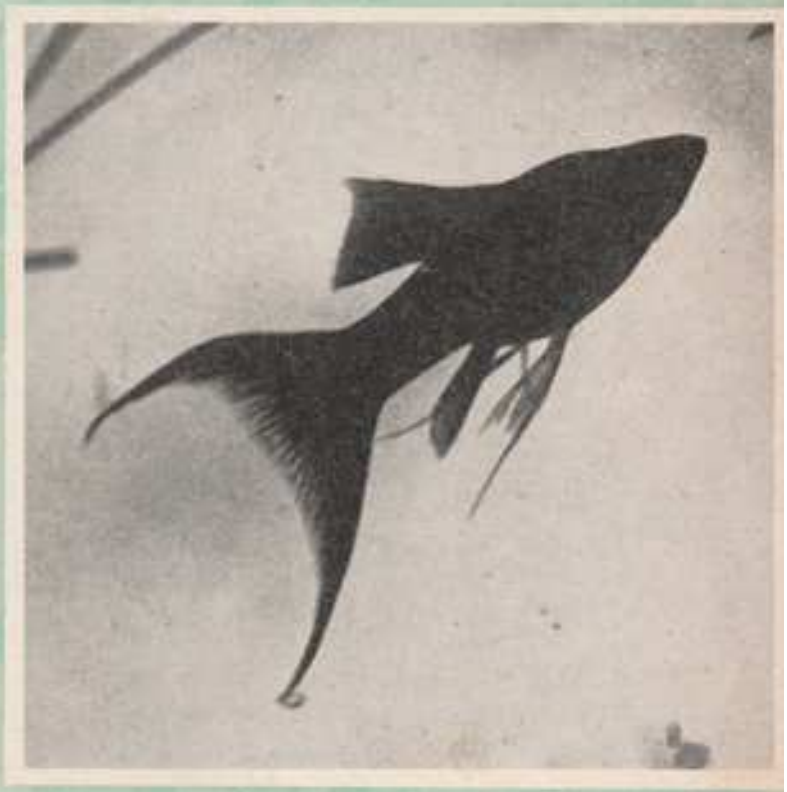
The Aquarist

and Pondkeeper

JANUARY 1963



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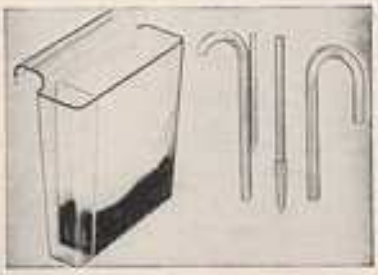

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Contents

VOL. XXVII No. 10 1963

The Intelligence of Fishes

SOME people judge the intelligence of a fish by whether or not it gets away when they are trying to catch it, but there is, of course, a good deal more to it than that! A fair amount of scientific experimenting has been done with captive fishes to ascertain the degree of their intelligence, and the results are quite interesting and revealing.

But such experiments should not be allowed to convince us that fishes are really intelligent creatures, for they are not. Compared with man himself, with the higher mammals like monkeys, even with some birds, fishes are dull-witted creatures, or more accurately, reflex creatures. That is to say, they act in a set fashion to a given circumstance, regardless of whether their action is suitable in each case.

Fishes cannot really think, they cannot reason and their power of memorising earlier happenings is very small indeed. But they can be exceptionally wary in an instinctive way, they can appear even to be cunning, especially when they are hooked, and they can, some of them, learn minor lessons to a certain degree. But they are not intelligent in any ordinary meaning of the term.

Fishes have comparatively very small brains, much smaller relatively than those in any animals. Fish brains are also simpler in type, too, lacking the complex cerebral hemispheres with their elaborate convolutions that are such a striking feature of a human or monkey brain. The major feature of a fish brain is not the section that co-ordinates ideas and works out reasoning and considered action, but the parts covering sight. Only the shark tribe have another section of the brain larger and more fully developed, and that is the section covering the sense of smell, for they are largely scent-feeders, not sight-feeders.

Like all the lower creatures of the universe, fishes are governed by an endless chain of reflex actions, most of them based upon instinct. Confronted with a new set of circumstances, or new problems to solve, they are quite incapable of dealing with them, and cannot apply even the simplest lesson learned earlier under different circumstances.

If the familiar stimuli are present, then a fish acts as it has always done; change the stimuli and it is quite lost. This reflex action may be elaborate and complex at times, and one instinctive method of behaviour may over-ride others at certain times.

For instance, spawning salmon then lose all their normal wariness, and eels and other fishes make migratory journeys of some magnitude without error.

Then again, as in all wild creatures, individuals vary

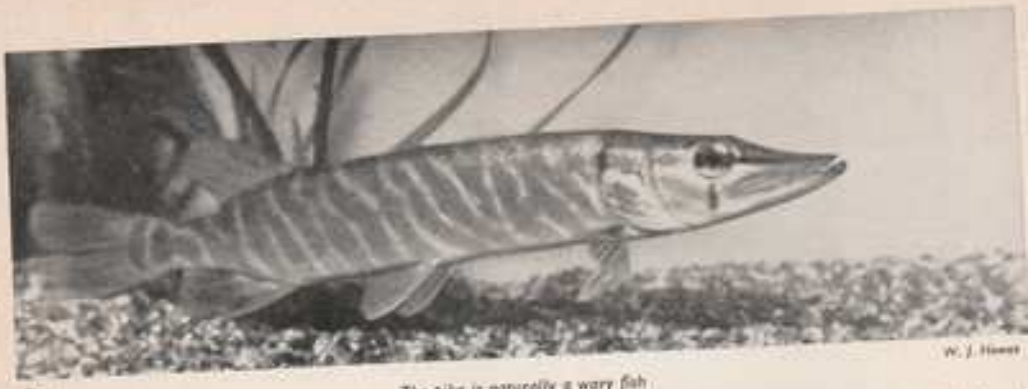


Photo: W. J. Howes

The pike is naturally a wary fish

greatly in their ability to react to given conditions, to become conditioned to new stimuli.

Some fishes are always cleverer than others, which explains why big fishes, wary and seemingly cunning, are so difficult to catch. The difference in intelligence may be really very small, but the simple-minded fishes all get caught, by human anglers or natural enemies, when they are young and small. Only the more wary, possibly more adaptable fishes, live long enough to grow big at all.

The important thing to bear in mind is that fishes must not be judged by human standards of intelligence. It is all too easy to assume that some giant pike that has skilfully eluded years of attempts at capture is gifted with super-fish intelligence and cunning, born of its long experience as a quarry, and so on, but science will not accept such views at all. The pike is excessively wary from years of most frightening experiences, or even because it was just made that way, and most of its cunning and trickery is really a product of human imagination.

Perhaps it can all best be summed up by saying that even at their most intelligent, all fishes are but reflex creatures: they have no inhibitions, no way of thinking things over before acting upon them, no hesitation over a course of action in their make-up at all, no powers of primitive reasoning which occasionally glimmer through the mentality of, say, a chimpanzee.

Show a fish a worm, and it opens its mouth and snatches the food. Show a fish a bigger, predatory creature, and it swims off at top speed and hides. Show a fish a line and it does the same, not because it has learnt from past experience that a hook with a line attached is dangerous and that fishes which accept worms offered in that way are not seen again, but largely because a line is a strange, and therefore a dangerous, object and one to be avoided.

All the evidence does not point to much intelligence in fishes. But what have the experiments taught us? Only that some fishes, the more sensitive ones the ones that react more readily to stimuli, can learn to some degree, but no further, and also that some fishes can be tamed and induced to react in a way that suggests a willingness to be at the beck and call of a human master or trainer.

One long series of experiments with a Siamese fighting fish led to the first conclusion. The fish was put into a tank that was separated into two by a glass partition down the centre. A live worm was put in one half and the fish in the other, and a hole left in the partition.

The fish could see the worm, but could devise no way of getting at it, until, quite by chance, it found the hole. In later tests it went straight through the hole to the worm.

But when another glass partition was used with its hole in a different position, the fish looked for the old hole, and failed to reach the worm until, at long last, it found the new hole again by accident. When yet another partition was used, with its hole in a new place, the fish looked for the old hole, then for the first hole, and still found the third hole only by accident.

A creature of intelligence would by then have realised that each time the hole had to be searched for. When an opaque screen was inserted to shield the worm from view when the fish had got through the hole, after seeing it a before, the fish was again completely lost, and only found its way round the screen to the worm, by accident. At length, when a hole was cut in the screen, exposing the worm to view again, the fish still reached its prey by going round the long way, as it had done the first time.

Fishes have been trained to come for food when music is played, when other sounds, even the simplest tapping, are made, and when their tank water is suddenly impregnated with a strong-smelling substance, such as amyl acetate.

In America black bass have been taught to tell four clear, pure colours. A small tube, variously coloured, was lowered among the fish and when they approached it food was given. When the colour of the tube was changed, a weak electric shock and no food rewarded the curious one. After about ten attempts, the fish could tell the 'safe' colours. In exceptional cases, this acquired knowledge remained with the fish for over a month.

Tame fish are by no means rare, and one well-known American expert has taught his fish to let him pick them and take them out of the water without struggling. I even tamed a fierce barracuda in a week, and made quite a pet of it. But sympathetic reaction from the man to the fish, his soft, caressing voice (a noted feature of all those who can tame any creatures) and much careful training with regular rewards of food all helped.

Most of the recorded instances of fishes actually performing tricks, such as tugging a rope dangling in the water that tipped food down to them, or swimming through wire hoops in the water, are actually cases where individual fish have acquired reflex reactions to unusual circumstances, mostly actuated by the prospect of food.

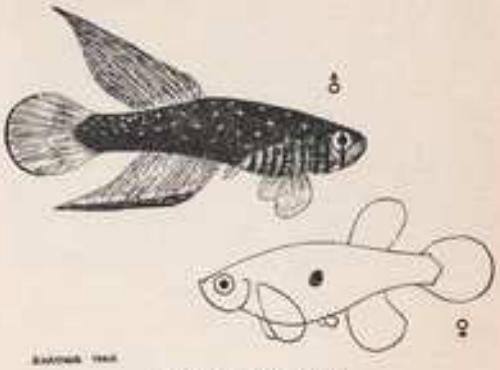
Nevertheless, some fishes, notably game fishes, certainly act in a sensible way in their wild state, protecting and rescuing their fellows, hunting in packs, working in pairs, shift stones for nest-building or to obtain food, and so on.

Yet we must never over-estimate the lessons fishes actually learn. Extreme caution, plus a grain or two of learning, help most fishes through their lives.

David Gun

Cynolebias whiteii

by JOHN HAYNES



Male above, female below

THESE fish belong to the family Cyprinodontidae, and are related to the Argentine pearl fish (*Cynolebias bellotti*). They are found in the Argentine in the area at the head of the River Plate to the north-west of Buenos Aires. The River Parana flows through this area and is boarded on its south bank by the "barranca", which is a steep embankment some 100 feet above the river level. This area forms a natural flood-plain and presents an ideal habitat for these fish, which, we are told, inhabit pools that dry up completely during the dry season.

The dry season occurs during the winter (our summer months) and the rainy season coincides with the warmer weather during our winter months. The flood-plain is in the area of the Argentine known as the Humid Pampa, the climate of which is described as having mild winters and hot summers. Average temperatures for Buenos Aires are given as 73.6°F (23°C) in January and 48.9°F (9°C) in July.

Cynolebias whiteii are not similar in shape to *C. bellotti*. They are long-bodied fish with a high pointed dorsal and in shape and finnage resemble more closely *Aphyosemion bivittatum*. The body of the male is a rich chocolate brown covered with a multitude of golden-green spots, extending into the orange-red dorsal. They have very large paddle-like pectoral fins and the large anal fin is edged with black. The caudal also has an edge colour, which can best be described as a blue-green. The underside of the body is a light straw colour and is divided by perpendicular purple bars, one of which bisects the eye. Males grow in captivity to a length of 1½-2 inches.

The female is a rather insignificant fish, with a drab olive-green colour; the one distinguishing feature is a large black spot in the centre of the sides of the body.

The fish I have are probably unique in this country and I would like to give a short history of their existence here.

Some 12 months ago members at Hendon and District Aquatic Society were very pleased to renew our acquaintance with our old friend Dr. Bill Hildeman, who was over here for a few days attending a scientific convention in London. Dr. Hildeman was once a member of our Society when working for a period in London before returning to California. With him he brought some eggs of *C. whiteii*, contained in a very small amount of peat tightly wrapped in a polythene bag. Originally these eggs were supplied by Mr. Dick Haas from California, and were given to Mr. and Mrs. Robertshaw with instructions about how and when they should be hatched.

Hatching proceeded without any difficulty and merely involved wetting the peat with rain water; within 24 hours some 25 fry could be seen free-swimming. The fry were reared to maturity and in February I was given a pair of these fish, and from here on I can refer to the entries in my fish house diary.

Diary of Events

17th February. One pair of fish received and placed in a 10 in. by 8 in. by 6 in. tank with a layer of peat ½ inch thick spread over the base.

11th March. 18 eggs were collected from the peat. The eggs were quite easy to collect by spreading the peat over a white plastic tray. They are about the size of a normal egg-laying tooth carp egg, transparent and of a light amber colour. It was found that they were hard enough to be picked up in a pair of tweezers without any apparent damage. After collection the eggs were returned to a smaller quantity of peat and put into about 1 inch of water, which was left to evaporate naturally. The eggs were left damp-dry in a glass jar tightly covered with a piece of polythene. These eggs were labelled Batch 1. The pair of fish were transferred to a small plastic box some 2 in. by 2 in. by 4 in. with a thick layer of peat. Within a week both fish were dead. The peat was dried as before and labelled Batch 2.

28th March. A letter was received from Mr. Dick Haas giving details of how the eggs should be dried, and briefly this is that the peat should be siphoned out of the tank through a fine mesh net after remaining in the tank for a week after the adult pair had been removed. The excess of

moisture is then gently squeezed out and the peat spread out in a tray and placed in a dark corner of the fish house, where it is allowed to dry until it is as moist as a good pipe tobacco. At this stage the peat can be kept in a plastic bag, which should be suitably sealed so that no further evaporation takes place. The bag should be stored at a temperature of about 75°F (24°C).

Mr. Dick Haas suggested that an attempt to hatch the eggs can be made after 6 weeks. In his letter he also mentioned two other methods of spawning which have proved successful, namely:

(*a*) by the use of nylon mops on the base of the tank, drying the mops after spawning, as for the peat, and storing them;

(*b*) by the use of very fine sand. After a week or two of introducing the adult pair the sand can be vigorously stirred and as it settles any eggs appear on the surface of the sand, as they are less dense than the sand. The eggs can then be removed and stored in previously prepared peat.

28th April. Eggs from Batch 1 were placed in a small plastic box about 8 in. by 4 in. by 3 in. with approximately 1 inch of water, composed of 1 part of tap water, 2 parts of rain water and 1 part of old peaty water.

A precise picture of the hatching was obtained by carefully watching the tank during the ensuing days.

11 a.m. Eggs in water.

3.30 p.m. Two fry free-swimming.

5.30 p.m. Five to six fry free-swimming. A few drops of liquid fry food were added at this stage. Fry approximately ¼ inch long.

29th April. At least seven fry were free-swimming.

30th April. Nine to ten strong fry, with four or five feeble ones (these could be late hatchers). Large fry were already able to take newly hatched *Artemia*.

3rd May. All fry killed by sudden increase in fish house temperature (one of our "fine" days).

This seemed disastrous at the time, but there was still the second batch of eggs.

An attempt to hatch this batch did not show any initial results and it was not until the peat had been in water for nearly 2 weeks that any fry appeared. According to Mr. Dick Haas, if no fry appear within 24 hours the peat should be dried again and a further attempt at hatching should be made in 6 weeks.

A close watch was kept on this hatching and it would appear from the results that the eggs mature over a period, although they must all have been laid within 4-5 days. To verify this claim consider the fact that after 2 weeks from seeing the first fry appear, some 15 fish, a total of 39 fishes was reached, by the eggs hatching out a few at a time over that period.

The fry were very difficult to rear and many losses were encountered, although the *Artemia* food stage was achieved without any losses; in fact during this stage fry were regularly hatching out. When it came to finding more substantial food, in the form of Grindal worms, the fry started dying. However, it was possible to rear some fish to the adult stage and those that were reared grew very rapidly. Within a month the females were already developing eggs, although only some ½–¾ inch in body length. As was to be expected, the fish were very uneven in size and it was interesting that the largest male was almost 1½ inches in body length within 6 weeks of hatching.

Several pairs of these fish were put to spawn and now, at the time of writing, I have no living fish, as they all died within 5 months, but merely a plastic bag containing some damp peat and a hope that from it will emerge some more fry.

When you consider that in 12 months two complete cycles of life from egg to egg have been achieved, it is fair to assume that in Nature the life span of these beautiful fish can be only some 5 to 6 months.

Tree Frogs of

by ROBERT BUSTARD, B.Sc.

(Photographs by the author)

IN 1955 I obtained from Ecuador, a mountainous South American Republic, a couple of dozen specimens of a remarkable frog. This frog, known to science as *Gastrotheca marsupiatum*, is a species of marsupial frog, that is, it possesses a pouch, remarkable as this may seem. Various members of the genus have differing arrangements, and retain the young in the pouch for varying periods of time. In some cases tadpoles are liberated from the pouch but in other species young frogs are produced, the tadpoles passing all their lives within the pouch, where metamorphosis also takes place. In all species of *Gastrotheca* the pouch is on the female's back and the opening is small.

When I received these frogs their breeding habits were not properly known and I was thrilled that I had several specimens with their pouches distended with eggs. These showed outwardly as little bumps on the female's back, because the pouch is thin-walled, and sometimes several of the small yolky eggs could be seen through the pouch opening. The specimens I received were, perhaps, the first live examples which had been seen in this country and they caused quite a stir in scientific circles, and before long some of my specimens were sent to the Zoological Society of London and others to research scientists at the University of London.

One of the problems was how the eggs entered the pouch through the narrow opening. This was soon solved by a friend of mine, Mr. John Walker (for a detailed account see the *British Journal of Herpetology*, vol. 2), who observed a pair of the frogs, which he had obtained from me, pairing. The ovipositor or egg-laying tube of the female was extruded and bent up over the back of the female, where the male pushed the eggs into the pouch after fertilising them as they were extruded.

Gastrotheca marsupiatum has a superficial resemblance to our European tree frog (*Hyla arborea*), except that it is

Leptodactylus species from Ecuador

South America

slightly larger. *Hyla arborea* also, of course, lacks the pouch and is considerably more arboreal than *Gastrotheca*, which spends much of its life on the ground. I have kept specimens that were coloured identically to *Hyla arborea*, as is the male on the right of the photograph. In *Gastrotheca marsupiatum* there is considerable variation in colour. Many specimens have streaks in various shades of brown, like the female illustrated. Both are adult and it can be seen (as is often the case in frogs and toads) that the female is larger than the male. To my mind the most attractive specimens are those that include stripes of various shades of green in their coloration.

Gastrotheca are voracious feeders and will eat smaller amphibians and even younger specimens of their own species, which should, therefore, be kept apart from their parents. My specimens were fed largely on bluebottles. These frogs are very hardy and need no heat. They will live happily at British room temperatures (55-60°F; 13-16°C). Mr. Alfred Leutscher, to whom I gave a pair, told me recently that the original specimens are still in good health after 6-7 years, and they have produced several pouchfuls of eggs during this period of time. During the summer I kept a colony in an outdoor, but fully enclosed, reptiliary with plenty of sturdy foliage for them to hide amongst. These conditions proved very suitable and the frogs soon settled down remarkably well and each evening could be heard calling. This was only heard after dusk and I was never able to see a specimen calling, but the noise made was clearly audible at a distance of several hundred yards.

Gastrotheca breeds readily in captivity and it is possible also to obtain specimens with eggs in the pouch. Such females must have access to water, as when the tadpoles hatch they will liberate them in the water while they are quite small, in the case of *G. marsupiatum*. The method is interesting to watch and I observed it a number of times during the winter of 1955-56. The female carefully enters the water (which, like the midwife toad *Alytes obstetricans*, they are not very partial to) and takes a hip bath. The front legs usually clasp the bank or a stone or branch at the water's edge. With water entering the pouch tadpoles near the pouch entrance swim away, but to hurry things up the female pulls open the rim of the pouch with the long toes of her hind feet and the feet may even poke inside to dislodge tadpoles. The tadpoles are easy to rear in my experience, on the usual vegetable diet, varied with meat when they reach a larger size. The tiny froglets feed very greedily on *Drosophila* (fruit flies); growth is very rapid, and before long, because they have large mouths, they are able to tackle bluebottles.

Pouched tree frogs (Gastrotheca marsupiatum): left, female; right, male

Another genus of frogs with some members having unusual breeding habits is *Leptodactylus*. The specimen illustrated also came from Ecuador and thrived with a temperature of about 70°F (21°C). They are less hardy than *Gastrotheca*.

Frogs such as those mentioned in this article are likely to cost about 10s. each, but *Gastrotheca* at least are hardy in captivity in this country and I soon multiplied my original colony number several-fold and eventually had to dispose of many specimens because of noise at night, which disturbed even the most understanding of neighbours! Note, however, that specimens kept in small vivaria indoors were silent.

The Uneducated Blue Acara

FOR about 18 months I have had four blue acara in my community tank. They live happily enough with those smaller species that were occupants of the tank before the arrival of the blue acara. They are even happier with fresh arrivals; unfortunately, these fresh arrivals do not share their enthusiasm, and their life in the tank is exciting but brief.

It has gradually become clear that unless the tank is to become empty except for the four blue acara it will be necessary to replenish the stock with fishes that will be acceptable to these four. One attractive answer seemed to be to spawn them and introduce the young into the community tank and eventually to have a tank containing only one species, namely blue acara.

A 24 in. by 12 in. by 12 in. tank was set up with about 8 inches of water, 1 inch of compost, a large flat stone and a flower pot. The temperature was raised to 80°F (27°C), and a pair of fish was introduced. They were well fed on earthworms and within a week they had spawned on the flat stone. This necessitated a frantic search through various weighty volumes and countless old copies of *The Aquarist* to see what to do next.

I need not have rushed. Every volume without exception assured me that the blue acara were exemplary parents who would devote the next week or so to the rearing of their young with touching devotion. I watched fascinated as the female fanned the eggs with her pectoral fins, and was equally fascinated on the second day to see the male take the eggs in his mouth. There was no need to worry; I had read repeatedly that the parents would do this to remove any dirt adhering to the eggs. Unfortunately, it would appear that the male had not read the same books as me. He rolled the eggs round in his mouth all right but swallowed when he should have spat out!

A fortnight later they once again spawned, and this time I was having no nonsense from the male. I removed him from the tank on the second day. The female showed her appreciation of having to do all the work herself by eating the eggs on the third day.

So much for the loving care of the parents. I now knew better, so the next time they spawned I removed both of the parents. The result—the eggs developed fungus!

F. C. Randall

How to Deal with Persistent Leaks

by ASTILBES

I HAVE dealt before with the problem of fairly small leaks through cracks in the concrete pond. Where the crack can be found easily and it is not far down in the pond it is possible to make a good repair. This is done by lowering the level of the water, locating the crack and dealing with it as follows. The crack is first thoroughly cleaned out and all the loose concrete removed. It is then filled in with a mixture of 1 part of fine sharp sand to 1 part of Prompt cement. This mixture is forced well into the crack but is not allowed to overlap the other part of the concrete. This sets in a little over half an hour, when the pond can be filled again. The small amount of lime from the repair will not do any harm.

Floating the Concrete

However, should the pond leak very badly and large cracks cannot be located, a more ambitious scheme must be undertaken. This entails completely refloating over the whole concrete surface with a fresh layer of about three-quarters of an inch in thickness. First empty the pond and clean it out well. The fishes should be housed in a safe place, away from frost and cats etc. I use a small pond for my tench and the fantail goldfish are housed in large cold-water cisterns. These were old leaky ones that I had treated with a cement wash nearly 20 years ago, and they still hold water. Wire netting should be put over these for safety. When the pond has been cleaned out any cracks will soon show up as the concrete dries, and these should be well cleaned out as described above. Chip off any extra concrete which may have been added at any time, as it is well to make sure that the base of the pond is fairly clean before refloating.

Obtain a bag of cement, which should be fresh, and some fine sharp sand. If the pond holds about 500 gallons of water it will be found that a quarter of a yard of sand will be sufficient. It is very difficult to assess the amount of water which an irregularly shaped pond holds. One fairly accurate method is to have it quite empty and then to fill it from a hose. Whilst it is filling, time the period of filling. Also fill a known measure, say a 2 gallon water can, from the hose at the same force and find the time it takes to fill. It may be from 50 to 60 seconds. It is then an easy sum to work out from the two times recorded how much the pond holds.

The Mixture

Scrub the pond well with a stiff broom and wash all concrete well. Then prepare your mixture. Three parts of sand to 1 of cement will do for your mixture. To make a good waterproof job get a bag or tin of waterproofing cement. There are several of these on the market. This is mixed with the cement to the maker's directions. It is a good plan to sieve the cement and waterproofing so that all is well mixed. Measure your sand and cement carefully. If the sand is fairly dry you can mix three pailsful of sand to one of cement, but do not add water to the whole of it. One-half will do for a start. Carefully add the water from a watering can rose and mix thoroughly, giving three mixes when dry and three more when wet. Do not make the mixture too wet.

Technique

Commence floating the mixture from the centre of the pond and lay on about three-quarters of an inch in thickness. Work as quickly as you can as you do not want the cement to start to 'go off' before you add the next portion. Gradually work up to the sides and, if the pond has been made with sloping sides (the easiest way), it will not be difficult to float the concrete up to the top. Do not keep working at the mixture once it has been put into place as the more you work it the softer it becomes and might slide down to the bottom. Try to cover the surface in one day, and if you can choose a day when it is cool and dampish the concrete will set better.

It is not wise to do this in hot weather, so that if there is no sharp frost or heavy rain this task can be carried out during the winter months. Make sure that there are no stones in the sand, and a sifting through a fine mesh sieve will ensure that when you are using the float there will be no snags through stones in the mixture.

After a couple of days the pond can be filled again. Leave it for 2 or 3 days and then empty it. As the pond empties scrub the concrete thoroughly with a stiff broom and wash round well after. Remove all the water and wipe out the bottom. Now refill with water, before or after planting, and the fishes can be returned.

Water lilies should have been kept covered with water and all other water plants suitably stored. When replanting the lilies it will be possible to do some pruning or sorting out. Take away some of the very old root-stocks and use only the younger outside growth. It will be easier to plant before filling the pond with water. Make sure that the lilies are well anchored to the bottom. If they are not set in large pots place some pieces of concrete or bricks over the stocks. If this is not done it is probable that when the lilies grow in the spring the whole root system will rise to the surface of the water.

Perpendicular Sides

If your pond has perpendicular sides it will not be easy to float this part without using some shuttering. However, it can be done provided that the old surface is scored with a sharp-pointed tool. This will give a "key" to assist the fresh concrete to gain a hold. Make sure that your mixture is not wet, and float up from below, moving round the pond as each foot or so is dealt with. This will allow the first placed to become slightly firmer before the next layer is added.

Should there be a hard frost after the pond has been repaired and filled, make sure that the ice which forms is opened each day and not allowed to get so thick that it creates too great a strain on the concrete. If the above instructions have been carried out a pond which has leaked for years can be made quite waterproof and refilling and topping-up next summer can be avoided.

The Reproduction of the Kuhli Fish

(Acanthophthalmus kuhli)

by PROFESSOR A. STOLK, M.D., Ph.D.
(Amsterdam, Netherlands)

ALTHOUGH Sibbes (1957) has published a survey of the reproduction of *Acanthophthalmus kuhli* (Valenciennes), in many respects this reproduction is still rather obscure. My own experience with this interesting fish is still far from complete, but this experience may be of some value, as data are very scarce up to the present. Moreover, it appeared to be in complete harmony with my conceptions about the regulation of the reproduction by means of the pituitary gland, as will be shown at the end of this article.

In spite of the communications of Hoedeman (1948) and Dvoskin (1956), who succeeded in breeding this fish in community aquaria, I placed 12 fish, varying in length from 75 to 81 mm., in an aquarium 175 cm. by 60 cm. by 60 cm., which was especially arranged for kuhli fish. The soil consisted of peat dust (not boiled), covered with rather coarse peat fibres. I have already shown that sharp sand particles may cause wounds of the skin, resulting in mould infections (Stolk, 1955).

Fig. 1. Male of Acanthophthalmus kuhli

Fig. 2. Female of Acanthophthalmus kuhli

The aquarium had been filled with a mixture of distilled water and rain water. The temperature ranged between 73° and 77° F (23-25° C) and pH was 6.5-6.8. Filtering and aeration were not applied. Along the back and side walls some stones were placed and the vegetation was provided by many different kinds of plants. However, the kuhli fish appeared to be indifferent to this vegetation and disappeared between the stones and into the peat dust and fibres. It could be observed that their activity was maximal in the evening. They were fed with *Daphnia*, *Tubifex*, enchytrae and sometimes gnat larvae.

As a result of earlier elaborate investigations I came to the conclusion that the anterior lobe of the pituitary gland influences the reproduction. In some species of fishes this anterior lobe appears to be well developed; in others, including *Acanthophthalmus kuhli*, it is less developed. As the anterior lobe produces the gonadotrophic hormones, there might be a relationship between its poor development and the difficult reproduction in captivity.

The anterior lobe can be activated by certain substances, of which the urine of pregnant animals and some hormone preparations are the most easy to use. Accordingly, I added a small quantity of urine of a pregnant woman, namely 0·5 ml. of urine per litre of water, to the tank in which the kuhli fish were living. About a month later the sex of many of the fish could be determined. The male fishes remained slender (Fig. 1), whereas the females became locally thick by a considerable enlargement of the ovaries (Fig. 2). Without exception all the fish showed the normal type generally seen in the Netherlands, which is the type with very regular dark parts and rather broad yellow bands.

Fig. 3. Pairing of Acanthophthalmus kuhli

After some time pairing was observed, the fish showing a kind of embrace (Fig. 3). The pairings always took place in the evening and close to the soil. Deposition of the eggs was never observed, as the fish were partly covered by the peat dust and fibres. A bubble-nest, as was described by Lindquist (1954), was never seen. Not even the slightest air-bubble formation or foam could be found between the aquatic plants at the surface.

After the pairings the soil was studied in detail. Near some stones, between the roots of *Sagittaria sinensis* and *Vallisneria spiralis*, some young kuhli fish, measuring 18-24 mm., were observed. They were slightly pigmented, but could not be called black, as was described by Hoedeman (1948). The characteristic colours of the adult fish were absent. Of course, the possibility exists that the young fish of the different types of kuhli develop differently in the formation of the colour pattern.

A further detailed investigation led to the discovery of some eggs. As was described by Lindquist (1954), they were about as large as the eggs of the Siamese fighting fish (*Betta splendens*). They had a yellowish colour and were observed in small groups near the stones and between the roots of plants. Fig. 4 shows two eggs, in which the developing embryo can be observed. The young fish were never seen at a later date, and they must have died. Probably the circumstances were not quite optimum or the right food was lacking. These results probably correspond very well with the results of Hoedeman (1948) as this author does not say anything about the further development of the young fish.

I have stated above that my observations were in agreement with my conceptions about the role of the pituitary gland in reproduction. A microscopic investigation of the pituitary gland of the fish after addition of the pregnancy urine to the water revealed an enlargement of the anterior lobe and the lobus intermedius, probably resulting in an

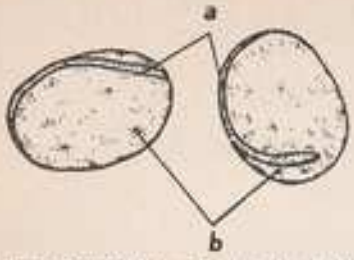


Fig. 4. Eggs of Acanthophthalmus kuhli with developing embryo (a); (b), granules

increased production of hormones (Fig. 5). Fig. 6 shows for comparison a pituitary gland of a sterile female kuhli fish, in which the gonads were not developed. The anterior lobe and the lobus intermedius appeared to be much smaller than is normally the case. In a case of a sterile male fish inflammation of the pituitary gland was found. Fig. 7 shows that an important part of the gland, especially the anterior lobe and the lobus intermedius, was destroyed. The characteristic inflammation cells were readily visible in the tissues. The relation between the sterility and the abnormal pituitary gland was very clear in this case.

It is clear that my observations are not yet complete, but they are worth mentioning. The investigation in this direction will be continued.

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FISH DISEASES

(6) Fungus

ALTHOUGH fungus spores are always present in water, they will only attack fishes that are dead or injured or where the skin is damaged by parasites. In the majority of cases fungus develops as a secondary infection and treatment must be directed first at the primary ailment. Fungus (*Saprolegnia*) is a mould that resembles bunches of grey or white cotton wool on the body or fins of the infected fish, and as the growths spread rapidly if neglected and sink deep into the flesh, it is essential to commence treatment as soon as possible.

The most effective treatment of fungus is to paint the growths with a mild solution of iodine (1 volume of iodine with 9 volumes of distilled water), taking great care not to touch unaffected parts of the body or to injure the eyes or delicate membranes of the gills by careless swabbing. This treatment may be repeated as necessary and the fish placed in a tank containing a solution of phenoxetol for a period of about a week or until the fungus is completely destroyed.

The phenoxetol solution is prepared in the following manner. A 1 per cent solution is made by dissolving 1 millilitre of phenoxetol in 99 millilitres of distilled water; 50 millilitres of this are then added for each Imperial gallon of water in the tank. Phenoxetol is obtainable from any dispensing chemist.

R. E. Macdonald

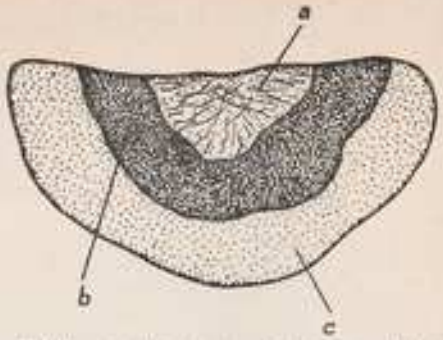

Fig. 5. Microscopical preparation of the pituitary gland of a female Acanthophthalmus kuhli after treatment of the fish with urine of pregnant woman. (a), Posterior lobe (small); (b), lobus intermedius; (c), anterior lobe (both b and c relatively large)

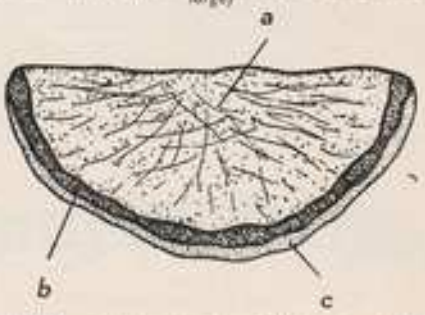

Fig. 6. Microscopical preparation of the pituitary gland of a female Acanthophthalmus kuhli without treatment. (a), Posterior lobe (large); (b), lobus intermedius; (c), anterior lobe (b and c both relatively small)

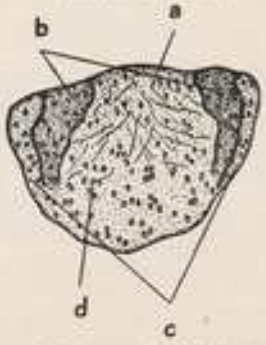

Fig. 7. Microscopical preparation of the pituitary gland of a sterile male Acanthophthalmus kuhli with inflammation. (a), Posterior lobe; (b), lobus intermedius; (c), anterior lobe; (d), inflammatory cells. The limitation of the lobes has been lost in some parts

AUTOMATIC FEEDER for Young Fish

by G. W. BAKER

HOW many times have you wished that you were at home all day so as to give your young fish regular feeds? There is no doubt that feeding little and often is the main ingredient for the growth of bigger fish, but many of us are away from home for most of the day, and in consequence are unable to achieve this aim. I am now going to try to assist you with this little problem by describing my automatic dry feeder, which will feed your young fish five times per day for 14 days without further attention. The cost of this feeder is about 16 shillings, which makes it a worthwhile investment.

Driving Unit

The driving unit is a Venner hand-wound clock, price 7s. 6d. secondhand, which is attached to a piece of plywood 6 in. by 6 in. The dial on the clock is not required so it is removed, leaving a shaft with a keyway, together with a flat-sided collar and grub screw. You attach to this shaft a 36-toothed cog wheel, having first removed the brass boss and grub screw. When you remove this boss you will find that the hole in the centre also has a keyway which fits nicely on to the shaft by means of the collar and knurled nut which originally held the dial to the time switch. Virtually all you are doing is replacing the dial with a cog wheel. This unit is then assembled on the plywood with the three fixing screws that originally held the insulating panel, on which were mounted the electrical contacts.

This driving unit is now connected to another 36-toothed cog which is placed at an angle, so as to make your motor at the top left hand of your piece of plywood, and the second cog at the bottom right hand. This assembly is then connected together by a 72-link chain. To this chain attach ten 0.22 bullet cases (as found in the local fairground), soldering five cases every six links, and leaving a gap of 12 links before soldering the other five cases at similar intervals. As the motor revolves only once in 24 hours, it will therefore take 2 days before your chain has done a full cycle. This means that the chain travels at a speed of 1½ links per hour, and with the bullet cases at every six links your fish will be fed every 4 hours. The space of 12 links indicates the night hours and your fish will not be fed between the hours of, say, 11 p.m. and 7 a.m. the following morning. The actual feeding times will depend on what position the chain is at when you commence, so that it must be set correctly before you commence feeding.

The Casing

Having made the moving part of the equipment all that remains is to make the casing to hold the assembly, and also hold the hopper which will contain the reserve of food. The open-fronted box is 6½ in. wide by 6½ in. high by 3¾ in. deep, with a groove 1 in. from the front to enable you to slide the plywood holding the motor into the box. It is no good making this a permanent fixture as it may be necessary to inspect the clock some time in the future, and if you are unable to remove the panel you cannot carry out any maintenance of the clock. Having made sure that the panel slides into the box, take it out and cut a square hole 1½ in. by 1½ in. in the bottom right-hand corner, and then build on to the case at the back of the motor panel a funnel-shaped hopper, which will hold the dry food and feed it out through the hole you have just cut and thus replenish the food to the feeder as and when required. This operates on the same principle as the water containers used for canaries and chickens.

Food Guide

The last thing that you have to do before your feeder is complete is to cut a hole about ½ in. square in the bottom left hand of the case and glue a small piece of plywood, at

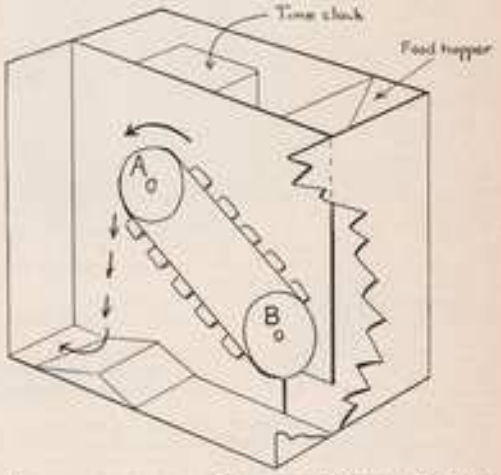

Diagram of construction of the automatic feeder. Part of the casing is removed and part cut away to show the interior. Arrows indicate direction of rotation of cog wheels A and B and the path taken by the food during delivery from the containers on the chain (shown as a line connecting the cog wheels)

an angle of 45 degrees, from the right side of this hole in an upward direction. This piece of plywood is responsible for catching the food as it falls from the bullet case at the apex of the chain and directing it out through the hole into your tank.

As this piece of equipment will feed small dried food to your fish five times a day at 4 hour intervals, for a period of 14 days, you can even go away on your fortnight's annual holiday knowing full well that the feeder will operate without any attention until your return.

The cogwheels and chain are Meccano and are similar to those used in the feeder described in the September 1961 issue of *The Aquarist*.

Fish Bowl Breeding

by J. R. TINGLE

MOST of my fish-keeping and breeding has been with coldwater fishes of all types, and for successful breeding plenty of tank space was required. However, the breeding of tropical fishes in any quantity also required plenty of tank space, and I found it quite a problem to have enough aquaria for both.

Eventually I found it was quite possible and easy to breed most egg-layers—danios, barbs, tetras and fighters in two tanks and one or two fish bowls. I use one 24 in. by 12 in. by 12 in. community tank, planted with the usual species, to accommodate the pairs of various egg-layers and livebearers, and one rearing tank (6 ft. by 22 in. by 10 in., previously used for shubunkins). This rearing tank is immediately over a 8 ft. electric tubular heater in the greenhouse, thermostatically controlled at 60°F (15°C), and for safety's sake I also have a 100 watt heater and thermostat in the tank, which is well planted with *Vallisneria*, *Myriophyllum* and *Cryptocoryne*.

Of course, a 24 in. by 12 in. by 12 in. tank could be used as a rearing tank and one thermostat with two 100 watt heaters used to control both tanks. Temperature of the water is kept just below 80°F (26°C).

The fish bowl I use is the larger size, 8 in. diameter. This is submerged in the stock tank (the rearing tank can be used but I have found better results from the stock tank, as the breeding pair seem to settle more quickly by seeing other fishes through the glass).

The bowl is supported by wire (galvanised iron) twisted round the neck of the bowl and hooked over the tank edges at one corner.

In breeding zebra fish or other danios well-washed gravel or pebbles are placed, about an inch deep, on the bottom of the bowl and a sprig of *Myriophyllum*, *Nitella* or willow-root is included.

I fill the bowl with tap water and leave the bowl inside the tank overnight to allow the temperatures to equilibrate and to allow any chlorine to disperse from the water.

I put the pairs of fish into the bowls in early morning and by evening I find the fish have accepted their small quarters. With zebras I have then found the female chasing the male round and round the bowl, but by the following morning things have generally changed and the male is busy chasing the female. I allow this driving to carry on for about 2 hours (sometimes I have had to leave them all day, but still with success), and then I put a small stick into the bowl and stir the water. As the eggs are not adhesive many will then be seen floating, and some, of course, will be devoured in the process. Immediately the eggs are seen I remove the parents to the stock tank and empty the bowl into the rearing tank, gravel, plants and all, and I set up the bowl again for the next pair.

With barbs, tetras etc. the same setting-up procedure applies for the bowl, but after spawning eggs will be seen adhering to plants. Some pairs take longer to settle down in the small container, but will do so within a day or so (a few live *Daphnia* added to the bowl help). You will find by this method of breeding three or four spawnings from one pair can be had very quickly.

Fighters do very well by this method, but only a little floating plant is needed in their bowl. The female is put into the bowl at night and by the next morning the male will be doing quite a dance round the outside of the fish bowl. I leave things for the day and put him into the bowl that night; sometimes he has started at once to blow his bubble-nest and embracing usually takes place the next morning. It is wise to remove the female fighter immediately after spawning, otherwise you may find a dead female if she is left too long.

I usually leave the male until the eggs hatch and then put him back in the community tank and empty the nest of bubbles gently into the corner of the rearing tank. Some youngsters will get displaced during the process, but you will find the young still assembled in the corner after the bubbles have disappeared.

This method of breeding applies to all the smaller kinds of egg-layers. I once tried it with a pair of penguin fish, but after trying to get the parents into the fish bowl three or four times I gave up; as fast as I got one fish into the bowl, it jumped out as I introduced the other!

I gave up with neon fish after keeping them in the bowl for about a week, and I emptied the contents of the bowl into the rearing tank, without any hopes of seeing any young neons. However, weeks later about six small neons were spotted in the rearing tank. Unfortunately these simply disappeared as the days went by.

Infusoria is required for the rearing tank. My best cultures are obtained from clover: freshly gathered clover (specially the flower heads), is scalded and left to cool, and within about 3 or 4 days the best and largest *Paramoecium* is produced.

A little ordinary flour sprinkled on the surface of the tank is a good food for young small fry and really helps young livebearers to grow quickly.

Of course, the usual live foods, micro worms, white worms, *Daphnia* etc. help, plus small portions of dry foods.

Dried Daphnia

WATER fleas (*Daphnia*) are excellent as a food for fishes and can be either collected in their natural habitat or bought at the dealer's shop. During the winter months, however, they become somewhat scarce unless cultures have been prepared in advance. It therefore pays dividends to dry *Daphnia* during the summer months and store them for use in the winter, when the fishes will benefit greatly from the stimulus to the digestive organs that the hard bulk of the fleas will afford.

Drying *Daphnia* is a simple matter and can be done by the novice without too much bother. By far the best method is drying in the sun. This is effected by washing them and sprinkling the live creatures on a tray made of gauze stretched over a wooden or metal framework, so that each water flea is able to receive air. They are then exposed to the rays of the sun until they are dead and completely dry. *Daphnia*, processed by aeration and the sun's rays, are richest in food value.

The alternative method is to dry the *Daphnia* in an oven, when great care should be exercised to avoid burning them. If they are burnt they will be completely useless as a food. All dried *Daphnia* should be kept in air-tight jars or cartons and stored in a cool, dry place.

R. E. Macdonald

The Lyre-tail Mollie

by BARRY R. JAMES

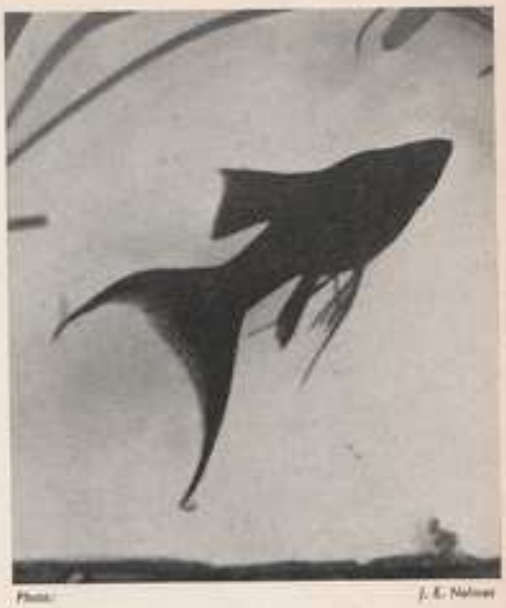

Photo: *J. E. Nelmes*

DURING the last year many aquarists must have been surprised to be confronted with what appears to be a new species of *Mollienisia*. The fish is labelled as the lyre-tailed, or in some cases the spike-tailed, mollie. On enquiry the potential purchaser will invariably be told that the fish has come from Singapore or Hong Kong, and on the evidence available it would seem that the latter country is its most likely origin.

The lyre-tail mollie is not a distinct species, but a sport of the common melanistic mollie (*M. velifera* or *sphenops*). Of streamlined body shape, this exciting livebearer has the most unusually shaped complement of fins I have ever seen in an aquarium fish. The dorsal, pectoral, ventral and anal fins are all elongated, as the photograph and diagrams show. However, it is the caudal or tail fin that immediately attracts the interest. The two corners are drawn out and curved over in the shape of a lyre, from which the fish gets its name. Lately I have come across several specimens which have rather stunted tails and it seems that these may be either throwbacks, or backcrosses with the ordinary mollie.

My own females have just produced, the average first brood being around 15 youngsters, which resemble their parents in every detail, although it is too early to tell if they will all develop the perfect finnage of the adults.

Needless to say, they will inter-breed freely with either the green or black mollies and must therefore be kept strictly segregated if they are to breed true.

Pectoral fin outlines of A, lyre-tail mollie and B, other mollies

Gonopodium outline of A, male lyre-tail mollie and B, other mollie males

Above: dorsal fin outlines of A, lyre-tail mollie, B, Mollienisia sphenops and C, M. velifera. Right: anal fin outlines of A, lyre-tail mollie and B, other mollies

Caudal fin outlines of A, lyre-tail mollie and B, other mollies

Ventral fin outlines of A, normal mollie and B, lyre-tail mollie

A Small Cichlid with Few Bad Habits

Aequidens curviceps

by Dr. R. O. B. LIST

Habitat: Amazon.
Family: Cichlid.
Size: Male 2½ in. (7 cm.) average.
Female 2 in. (5 cm.) average.
Temperature: For keeping and breeding 75° to 68°F (23° to 25°C).

THIS fish is an extremely pleasant little fellow and is rated as a good aquarium fish, with very few bad habits. Its name *curviceps* is derived from the shape of the head. Its colours show up best in direct sunlight, which shows a green azure in the main, with iridescent sheens.

To sex this fish is comparatively simple. In the male, the dorsal and anal fins are pointed and the dorsal has a red spot at the tip. Dorsals should also reach beyond the commencement of the caudal fin. The female does not have any points to her dorsal and anal fins, and the fins are much rounder.

They will eat all forms of live and dry foods and are not at all particular as to variety. They are, however, heavy feeders, and require more food than usual, especially when they are young.

For breeding a pair should be put together in an aquarium well planted with *Sagittaria* and *Vallisneria*. An essential is a number of large stones, very flat if possible. The pair will then choose a stone and commence to clean and polish it. Water hardness should be 13°DH. The pH reading should be 6.5 to 6.8 to be ideal.

There is no obvious courtship as with some fishes, and it will be found that eggs are usually laid in quiet times. It has been suggested to me that a facing sheet of cardboard should be placed in front of the tank, and this should have small eyeholes cut into it for observations. I have tried this method, but can see neither a useful advantage nor disadvantage. The eggs, which usually number 100 to 120, are laid approximately 6 days after the chosen stone has been well and truly cleaned. Now we come to the first and I believe the last bad habit of these fish. They usually eat their first spawning completely. In fact, I have never found that there is any exception to this rule of behaviour. This may also happen on the second spawning, but thereafter it is always plain sailing.

Exemplary Behaviour

One of the chief characteristics of this species is the enormous care they take of their brood after they have hatched out. There are very few fishes which are as exemplary in their behaviour as these.

It should also be noted that eggs are more often than not laid on the cleaner stone, but cases have been known where an Amazon sword plant has been chosen in preference to the stone. Even a heater tube has also come in useful, but these seem to be comparatively rare exceptions.

Before the spawning it will have been noted that the fish seem to take on a darker colour. Hatching will usually commence 48 to 55 hours after spawning, and the pair will take regular turns in fanning the eggs.

When hatching does commence, it will be seen that the fish now become most industrious. The male will be seen to take each fish into its mouth, and transfer them to a hollow in the compost which has been previously prepared. The female will then stand watch over the eggs, and I have always found that one can never distract her attention until the last egg has hatched out. The fry will often be transferred from one depression in the compost to another and this usually takes place up to 7 days after hatching.

After the seventh day, the fry will be seen to be free-swimming in a shoal together with the parents. For first feeding I prefer to use yolk of a hard-boiled egg, followed by small live foods.

A further curiosity of this species is that even while swimming around with their fry, they will again spawn and then take it in turns to deal with the newly hatched fry and the newly laid eggs. If they spawn a second time, they usually prefer to use the same stone or plant leaf as previously used.

These fish could not be in any way regarded as aggressive, and being small for a cichlid, and most colourful, they can be regarded as one of the ideal fishes for both the spectator and the breeder.

Colours

For a general review of colours, the following notes will enable you to seek out the choicest specimens:

Male.	Back:	brown to olive green.
	Sides:	silver grey, also yellow grey and sometimes darkish blue.
	Abdomen:	silver to light gold.
	Iris:	gold with blood red.
	Dorsal fin:	blue green with gold shimmer. Top curve a greyish white with a red spot.
	Ventral fin:	blue green.
	Pectoral fin:	green.
Female.	As in the male but rather matt.	
	Caudal fin:	inclined more to grey than in the male.

Aequidens curviceps is also a cichlid that takes no interest whatsoever in tearing out the plants in its aquarium. This may be of some interest to the breeder, as it will be seen that they can safely be left in an aquarium in which the breeder keeps some of his choicest plants.

I have also noted, which has been confirmed by other breeders, that the fish are usually 4 to 5 months old before they are ready to commence breeding. A certain sign is the appearance of the breeding tubes or ovipositors in the female. These are actually used when spawning for ejecting the eggs into the desired area, and although I have never been able to witness it, it would appear from other observers that after the female has placed the eggs, fertilisation by the male is performed by a process of spraying.

These fish also appear to be very prone to disturbances when mating, but as I have not wished to create unnecessary shocks in the mating period, I could not say with accuracy what might happen if the pair were so disturbed.

An attempt at breeding these fish will, I think, give the breeder just that little extra pleasure over that obtainable with some of our more well-known species.

STANDARDS for Shubunkins

by JOHNSON H. HOOD

SINCE the appearance in *The Aquarist* of articles in which I suggested there were certain subdivisions in the metallic and nacreous groups of goldfish, based upon the absence or presence of the red/orange factor, together with the rate or manner of the development of the red/orange factor, I have had many queries from fellow aquarists seeking further information.

I would be pleased to clarify the points raised by correspondents in a future article but I feel the most pressing need is to deal with the many questions raised on show standards. It is plain from the questions asked that a great number of shubunkin enthusiasts do not fully understand the difference between nacreous and matt fish. Nor do they truly understand what the present show standard(s) are demanding in the fish benched for judging.

At this point I feel I ought to state my position. I am not a member of the Goldfish Society of Great Britain, but I think the society has rendered signal service to the goldfish enthusiasts by coining the terms metallic, nacreous and matt to describe the three broad types of goldfish. These names I am quite prepared to use and acknowledge their source. However, this does not necessarily mean I agree with every idea expounded by the Goldfish Society. I am not a member of the Bristol A.S. and therefore am not antagonistic if someone makes a suggestion about the Bristol shubunkin, although I sympathise with their annoyance when a new standard is set up and called 'Bristol' shubunkin without their previously being consulted (or when they have it rammed down their throats that the 'Bristol' shubunkin is not biologically possible!).

Metaphorically and geographically speaking I am far removed from the opposing centres of opinion and desire only to give the amateur breeder a clearer understanding of what is facing him if he intends to try his luck on the show bench.

When I refer to show standards I refer to the Bristol standard introduced by the Bristol A.S. and the later Federation standard which also claimed to be the 'Bristol' shubunkin. The Goldfish Society operate their own standard but at least they do not call it a Bristol shubunkin but give a blanket name of single tail, to cover metallic, nacreous and matt fishes, each with an appropriate scale of points.

When the first Bristol standard was drawn up it was very doubtful whether any fish approaching the standard demanded existed. Also the difference between nacreous and matt types was very imperfectly understood, and the term 'calico' was applied to cover both types of fish. The term 'calico' implies a non-shiny surface. This is very important, because the original conception of the shubunkin was a fish with a non-shiny surface and 'soft' gill covers. In other words a fish that to-day would be classified as a matt fish. The sole deviation from the calico or matt conception was the fact that 'ringed' eyes were also demanded. No matt fish can have 'ringed' eyes, only black eyes, because matt fish lack reflecting tissue even in the eyes.

The present standards are still based upon the original 'calico' conception and fit neither nacreous nor matt fish. They do not fit nacreous fish because they have reflecting tissue. They do not fit matt fish because these cannot have ringed eyes.

Photo: W. J. Hewer

What exactly is the difference between matt and nacreous fish? A matt fish has no reflecting tissue. There is an almost complete absence of guanin crystals at all levels of the skin and body tissue, including the eyes and gill covers. At face value it would seem that matt fish are the type to breed because they appear to fulfil almost all the show standard requirements. The trouble is that at least 99 per cent of matt fish in existence are predominantly a pink flesh colour. It is possible to breed a well-coloured matt fish, but unfortunately specimens that display attractive coloration at 3-6 months old are very anaemic looking at 1½-2 years old. The colour, especially black (or blue), just fades away. I have no desire to deter breeders from trying to establish a highly coloured strain of matts; indeed, I would be delighted if someone succeeded, because, in time, societies and official bodies would have to recognise such a fish and create a show standard just as the Goldfish Society has done.

A nacreous fish is an entirely different type of fish. It can be slightly, partially or wholly endowed with reflective tissue lying below the normal scales, imparting a distinctive mother of pearl effect. Unfortunately fish with much reflective tissue are prone to have areas with double reflective tissue, giving some of the scales a metallic appearance. Also, there is a strong tendency to have reflective areas on the side of the head and especially on the gill covers.

There is little doubt that the finest coloured shubunkins that have appeared on the show bench were nacreous fish. Small wonder that the vast majority of breeders concentrate on the nacreous type of fish and simply hope that one day they will breed an outstanding specimen with soft gill covers and no metallic scales, but with much nacreous reflective tissue to give stability to a brilliant and lasting array of colours. After 30 years of trying I have reached the sad conclusion that any fish with large areas of nacreous tissue is certain to have, at the very best, small metallic areas, and at the worst, large metallic areas.

The breeder is therefore faced with the problem of breeding well-coloured nacreous fish and being heavily down pointed (or even passed over completely) for visible scales and/or reflective gill covers, or breeding matts which are almost certain to fade very quickly. He is truly between the devil and the deep blue (or should it be pale pink?) sea.

Recently some breeders have been concentrating on nacreous fish in which the nacreous tissue has been reduced to a minimum. Some success has been achieved but

unfortunately all brilliance of colouration is being lost.

Can we truly say that having one show standard for two types of fish is stimulating the production of brilliantly coloured fish? In my opinion the fishes seen to-day are not as good for colour as they were 10-14 years ago.

When word went round the judging fraternity that metallic scales were taboo, the hobby began to career about like a ship without a rudder, and breeders were left wallowing in a trough of bewilderment and despondency. No wonder! It was demanded of them that they breed nacreous fish with matt characteristics.

The late Dr. R. J. Affleck once wrote: "Nacreous—most regions of trunk and tail having a nacreous appearance. Regions with metallic shine to be small". It is plain he recognised that nacreous fish are almost certain to have some metallic areas but that the aim should be to keep it as small as possible. I entirely agree with this sensible opinion. I would never condone fish disfigured by large numbers of metallic scales but I think that the pendulum has swung too far and the time has come for a more realistic approach to the problem.

I am sure I am speaking for a large percentage of hobbyist breeders when I say let us have more understanding, more active co-operation, more open discussion, and more realistic show standards. Or better still, one agreed show standard for the whole of Britain. I expect after reading this article many of you are itching to take up a pen to agree or disagree with sentiments expressed. Do so by all means. The hobby will be much more healthy and vigorous after a verbal pruning.

A Judge's Thoughts on Judging Fish

THERE has always been argument about the results of competition in any field of human endeavour, and I suppose that there always will be. Even in races, with a tape to break, or a photograph finish, there are objections, so that in a field of competition that relies on the memory, colour sense, keenness of observation and individual interpretation of rules of one or two judges to place first, second and third, there will inevitably be dissent, or even bewilderment at the result.

This series of articles will not change that situation, nor will all I have to say find general agreement, but I believe sincerely that, as in our courts of law, "not only must justice be done, but justice must also be seen to be done"; and articles and "letters to the press" are ways in which understanding of judging methods and a better standard of judging will come about.

When I first suggested that our Society should train a judge, I was told that judges were members of some sort of Secret Society who were jealous of their privileges, admitting newcomers only after years of study and passing a gruelling initiation ceremony. It took me more than a year to find out that this is all "poppy cock", but there are probably many aquarists who still think it true. The truth is (within the Federation of Northern Aquarium Societies) that you only have to convince your own Society, and you are "in", provided that your Society is in the F.N.A.S. and will sponsor you.

Every aquarist who exhibits fishes should make himself, or herself, familiar with such general rules of showing that there are, with what constitutes a good specimen of the kind of fish intended to enter and the "standard method" of judging. The F.N.A.S. deals fully with the last-named in its Bulletin no. 5 (obtainable from Mr. Geo. W. Cooke, Spring Grove, Field Hill, Batley, Yorks.; price 3s. plus postage).

When a judge arrives at the venue of the show, he knows that he will be confronted with a wide variety of fishes, some of which he is not very familiar with, for the very good reason that very few of a species may arrive in the country, no book gives more than a superficial description of it, with perhaps a monochrome picture, or, probably, only a drawing. The few lucky owners are the only people who really know anything about them, and as their knowledge is confined to only one or two specimens, nobody knows what a perfect specimen looks like.

He also knows that he will have to judge one fish having only a little colour at best, against one which has up to ten colours, and some species for which standards are laid down against those which have not; varieties which never move, but just lie on the bottom, all fins closed, against those which are so convulsed with movement that he cannot assess size, body, shape or fin, nor see whether or not they are damaged. He knows, too, that he may mistake an immature, poorly coloured fish for a good specimen of a less colourful variety.

And he knows that whatever pains he goes to to ensure as fair an assessment as possible, a losing exhibitor will make his opinion known, either by facial expression or a just-loud-enough-to-hear remark. He knows that almost certainly a bright, colourful fish, swimming well, a really good winner, is just waiting until he has given it 'First' and passed on to the next class, to fold its fins and lose all its colour. If it is not that which happens, it will be the reverse: a poor-looking thing huddled in a corner will suddenly blossom into brilliance. And the judge's name will be mud.

So what sort of person should a judge be? Ideally he or she would have first-hand knowledge of every kind of fish known to science, and some that are not. He would know to what size each one should grow, the exact body shape and proportions, all the pattern and colour varieties, what the breeding colours are like, the exact fin shape and size of every species, and how to spot any kind of disease in its incipient stage.

For the Breeders' Class, he would know just how big an ootry ought to be at the age given. For Pairs Classes he should be able to distinguish between male and females, even in cases where the scientist has to X-ray or dissect to ascertain sex, and also know if the female really is of the same species as the male.

For the Furnished Aquarium Class he must also know all the plants, and have really good artistic appreciation, as well as a knowledge of what kinds of rock work or gravel might prove harmful to fishes or vegetation.

On top of all this he must have no favourites, be scrupulously fair and not be influenced by the fact that some of the specimens are recognisable as fish he sees twice a week in his best friend's tank.

He must be prepared to give up his Sunday lunch to catch an early bus, and travel 40 or 50 miles to officiate at a table show in a noisy hall, with competitors breathing down his neck in an effort to get a preview of the results.

If you know of such a person, please do your best to persuade him (or her) to become a judge. In the meantime, we will have to "scrub along" with the handful of mere mortals who, with all their faults and shortcomings, are keen fish hobbyists doing their best. In my next article(s) I will deal with the five sections of pointing—size, body, shape, colour, finnage and condition and deportment—separately and in detail.

Francis Barratt

Colourful Aquarium Sharks

The Genus *Labeo*

by AQUARIUS

THE genus *Labeo* contains several species but few kinds have been available to aquarists in this country. Three kinds are fairly well known: the black shark (*Labeo chrysophekadion*), the red-tailed black shark (*Labeo bicolor*) and the green shark (*Labeo erythrurus*). The generic name means "fringed lips", and the fishes all have the typical fringe-like barbels near the mouth. Two pairs are carried usually and one pair is used by the black shark almost as a tongue when feeding. Some of the species have one pair of barbels and others are said to have none. The term black shark has no doubt been used because of its likeness to a shark of the sea. Most sea-going folk have only seen the triangular black dorsal fin of sharks in the open sea, and so associate the triangular dorsal fin of *Labeo chrysophekadion*, with the proper sharks. However, the body form is also similar to that of the shark, but the head and mouth are different.

According to some aquarists the tropical sharks can be aggressive, not only to other species of fishes but also to members of the same species. However, the black shark has a good name as a community fish in general. This fish grows rather large for an aquarium fish, and under these conditions it reaches about 10 inches in length. It has two pairs of barbels, one just under the nose and the other pair at the sides of the mouth. The dorsal is large and triangular in shape and is usually carried erect. The colour is a sooty-black when the fish is young. As it grows the caudal fin or tail loses the black hue and becomes almost bronze. The fish is long-lived, as is the case with several of the tropical fishes which reach a large size when adult. It appears to be easy to keep in good health. Rather soft water appears to suit this fish best and a temperature of about 72-80°F (22-26°C) should be maintained. The fish is omnivorous and scavenges well over the lower growing water plants. Boiled spinach is liked by fishes of this genus.

Little seems to be known about the breeding habits of the black shark but it is said that the eggs are laid in caves or on stones and that the male watches them.

Most of these fishes are natural to the rivers of Thailand, but have also been reported from Sumatra, Java and Borneo. As these fishes are used to heavily planted waters it will be found advantageous to keep them in a rather subdued light or else provide enough plant life in the tank to provide plenty of shade from over-head lighting.

The red-tailed black shark (*L. bicolor*) is shaped rather like the fish described above but the tail is a fiery red. Sometimes young fish will have white tips to the dorsal fin. This fish is otherwise sooty-black. It does not grow as large as the black shark, reaching about 6 inches in length under tank conditions. This species comes from Thailand and inhabits flowing rivers. According to some aquarists this species is rather aggressive and even small fish have been known to fight with others of the same species, apparently as a means of defending their own particular territory. This species has two pairs of barbels and feeds on foods similar to those eaten by the black shark.

The green shark (*L. erythrurus*) is a smaller species and reaches about 5 inches in length. The body, although elongated, is almost round. The colour of this fish is a greenish brown, with a lighter stripe running along the body. The front pair of barbels are black and the fins are red. This fish occurs in the Mekong river of Thailand. It requires the same conditions as described for the other species mentioned. There have been reports of this species having been bred in captivity and it is said that the male defends the eggs and guards them against all comers.

It would be interesting to hear from aquarists who have bred any of the genus *Labeo* in the British Isles. Attempts to do so should prove a very satisfying task for the keen aquarist who wishes to further our knowledge of aquarium species.

Collection of Pure Water from the Soil

A SIMPLE apparatus that uses solar energy to collect drinking water from the soil has been developed by the Nippon Electric Company (Japan) for use in areas inaccessible to regular water pipelines. A series of low, specially-processed plastic "greenhouses" trap the heat of the sun, to distil water from the soil through evaporation. The moisture is collected in a system of pipes and stored in a reservoir vessel.

Official laboratory tests show that water is immediately drinkable and can be used as distilled water for pharmaceutical purposes or for batteries. One experiment simulating conditions of radioactive rainfall showed that the water collected by the water collector was completely safe to drink.

The apparatus is known as Necaquarius. Under normal conditions it collects up to 1 litre of water daily per square meter of soil. Additional amounts of water can be obtained by adding more Necaquarius units.

What is in effect distilled water collects in the pipes from these "greenhouses" when the sun's heat causes evaporation from the soil

The One-spined Stickleback

by JAMES McM. URE

(Secretary general, British Ichthyological Society)

LAST year, while on holiday beside Lough Rea in the Republic of Ireland, I came across a most interesting variation of the ten-spined stickleback, *Pygosteus pungitius* (R.). The circumstances and nature of this find deserve comment and description.

Ireland is well-known for the number of variations of sticklebacks that can be found there, and therefore I was inclined to take the finding of this one further example in the light of yet another mutation. I was, however, interested in the numbers in which they were found. Out of a batch of 25 sticklebacks caught, no fewer than 15 had only one dorsal spine. This would appear to suggest that either the deformity was predominant in this area, or that the one-spined stickleback is in fact a different species. Of course, before it could be determined to be such, it would be necessary to carry out further and more exhaustive investigations, and I intend to go to Ireland again in 1963 with the intention of carrying them out.

A brief look at the facts already available will, however, enable us to draw some reasonably sound observations. The following are the numbers of different varieties found in a batch of 70 fishes:

Pygosteus pungitius(?):	
One spine:	27 fish.
Two spines:	4 fish.
Three, four and five spines:	nil.
Six spines:	2 fish.
Seven spines:	6 fish.
Eight spines:	8 fish.
Nine spines:	8 fish.
Ten spines:	3 fish.
Eleven spines:	1 fish.
Gasterosteus aculeatus:	10 fish (no deformities or variations observed).
Phoxinus phoxinus:	1 fish.

The above figures show that the sticklebacks can be divided into two distinct groups: those with more than five spines and those with two or less. The unaccountable gap in the middle seems to add weight to the possibility of there being two distinct species, but it is also possible that different relationships from those shown above exist in other parts of the lake. I did examine fish at other points (these were gathered at St. Johns, a property about half way down the lake), but did not take accurate figures, and can only state that the percentages of the catch were approximately the same as those shown above.

In no cases did I find fish minus one or more fins, and it is also of interest to note that there were very few variations in the numbers of fin rays in the one-spined variety. Another point worthy of note is that the above figures show that variations of the ten-spined stickleback, even excluding the one-spined fish, greatly outnumber the "normal" fish.

I brought some specimens of the one-spined and ten-spined varieties home, with the intention of observing them, and if possible, breeding them. This project met with little success as I found that by the spring I had only three female one-spined fish left alive. I therefore could not ascertain which type of nest this variety makes, but I noted that the ten-spined male showed no interest in the one-spined females, though he had built his nest and showed every intention of wishing to breed. When, the next day, the females were removed, and a ten-spined female was added, he immediately showed interest and spawning occurred the next day. As I had only the single male ten-spined stickleback available, this occurrence cannot be taken to be conclusive, and once again we must wait until more exhaustive tests are carried out.

Another rather interesting fact about this variety was brought to my notice by Mr. Eric E. Boon, of the British Ichthyological Society. He states that in the *Book of Kells*, there is an illustration of the one-spined stickleback. Such illustrations were invariably very accurate, and the fact that the fish was there at all tends to show that it must be numerous over a wide area, or the Monks would not have known about it. This fact is also made apparent by noting the rather large area of countryside between Kells, and St. Johns, on Lough Rea, where I encountered the fish.

If any persons have found the one-spined variety, I I would be very interested to hear from them. I would also be very grateful to any aquarist who can give me reasonably accurate figures on the numbers of variations and/or deformities found among the fry of normal ten-spined parents.

Is the Stickleback Polygamous?

I WAS very interested in the article by Mr. L. E. Perkins on the breeding behaviour of the three-spined stickleback, which appeared in your October issue, and it was for some such article to appear that I have been waiting, for like the author I have been keeping and breeding these fish for a number of years, but my experience is a little different from that described in the article.

When about 5 years ago I found five sticklebacks in with some *Daphnia* I had caught, three males and two females, I dropped them in my 48 in. by 18 in. by 18 in. goldfish tank. They soon settled down and two of the males built themselves a nest each and banished the other male to a distant corner. Each male appeared to pay court to one of the two females, and should at any time the female of the other male stray into the other male's territory she was promptly driven away, whilst his own female was allowed to remain, at a distance, and watch the nest-building procedure.

During the last 2 years I have always arranged to keep the same numbers of each sex, six in all, and each summer each male secured a female for himself and made all the others keep their distance. At no time did they in any way harm the three large goldfish in with them, apart from a peck if one came too near their nests.

The question now arises, which is their natural breeding behaviour? In the wild the sexes would be more or less equal, in numbers, judging by my boyhood experiences when catching them with a margarine basket tied to a long rope. I have read articles about them before describing breeding behaviour similar to that described by Mr. Perkins.

W. G. PHILLIPS,
Harrow, Middlesex.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

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

I have a long hairy type of weed in my garden pond which seems to be covering the plants. Is it harmful and how can I get rid of it?

The plant is blanket weed. It can choke other plants, especially the more delicate ones. As it is just another plant anything put into the pond to kill it would also kill the good plants as well. It does not often thrive when there are plenty of other healthy plants growing in the pond. To enable these to get going well you should remove as much of the blanket weed as possible. Twist a broken stick into it and you will find that masses can be pulled out. Persevere with this treatment and you will soon find that you can clear the pond and so enable the other plants to become established, when they in turn can choke out the troublesome weed.

In my 24 in. tank there are thousands of very tiny creatures crawling about on the glass and surface of the water. I have one 4 inch sunfish in the tank. What are they and how can I get rid of them?

The creatures are planarians, a kind of flat worm. They can be encouraged by overfeeding with dried foods and as the only occupant of the tank is a sunfish, which generally will eat only live foods, it is possible that you have given dried food and so encouraged the planarians to increase. If no food was given to the sunfish it is possible that it will eat some of the planarians. If not you will have to remove the fish to another tank and add a tablespoonful of household ammonia for each 5 gallons of water. Leave for a day, wash out and refill. Repeat after a week if any more planarians are seen.

I have a small orchid house in which I have installed an aquarium, 3 ft. 0 in. by 12 in. by 12 in. I put in 2 inches of gravel and some fishes; four goldfish, four shubunkins and four small golden orfe. There is a good planting of oxygenating plants. After 6 weeks of running the water now smells badly. What has gone wrong?

I suspect that you have been feeding too much and that what the fishes have not eaten has decayed and turned the water foul. Also, from these fishes there would be quite an amount of droppings to assist in the pollution of the water. The tank has not been set up long enough for it to become self-supporting when feeding is done rather heavily. If the water plants were well established they would be able to assist in keeping the water pure by breaking up and utilising the waste matter from the fishes. You had best change most of the water and do not feed again for a few days. The fishes will come to no harm during this time. Then when feeding is recommenced go sparingly with it.

I have a veiltail goldfish and would like to know if it needs any special food.

As the veiltail is a variety of the common goldfish it will eat all the foods usually given to that fish. Some aquarists are of the opinion that as this fish has a short round body it should have a mainly starchy food. I do not think that the food is likely to make much difference to the actual shape of the fish. See that a varied diet is given, of both live and dried foods.

If I introduce some comets, shubunkins and nymphs into my pond shall I be able to breed from them? I already have some common goldfish, which came through the winter safely. Will nymphs be hardy in the pond?

The nymphs could stand the winter in your district but the tail is always a little delicate and may be attacked by fungus. You must realise that all the fish you mention are varieties of the common goldfish and so could all interbreed. This could give you many cross-bred youngsters, which would soon take a firm hold in your pond and in time only a lot of throw-outs would be bred. If you desire to breed any variety of goldfish it is essential that only the one kind is kept in the pond.

I wish to grow water sprite in a greenhouse but do not want to use aquaria if I can help it. I can use underground cable heaters and keep a humid atmosphere.

The water sprite, *Ceratopteris thalictroides*, can be grown in mud and water as long as there is sufficient depth for root run. This plant does not like cold conditions in the winter but should thrive under your conditions. Many of the water plants used in tanks are actually bog plants and will grow quite well with their stems and leaves out of the water. *Ludwigia* is a plant that will thrive under the conditions you describe.

Where can I obtain grooved holders for sliding glass down when one wishes to divide a tank?

I do not know of any firm supplying the type of grooved material you require. I find the following method quite satisfactory: see that the glass is of the correct width and about half an inch shorter than the depth of the tank. The glass slide can be pushed into the mulm at the bottom and then two small pieces of india rubber can be pushed between the top of the glass and the top frame.

My tank has a large quantity of water plant life but it is covered with green algae, which I cannot seem to get rid of. Is there any chemical that would destroy the algae without harming the plants and fish?

Towards the end of the winter many tanks with a good growth of water plant life will have plenty of green filamentous algae. I get some in my own tanks. My method of getting rid of it is to introduce plenty of tadpoles. If you can get toad tadpoles so much the better, as these will not be eaten as will the frog tadpoles until they are too large for the fishes to eat. Once a fair number of tadpoles are in the tank they will feed all day long on the algae and clean the plants up as if by magic. During this time do not feed the fishes on any dried food but use plenty of live food, which they can eat up before the tadpoles can get it. You will be surprised what wonderful scavengers tadpoles can be. The only difficulty is catching them once their legs develop. Once their front legs appear the froglets will stop feeding on algae and must soon leave the water. A piece of wood floating on the top gives them a safe place to crawl on to. Chemicals would kill all the water plants.

What size tank do I have to use to set up for a show? Also for a shubunkin or a pair of shubunkins what are the regulation sizes, and for coldwater fish would I have to have plants?

Coldwater fishes are shown singly and it is usual for the tanks to be supplied by the show authorities. The minimum body length for exhibition shubunkins is 3 inches (this is exclusive of the tail). Water plants are not usually placed in coldwater tanks for individual fishes although I have officiated at some shows where a few plants are placed in the tanks after they have been judged to improve the look of the tanks. If you wish to enter for a furnished tank competition you will find that tanks are provided, being either 24 in. by 15 in. by 12 in. or 24 in. by 12 in. by 12 in. Some societies provide gravel but it is better to take your own to match your rockwork.

I have an outdoor pond which has raised sides constructed with breeze blocks concreted over. During the winter ice formed and when it thawed there were a number of cracks in the concrete all round the pond. Can you suggest a way to repair the damage without re-concreting the whole pond?

It will not be easy to repair the cracks. It is always difficult to get new cement to join up with old. You must remove all loose concrete and rake out all cracks. Make a compost of 1 part of clean, fine sharp sand and 1 part of Prompt cement. Do not make the mixture too wet, and force it into the cracks. There is no need to overlap at the sides. This cement sets rock hard in half an hour even under water once the original set has taken place. It is therefore possible to lower the level of the water in the pond and fill up again soon after the repair has been made. The little free lime will do no harm to the fish.

I have a pond in the hospital grounds about 11 feet in diameter. I would like to stock it with plants and fish. Could you please tell me how to do this and how to maintain the pond in good order?

There is far too much to write about all the information you require to include it in a letter. However, *Coldwater Fishkeeping*, price 2s. 10d. post free from *The Aquarist*, will give you all the information you need. This book was written specially for aquarists starting with a pond and also for those wishing to breed and rear fishes as well. All your queries are answered in this book.

I have just come into possession of a galvanised tank, 5 ft. long and 2 ft. 3 in. wide, with a depth of 1 ft. I wish to sink it in the ground for a pond. Would you please advise me as to whether it should be painted inside and what to stock it with?

The tank can be painted inside with one of the bitumastic paints. You must realise that this will not be very large for an outdoor pond and so you should not try to over-stock it either with plants or fishes. You will not need any soil at the bottom; the few plants necessary can be set in small containers to facilitate easy cleaning of the tank. Try four small goldfish and see if they thrive. During the winter the tank will need special watching as it can freeze almost solid in a heavy frost and the fish may be killed by the expansion caused by forming ice. A small heater could be installed or the fish should be taken inside for the winter.

I have been offered a large aluminium tank and wonder if it will be safe for keeping fishes in a conservatory. It was originally intended for storage of water for drinking purposes.

The tank should be safe for fishes but you can make sure in the following way. Fill it with water and leave for a week, then empty it and wash round well. Fill it again and put in some water plants and after a day or two put in some freshwater snails and, if possible, some *Daphnia* (water fleas). If these creatures live then fishes will do so. Snails are very soon in serious trouble if there is anything poisonous in the water.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

I bought a medium-sized pair of firemouth cichlids the other day, and since being placed by themselves in a 24 in. by 12 in. by 12 in. tank they have developed a most pitiable attack of nerves. They bang themselves against the glass sides at my approach, or when the room light is switched on, and huddle at the bottom at the back of the tank too scared to swim to the front for food. What can I do to make these extraordinarily nervous fish happy?

The kindest thing to do is to provide them with hiding places behind large stones. These should be positioned in the shadiest part of the aquarium. Do not tap on the glass sides in an endeavour to make them move, or prod them into action with a dip-tube or planting stick. Live food such as tiny red earthworms, tiny gentles or tiny woodlice will help to restore their confidence. All food should be flicked towards the back of the aquarium. Once these fish get used to the vibrations and shadows associated with feeding time, it will not be long before they get over their fears. Another point, cichlids taken from acid water and introduced into alkaline water often become scared or sulky. As soon as the water is made acid they usually recover their appetite and sociability.

I would appreciate some information on the fish called *Bedotia geayi*.

This species is native to Madagascar. It is a member of the family Atherinidae and is found in mountain streams as well as in more sluggish waters in the plains. It is easy to feed on live or dried food and has a temperature range extending from the sixties to the eighties °F; (16-26°C). But in a temperature above the middle seventies it soon becomes uncomfortable unless the water is well oxygenated. In this respect it resembles the White Cloud Mountain minnow, a fish that also inhabits coolish mountain streams. *B. geayi* also likes a bright toplight and an abundance of plant life. In mature fish the sexes may be distinguished by the slimmer body of the male and its richer and greater spread of colour in the fins.

One of my barbs had what looked like a blood blister just below a gill-opening; so I took the fish from the water and, with the aid of tweezers, pulled what I took to be some sort of louse from its skin. Are such pests common in tropical aquaria?

Fish lice seldom turn up in the tropical aquarium, but are often found on captured river fishes or domesticated fishes kept in a garden pond. They can, however, be introduced into cold or tropical tanks on plants collected from the wild. It is not recommended to pull a fish louse straight from the body of a fish without first touching it with a spot of paraffin or turpentine. The oil makes the parasite loosen its grip on the fish so that its removal is complete.

My community tank is stocked with guppies, bloodfins, harlequins, neons and bronze catfish. Given proper and adequate food and attention, will any of these species attain an age of 3 years? A friend has told me that it is most unusual for small fishes such as these to live for more than 2 or 3 years.

Size does not play such an important part in determining a fish's longevity as some people would have us believe. For instance, most of the *Corydoras* catfish, a number of the smaller tetras, including the lovely little neon and the attractive pristella, will live for upward of 5 years. The constant stimulation provided by excessive overhead lighting and a high temperature all the year round does a lot towards shortening a fish's life.

How can I prevent rust eating away the top angles of my aquarium frame?

There are several methods of rust prevention. One is to empty the tank, remove the rust with a wire brush or old knife, and then treat the cleaned surface with one of the rust preventives you can buy at any well stocked paint shop. Yet another way is to obtain some plastic strip and bend it over and under the entire top edge. It can be kept in position with blobs of sealing compound. You can achieve a similar result by slitting rubber tubing along the middle and pushing it into place to cushion the glass cover and prevent water collecting along the top edge of the metal frame.

News from AQUARISTS' SOCIETIES

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

THE president of the **Derby Regent A.S.** (Mr. H. P. Finch) presented three of the four Cups won by members during the 1962 Table Show season, and himself received the Guppy Cup from the chairman (Mr. P. Hasler), at the Society's Christmas Party. The Thompson Cup for most points scored during the season went to Mr. M. Sail; the Cup for the Best Fish in the Society to Mr. M. Davies; and the Novice Cup, for the member gaining most points, but failing to win a card, to Mr. P. Harris. Outstanding in a lively evening were the cartoon and comedy films shown by members of the Derby 854 Cinema Club. Mr. D. Fall was M.C. for the party and there were many gifts for the numerous children present.

During the table show season 36 members exhibited some 300 fish, compared with 139 exhibited by 22 members in 1961. These figures do not include inter-club shows.

The Society's outstanding event in 1963 is the Open Table Show at the Railway Institute, Derby, on Sunday, 21st April.

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THE **Prestwich and Bury A.S.** has acquired a room at the Church House, The Wylde, Bury, and meetings will be held there on the second Tuesday of each month. At the last meeting there was an encouraging turn-up, no fewer than eight new members being enrolled. Included were three juniors which it is hoped will be the nucleus of a flourishing junior section.

The meeting took the form of a general discussion on fish-keeping hot, with the membership now nearly doubled it is hoped that an interesting programme of lectures, etc., can now be arranged for future meetings. The table show was for A.V. Livebearers and was won by Mr. Jennings with a guppy. Second was also Mr. Jennings (Platy) and third, Mr. Wardle (Guppy).

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AT the annual general meeting of the **Bristol Tropical Fish Club**, the following officers were elected: Chairman, Mr. L. Nightingale; vice-chairman, Miss O. M. Iles; hon. secretary, Mr. L. Littleton; hon. treasurer, Mr. E. Jones; reporting secretary, Mr. W. Holland. An increase of membership and a profit on the year's working were reported by the secretary and treasurer respectively for 1962, and a comprehensive programme of talks, film and table shows, etc., is being arranged for the forthcoming 12 months. Meetings of this club are held every third Thursday in each month at the Old Duke Hotel, King Street, Bristol, and all enquiries will be welcomed by the Hon. Secretary, Mr. L. Littleton, 8, Little Stoke Road, Stoke Bishop, Bristol, 9.

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THE results of the monthly table show of the **Leith A.S.** were as follow: Egglayers: 1, H. Foster (Silver Shark); 2, D. Paterson (Bloodfin); 3, G. W. Wilson (B.A. Tetra). Livebearers: 1, D. McNeil (Red Swordtail); 2, J. Paterson (Blue Platy); 3, H. Foster (Green Mollie). Guppies: 1, A. Halliday (Male Tritail); 2, A. Halliday (Male Wedgetail); 3, C. Barr (Female Veiltail). Juniors: 1, 2 and 3, J. Miles.

A visit to Lanarkshire A.S. for the inter-club show resulted in Mrs. I. Paterson securing a third with a Blue Platy and a fourth with a Corydoras Aeneus.

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THE results of the **Leeds A.S.** open table show were as follow: Livebearer: 1, Mr. B. Baxter (Tadcaster); 2, Mr. Pemberton (Tadcaster); 3, Mr. Dyson (Wakefield). Barbs: 1, Mr. Atherton (Bedford); 2, Mr. Hodgett (Accrington); 3, Mr. Whitelock (Tadcaster). Characins: 1, Mr. J. Smith (Leeds); 2, Mr. Hodgett (Accrington); 3, Mr. Lewis (Burnley). Carp and Minnows: 1, Mr. Greenall (Tadcaster); 2, Mr. Jackson (Don Valley); 3, Mr. Reynolds (Leeds). Fighters: 1, Mr. Hodgett (Accrington); 2, Mr. Baxter (Tadcaster); 3, Mr. Whitelock (Tadcaster). Anabantids: 1, Mr. Reynolds (Leeds); 2, Mr. Grainger (Don Valley); 3, Mr. Greenall (Tadcaster). Cichlids: 1, Mr. Hirst (Leeds); 2, Mr. Proctor (Burnley); 3, Mr. Tyrrell (Burnley). Catfish and Loach: 1, Mr. Hirst (Leeds); 2, Mr. Lewis (Burnley); 3, Mr. Lees (Leeds). Coldwater: 1 and 3, Mr. Booth (Bradford); 2, Mr. Boothroyd. Egglayers: A.O.V.: 1 and 2, Mr. Hodgett (Accrington); 3, Mr. Hirst (Leeds). Egglayers Breeders: 1, Mr. Dyson (Wakefield); 2, Mr. Jackson (Don Valley); 3, Mr. Holland (Celtic). Furnished Aquarium: 1, Mr. R. Moss (Leeds); 2, Mr. P. Reynolds (Leeds); 3, P.C.B.S. (Skipton Society). Junior Coldwater: 1, Miss J. Moss (Leeds); 2, G. Higginson (Leeds); 3, D. Wyndman (Leeds).

The Society held their monthly meeting recently. A lively evening was had when two teams had a light-hearted quiz game with questions from the members. On the table were two classes for fadging. Coldwater: 1, Mr. Boothroyd; 2, Mr. B. Moss; 3, Mr. P. Haywood. Barbonis: 1 and 2, Mrs. P. Haywood; 3, Mr. J. Smith.

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THE **Don Valley A.S.** recently held their annual general meeting and the members elected to the committee were: Chairman, Mr. Gray; secretary, Mr. D. Cross; show secretary, Mr. P. Jackson; Mr. R. Gliddon, Mr. C. Holmes, Mr. K. Gray. Mr. Hart and Mr. Ball were elected to serve as assistants to the show secretary.

The winner of the Home Aquatic Competition was Mr. H. Grainger with 63 points. Second was Mr. D. Ball with 62 points. A plaque has been presented to Mr. Grainger.

The Society, which now meets in a room at the Doncaster Y.W.C.A. on the first Wednesday of every month, welcomes new members, who should contact the Secretary, Mr. D. Cross, 65, West Lane, Sharlston, Nr. Wakefield.

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CHANGE OF NAME

SOME time ago it was decided to wind up the Lancaster, Morecambe and District A.S. for various reasons. The publicity that this caused appears to have raised a new interest in an aquarist society, and at a recent meeting enough support was found to form a new society which will be called the **Layne Aquarists.** Fortnightly meetings will be held during the winter months and monthly meetings in the summer. Most of the interested persons are comparative newcomers to the hobby and it is hoped that a flourishing society will result. The secretary is Mr. T. H. Marckel, 15, Fairhope Avenue, Vale, Lancaster.

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NEWS from the **Dundee Aquarium Society** gives the results of the table shows for Bulgay Trophy (Breeders Livebearers) and Balgillo Trophy (Breeders Egglayers). The results were as follow: Bulgay Trophy: 1, A. Robertson; 2, W. S. Russell; 3, S. Mackenzie; 4, A. Hastie. Balgillo Trophy: 1, P. N. Greening; 2, A. Robertson. There was also an illustrated talk on "Whaling in Southern Georgia" by Mr. John Alexander. The table show as the last meeting was for Characins, but results of this have not yet been received.

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THE programme of the **Bradford and District A.S.** recently included a table show night with Skipton, Attercough, Leeds and Dewsbury. This was won by Bradford by a small margin. The society table show was won by Mr. G. Holmes, Mr. P. Bentley being second, and Mr. P. Rushworth third. This win in the Breeders Class by Mr. Holmes gave him a really outstanding win in the table show competition for 1962. His total of 40 points is far the highest that has been gained for a number of years. The second place which had been hotly contested by Mr. P. Bentley and Mr. P. Moorhouse finished in a tie both scoring 27 points. Then followed Mr. Rushworth (21 points), Mr. R. Norris (16 points) and Mr. C. R. Wilson (12 points). During 1962 the society has made a lot of progress, but the most welcome feature has been the large number of new faces that have appeared, and it is hoped they will stay and continue to take an active and interested part in the society.

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AT the last meeting of the **Merseyside A.S.** the first open table show has been fixed for the 12th May at the club premises. The following dates have also been decided for the Club of the Month Competition: 17th January, S. Barbs; 14th February, L. Characins; 14th March, L. Cichlids; 11th April, A.O.V.; 9th May, L. Barbs; 6th June, Livebearers; 4th July, Catfish; 1st August, S. Characins; 29th August, S. Cichlids; 26th September, Knockouts.

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THE charity efforts of the **North Warwickshire A.S.** is deserving of special mention. This society has now raised over £200 in aid of Birmingham charities. The latest effort was toys, etc., for Christmas children patients in the Birmingham Accident Hospital. The winners of the last table show were: Mr. Bennett first in Livebearers and Barbs, also Best Fish in the Show. Mr. Badger, 1st A.O.V., and 1st A.O. Anabantid. Mr. Swindling was first in the Cichlid class.

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RECENTLY the **Brighton and Southern A.S.** staged a one day show in conjunction with the local Cage Bird Society. The competition was won by Mr. C. Dowding. The society has enjoyed an average attendance of about 40 members since the season began and has furnished a varied programme. In the annual breeding competition Mr. John Kail won the first prize for both egglayers and livebearers. On the 23rd January the society will receive a return visit from Mr. A. Villiers. The Secretary is Mr. Peter D. Hartland-Swann, Kingston Bay House, Kingston Bay Road, Shoreham-by-Sea, Sussex, and the society meet in the Central Schools opposite the Brighton Corn Exchange at 8 p.m.

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NEWS has reached us of a society in Hull. They have been established for some months and the full name is the **Hull Aquarist Society.** The secretary is Mr. E. Storey, 7, Ada's Terrace, St. Paul Street, Hull, and new members will be welcomed.

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AT the annual meeting of **Hounslow and District A.S.,** officers elected were: Chairman, Mr. R. Barber; secretary, Mr. D. Woodward (snr.); treasurer, Mr. R. Luff; show secretary, Mr. H. Pratt; press secretary, Mr. B. Bonfi; librarian, Mr. M. Patrick; public relations officer, Mr. R. Willis.

The secretary reported a good year. Table shows had been a star feature and well supported. The highest points winners were: 1, Mr. D. Woodward (148); 2, Mr. R. Luff (87); 3, Mr. H. Pratt (86); 4, Mr. R. Willis (68). Master Woods (52) was highest junior member.

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