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FISHERKEEPER or aquarist? If urged to decide upon a title for himself it is likely that the man with an interest in aquaria would not distinguish between these two names. In fact, most people would probably be content to describe an aquarium as a container for live fishes, although neither the word aquarium nor the word aquarist should be closely identified with fishes at all. It has been suggested that the rather narrow interpretation of the terms and association of them with fishes only instead of with all forms of aquatic life is unfortunate, because it might cause the other interests within the hobby to be overlooked.

Certainly it is the exception rather than the rule these days to find an “aquarist’s” society devoting time at meetings to any aspect of aquarium-keeping other than fishkeeping. This emphasis is a relatively recent phase in the development in the hobby, and the introduction of tropical fishes can be given as the main cause of the change. A glance at some of the early books for aquarists will confirm that, in the first two decades of this century and before, their readers were being told how to keep and observe invertebrate freshwater animals as diverse as crayfish, water scorpions and mussels, and in prominent sections on marine life, enthusiastic accounts were given of species from the sea shore for the home aquarium.

Although the number of mature fishkeepers likely to want to extend their activities in these ways is probably small we do believe that societies in particular should be conscious of the true breadth of the hobby, because they may be in a position to influence the young aquarist. In schools we would like to see augmentation of the usual one or two aquaria housing fishes with containers displaying specimens of local pond life, captured by the children themselves where possible. The child who develops an interest in matters aquatic should be given a chance to experiment widely, for he will surely be a better fishkeeper for the experience.
Breeding the Spraying Characin

by R. E. MACDONALD

I have always felt that breeding is the most absorbing aspect of tropical fishkeeping. Without a doubt, maintaining an aquarium is interesting enough, but the eccentric manner in which some species reproduce invariably encourages the ordinary aquarist to further his hobby by setting up a breeding tank. Once an aquarist’s interest begins to develop along these lines, his desire for the unusual will increase proportionately.

One such unusual breeding habit that I happened to witness took place in a friend’s breeding tank that contained a pair of spraying characins (Cop petina arnoldii), of the family Characidae.

We had decided previously that we would make an attempt at breeding this particular characin and had set the stage by half-filling a 24 in. by 12 in. by 12 in. breeding tank with seasoned water. The water in the tank was kept at a steady 75°F throughout the entire breeding period and the pH value of 6.8, slightly acid, was maintained, by frequent testing with a pH test set.

Knowing what to expect we had placed in the tank a piece of slate that had one end embedded in the sand and was supported below the surface of the water by a rock that held the slate, half out of the water, at an angle of 30-45 degrees, as shown in the diagram. Also in the tank we placed a few floating plants, namely Riccia and floating fern, and planted bunches of Fontinalis in the sand.

After the tank had been allowed to stand for a further week, we selected the healthiest-looking pair of fish and introduced them to the tank. It is no trouble to separate the sexes of Cop petina arnoldii as they differ from each other in many ways. The male is much larger than the female and has a more pointed dorsal fin. The female carries a red spot on her dorsal fin and is always recognizable by the characteristic fullness when ripe that indicates the female sex. In addition, if the female is observed with a strong light behind her, the dark yellow eggs in the ovary can be seen through the abdominal wall.

The male spraying characins were then well conditioned on a diet of Daphnia, white worms, chopped earthworm, raw beef and fish and before long the female began to bulge with spawn. It soon became apparent that the larger the female became with eggs, the more attention the male paid to her, and it was not long before the male was darting through the water in search of a suitable spot on which the pair could spawn.

Inevitably, the male fish soon began to examine the slate and after a thorough inspection, he drove the female to within an inch or so of it. Then quite suddenly they leapt from the water, locked their fins and appeared to cling together on the slate. At first we wondered how they managed to keep attached to the slate but after much observation we became apparent that by pressing their fins to the surface of the slate they were able to produce a form of suction, rather like that when rubber suckers are attached to glass or tiles.

While they were clinging in this manner on their selected spawning site, about 10 eggs were deposited by the female and fertilized by the male. The eggs appeared to adhere effectively and could not be easily dislodged from the slate. Whether the eggs were forced from the female by the sudden leap as she leapt on to the slate, or whether they were forced from her by pressure on her body from the male, it is hard to say. It was obvious, however, that the fin-clamping procedure of the spawning fish facilitated a complete fertilization of the extruded ova. This was proved from the resultant number of fry.

In all, it took 52 minutes for the fish to produce somewhere in the region of 90 eggs by this method of spawning.

The male and the female worked incessantly, never stopping for a moment, until the final eggs were laid. Then, completely exhausted, the pair wriggled from the slate for the last time and sank to the bottom of the tank, where they rested from their labours. The rest was not complete for the male, because every 15 minutes or so afterwards, he made a fast dash for the spawning site and by vigorously thrashing his tail fin about, succeeded in splashing water over the next circle of eggs on the slate. In this manner he continuously kept the eggs moist for the next 5 days.

At the end of this period I received a phone call to say that the eggs were hatching, and on arrival I saw that this was indeed the case. As they hatched out, the fry were wriggling into the water from the slate and were making their way to the bottom of the tank, where they were hiding in the vegetation.

When the last egg had hatched and the male no longer occupied himself by splashing water over the spawning site, the parents began to show their hereditary cannibalistic tendencies by hunting out and devouring the young fry for which they had previously worked so hard to produce. It is still a mystery why fishes should react in such a way—building and then destroying. Perhaps this action is entirely because fishes lack a power of reason. Without a reasoning power the desire and need for live food, particularly after the energy used when producing young, obviously...
becomes stronger than the maternal instinct and mental will-power that fishes are capable of exercising. In some cases they can be distracted from their efforts by constant feeding with live foods, particularly after the eggs have hatched, but their desire to consume their own offspring is obviously great. Needless to say that once this pair of spraying characin was seen to display these tendencies they were removed from the tank without delay. Little was seen of the fry for the next 7 days, during which time they were fed with plenty of Infusoria, but on the seventh morning we were greeted with the sight of about 60 fry swimming in a school, obviously looking for food. The fry were then fed on sifted live Daphnia, freshly hatched brine shrimp and dried foods and lived without mishap to be distributed amongst our closest friends.

The spraying characin is a peaceful species, growing eventually to about 3 inches, and is therefore the most desirable as an addition to the community tank.

**OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES**

The thermostat controlling the temperature of my aquarium is set at 75 F, yet sometimes in the morning the thermostat gives a reading of about 80 F. For the rest of the day the temperature ranges between 75 and 80 F. Do you think the thermostat is faulty?

If your aquarium gets early morning sunlight that will account for the rise in the temperature. You will probably find that the current is “off” when the thermoreactor shows a reading of 80 F. The sun streamlining through the window warms the back of the aquarium and is responsible for the temporary rise in the temperature. It is surprising what a difference even an hour of winter sunlight will make to the temperature of an aquarium, let alone the stronger sunlight of spring or summer.

I am a beginner in tropical fishkeeping, and my aquarium is stocked with plecos, guppies and plats. The plecos remain on the bottom of the tank, but when the top light is switched on at night the male chases the female in and out of the light for hours! What do I do to stop this treatment?

The strong light at night stimulates the mating instinct in the male and causes him to court and pursue the female. So long as the tank is well planted to provide temporary hiding or resting places for the female, she will not suffer any harm.

I should like to use a piece of cork to enhance the appearance of my aquarium. Is it safe to place cork in the aquarium?

If you leave your piece of cork to soak in water for several days it should prove quite satisfactory.

Some of my tropical fishes do not seem to be enjoying the best of health. I feed them on dried and live food and keep the aquarium scrupulously clean. The temperature is maintained at 75 F, and the fish are covered with the top light is kept bright with regular polishing to boost the light supplied by a 25-watt bulb. Can you give me any ideas why my fishes appear to be off colour?

Drops of water falling off the hood into the aquarium may be the cause. But if the cover is made of glass in contact with water (condensation) is not ideal for fish. We advise you to give the hood at least two coats of white enameled paint, and then soak it in a bath of water for a few days before returning it to the aquarium.

I have a small zinc-bottomed and -framed aquarium in which I have kept some guppies for several weeks. Lately the guppies have been swimming about with closed fins and hollow bellies. What is wrong with them?

Fishes do not do well in a zinc-bottomed aquarium. But you can make such an aquarium suitable for fishkeeping by covering the floor with a sheet of glass bedded round the edges and middle on aquarium cement. Then paint the undersides and top of the frame with two coats of binzum cement. Give the aquarium a good soaking in several changes of water before putting it into use.

I tried to make a young but sexually mature male Siamese fighting fish with a larger female, but though the male built a bubble nest the female turned out vicious that I had to remove him from the aquarium. Is it possible that the female so dislikes this male that spawning them is out of the question?

It is always advisable to pair up two fishes of about the same size. For the time being, keep the fish separated and try them again when the male has increased in size. A generous diet of live food will help to bring him into good condition.

I should like to breed mollies, and would appreciate your advice on the size of the tank, depth of water, food, temperature and so forth to achieve the best results.

Mollies like plenty of swimming space in water about 7 to 9 inches deep. A 24 in. by 12 in. by 12 in. aquarium would make a good breeding tank for a couple. Mollies prefer slightly saline conditions. A level teaspoonful of evaporated sea salt to every gallon of water should not inhibit the growth of the plant life. The temperature should be maintained at about 72 to 75 F. Mollies are fond of eating greenstuff, and mealy algae should be permitted to grow on the back and sides of their tank. Chopped lettuce, boiled spinach and dandelion are good substitutes for algae. Any dried or live food will be taken with relish. Their aquarium should be lighted with strong electric light, or placed in a sunny window.

I am considering buying some pomegranate fish, but as these fish are rather expensive I should like some information about their habits and care. Would they settle down in a 24 in. by 18 in. by 15 in. tank housing some clown loach and angel fish?

The pomegranate fish (Symphysodon discus) likes acid water and is not pugnacious. It will eat dried food and live food and should settle down nicely with clown loach and angel fish. The pomegranate fish has a temperature range of about 70 to 85 F, and is not difficult to keep in good health.

Every few weeks I have been adding a little salt to my aquarium, and though the guppies, neon tetras and goldfish seem to be enjoying it, they are not as healthy as last fortnight. Do you think the salt has killed them?

A small amount of salt added to an aquarium will not harm carnivores, but adding salt at frequent intervals has proved too much for them. Catfish do not like saline conditions. Guppies, neon tetras and goldies can withstand an appreciable amount of salt in the water without suffering any harm. However, once some salt has been added to an aquarium, it is not a good policy to introduce any more.

What is the best depth of compost for growing plants in the aquarium?

It all depends on the sort of plants you intend to cultivate in your tank. Plants such as Vallisneria, Indian fern and...
**COLDWATER FISH-KEEPING QUERIES** answered by A. BOARDER

It is very dry should answer your purpose well. A second coat can be added once the first has dried.

My young son cracked the front glass of my tank and I have had to replace it. Since then I have been unable to keep the surface of the water clear of a coloured film. What can I do to remove this?

The film is the result of oil seeping from your glazing compound. Most of these contain either linseed oil or similar. You have probably left too much compound exposed inside the tank. Provided that the glass was cut to the correct size there need not be much of the compound in contact with the water. You can get rid of the film by drawing a sheet of paper quickly along the surface of the water from end to end. It should soon disappear.

I have recently bought a moose which although it ate greedily seems to suffer in jerks. It is floating on its side and has had its own fin bitten by, I believe, a catfish. Will the fish heal again?

Many moors swim in jerks, especially the voileta type. Their tails are so long and their bodies so short that normal swimming movements are impossible. You cannot stop the catfish from nipittng its fins except by removing it to another tank. Once you have removed the cause of the trouble the damaged fins will soon heal and grow again, especially in the warm weather. The fins may show a thickened line where the damage ended but otherwise the fin will grow all right once the cause has been removed.

I have a pond that has unfortunately developed a crack. I am under the impression that I read lately of a method of mending a crack without emptying the pond. How is this done?

The position of the crack will decide whether it is possible to repair your pond without emptying it. If it is not right at the bottom it is possible to make a good repair without actually emptying the water out. If the crack is exposed when the water is lowered it should be cleaned out well and all loose material removed. Then force in a mixture of one part of Prompt Cement and one part of fine, clean, sharp sand made "puddy" with a little water. See that the mixture is pushed well in and do not allow a lot of it to overlap the edges of the crack on the old concrete. This cement sets hard in half an hour, and then the pond can be refilled. The small amount of free time which may come from such a repair will not do any harm to the fishes.

Naturally it would be difficult to make such a repair under water, but I have done such a repair to a large galvanised tank. Some rather dry mixture was placed in a polythene sheet and thrust down into the tank over the hole. It was held there for a few minutes with the polythene on the water side to prevent as far as possible the water from washing away the cement. The trick has worked, as the tank still holds water. Whether you would be able to do such a repair to your pond depends on the extent and depth of the crack.

Last autumn I made a garden pond and filled it with water. I changed it before the winter and it went rather green. How...
ever, during the winter it has cleared nicely. I am now wondering if I should empty it again or can I start to put in my plants and let them do the work?

It should be quite safe to plant your pond now without emptying the water out. If you do it is almost certain that the tiny green plants will be washed away. Do not put in your fishes until the plants have grown up and have helped to get the water in a good condition.

I have recently fitted a waterfall to my pond and now some of my fishes are dying. Why is this?

If the trouble has only started since you started the waterfall, it is possible that there may be something poisonous about the fittings. Any copper or brass can be very dangerous and if such metal was used it will be well to know it, but it is said by some people who know better that a pond will attract mosquitoes, which will breed there and be a nuisance.

Although it must be admitted that many kinds of insects will visit a pond for the purpose of laying their eggs it is a fact that so long as there is only one goldfish in the pond the resultant larvae will never reach maturity, as they will be eaten long before that time. Provided then that a few fish are kept in the pond, there need be no fear that any annoying mosquitoes or midges will be bred there.

**The Garden Pond in July—by ASTILBES**

At this time of the year pond keepers have an opportunity of enjoying the interest of his pond and may be able to sit in a deck chair and contemplate the many living forms in the water. There are few gardens which could not be improved by the addition of a pond, but it is said by some people who know better that a pond will attract mosquitoes, which will breed there and be a nuisance.

Taming Pond Fish

In addition to the attraction of the pond in the garden with its water lilies and other flowering plants, there will be the added attraction of watching the fish swimming around and perhaps breeding. Many people tame their fish so that visitors can be entertained by them. This may be a good idea but it must be realised that the more tame the fish are the more chance is there of cats being able to catch them. Normal fish will soon become tame as long as a few points are borne in mind. In the first place the fish will come near the owner when they are hungry. If they have plenty of food they are not likely to be bold enough to come close to the side but hunger drives them to take risks which they would not normally take.

When the fish are really hungry a little food can be thrown into the pond whilst the owner stands very still at the side. Gradually the small particles of food can be thrown closer and closer and as long as no quick movements are made the fish will swim closer and closer. All movements near the pond must be made very quietly and sharp movements must never be made. A few days of training will soon encourage the fish to come in quite close to be fed. Continuous training is necessary for several days running and food should be given other than that which is placed near to the owner and always in the same place. Small pieces of dry brown bread will float on the surface for a long time and will prove a very good food for encouraging the fish to become tame.

**Spawning Time**

In many ponds goldfish will breed with no assistance from the pond keeper and yet in others the fish will never make the slightest attempt to breed. The conditions which encourage the fish to spawn are fairly well known but as soon as the spawn actually starts the fish off in the breeding chase is not properly understood. Sometimes the fish will commence to spawn at the beginning of a warm spell whereas at other times a slight shower of rain may be the signal. The goldfish may lay full of eggs and appear to be in prime condition but yet there may be no sign of any attempt to spawn. Some pondkeepers never know that their fish have spawned, but if they have watched during early mornings it would be almost impossible not to notice that something extraordinary is happening once spawning starts. The fish rush around like mad things and the male fish continually mudge and push around the females, urging them into the thickest water weeds so that the eggs may be laid.

Often several males will drive one female and these attentions may give one the idea that the female fish will be killed by the constant nudging. However, little harm will come to them and in due course the eggs will be laid. They are fertilised in the water by the milt from the male as they are laid and they adhere to the water plants, as they have a peculiar sticky substance which enables them to stick to the plants although under water. The eggs may be seen as small single beads of jelly each about the size of an average pinhead. If the plants are lifted out of the water for a moment the eggs will show up more clearly and take on a slightly amber hue.

When several goldfish are spawning in the shallows of a pond the noise can be as much as if a dozen badgers were digging in the water. The time of spawning is usually in the morning and it does seem that when the sun can reach the pond about this time the fish are encouraged to make a start. Sometimes it is as late as July before the fish will breed in.
Strange Habits and Floral Mechanisms of Familiar Aquarium Plants

by C. D. SCULTHORPE (Photographs by the author)

Species of Vallisneria, Hydrocharis, Elodea and Stratiotes are well-known aquarium plants; that they all belong to one family is surprising for they are markedly dissimilar in appearance and show many detailed differences in vegetative structure. When their floral arrangement and strange pollination mechanisms are studied their botanical similarities become apparent, and their interest for the aquarist, in whose tanks and pools all of them will thrive and flower, is obvious. This family, the Hydrocharitaceae, is notable in that all its 13 genera, comprising some 65 species in tropical and temperate regions of the world, are aquatic, the majority inhabiting fresh water. Of the five genera occurring in the British Isles, three are submerged, one is partially submerged and one is floating.

The only species of Hydrocharis, from which genus the family name is derived, is H. merremianus L., the frog-bit, a locally common, floating plant well known to aquarists. The yellowish green leaves are sometimes bronzed, and from the node where each rosette is produced hangs a bunch of long, simple, white roots with conspicuously long, dense root-hairs. The roots became entangled not only with each other, but with the long-stemmed, and in midsummer a pool may be covered with a matted network of plants. A new rosette of leaves arises from a bud at each node of an advancing stolon; in autumn, or earlier if adverse conditions prevail, these stolons form terminal tuftts, each of which is dark green and clasped by two, tight, scale leaves. A split develops and the tuft falls to the substratum, where, its centre of gravity being in the basal, stalked end, it always remains upright. A minimum degree of illumination, particularly at the yellow and red end of the spectrum, is necessary to induce germination. The bud scales open, the rapidly growing leaves develop air-filled spaces, and the young plant floats to the surface.

Lemna minor L., sometimes known as Trisema neglecta Kant., is an American frog-bit from the Mississippi valley, differing from Hydrocharis only in its cordate,
thick, fleshy leaves and its preference for warmer water.

One of the most fascinating physiological features of plants with floating leaves is the adjustment of their petiole length to water depth. *Hydrocharis morsus-ranae* plants grown in water 11 inch deep and then held beneath 12 inches of water produce floating leaves with petioles at first 1 inch long, and after the change about 12 inches long. Similarly water lilies progressively lowered in the water of a pool produce successively longer petioles. Now there are really two ways of examining this feature. Firstly, one may search for some positive agent which, so to speak, pushes the petiole up to its predetermined place at the surface; if one believes, as I do, that all plants will continue to grow unless they are arrested, one will look for the factors which effect a gradual cessation of growth as the petiole nears the surface. It is certain that in *Hydrocharis morsus-ranae* the regulation of growth does not result from changes in light intensity, since accommodation of the petioles occurs in complete darkness.

The regulation is not due to the surface film constituting a physical barrier; if it were, we should expect all floating leaves to lie just below the surface film, not upon it. Nor is it due to the lowering of the pressure of the water above the leaf. Some years ago a research worker discovered that if tubes of oxygen-free air were inverted over individual leaves of *H. morsus-ranae*, *Ranunculus scleratus* and a species of *Marilula* just before they reached the surface, the leaves continued to grow, into the air. He therefore concluded that the presence of oxygen in the atmosphere checks the growth of petioles at the surface, though the actual path of inhibition was not discovered.

It was thought for a long time that the aerial male and female flowers of the frog-bit appeared on different plants. Later observation revealed that they are borne on the same plant, but at different nodes, separated by stolons which had presumably been broken by those making the early records. Two or three male flowers occur within a spathe, each having 12 stamens, of which only the inner ones are fertile; each solitary female flower has a six-celled ovary. The flowers are about 1 inch in diameter and have three, obovate white petals with a yellow mark at the base. Only intense illumination induces flowers to appear. Many...
years ago, a set of plants was exposed to 9 hours of sunlight daily from spring onwards and an equal number was exposed for 3 hours daily from the same date. From 1st July to 31st August the first set bore over a thousand flowers whereas the second set bore none. Plants from the second set put out bright sun at the end of June bore flowers within 4 weeks. The water temperatures of both experimental sets were equalized throughout. It is doubtful if fruits ever mature in this country, though elsewhere they are fleshy, gelatinous and dispersed by water fowl.

Stratiotes aloides L., the water soldier, closely resembles Hydrocharis in the arrangement and structure of the flowers, though male and female plants are quite distinct, and only the female occurs in Britain. The petals are larger and more rounded; the fruit is never produced in this country. Since male plants are absent the continued survival of the species depends on vegetative reproduction by offsets formed in autumn. These offsets are bright green and grow into new plants in the following spring. Stratiotes inhabits more calcareous water than Hydrocharis and may thrive in a pool, but will not multiply throughout the summer with the same vigour as Hydrocharis, unless conditions are ideal. The rigid, bristle leaves may grow to 20 inches in length, and are armed with surface spines and saw-toothed edges. Bright bronze-green when young, they become dark brown with age. The very long, unbranched roots grow fast, at the rate of about 3 inches in 24 hours, but are short-lived. The unbalanced posture of the plant after any of these roots have been destroyed hints at their function in maintaining equilibrium.

The renowned rising and sinking of S. aloides have intrigued botanists for over a century. The first recorded claim that the plant rose and sank twice each year; this has not been verified, and all subsequent observers agree that it rises in the spring, flowers and in late summer sinks to the bottom and produces offsets. Water where it grows contains much dissolved calcium bicarbonate. Absorbed by the plant it dissociates into carbon dioxide and calcium carbonate; the carbon dioxide is retained in the leaves while the calcium carbonate is secreted in weak solution on to the leaf surface, where evaporation leaves it as a crystalline deposit. Accumulation of this throughout the summer, and waterlogging of the decaying leaves, increase the specific gravity of the plant and it slowly sinks. In spring, rapid growth of young, succulent leaves decreases the proportion of calcium carbonate-encrusted leaves and hence the specific gravity of the plant which therefore rises once more to the surface.

Stratiotes aloides and Hydrocharis morsus-ranae are pool plants of unusual appearance and habits; for the fulfillment of their life-cycle they need sunlight, and do not thrive for long in indoor, coldwater aquaria.

The submerged genera of the Hydrocharitaceae have foliage of two main types: long, ascending stems with whorled, alternate or opposite leaves, e.g. Elodea and Hydrilla, or crown-like stems from which arise radical, ribbon-shaped leaves, e.g. Vallisneria and Ottelia.

Of the genus Elodea, native to the Americas, E. canadensis Michx., the Canadian pondweed, has been naturalised throughout the British Isles. All species of Elodea have inconspicuous, unisexual flowers, male and female on different plants, borne solitarily in tubular spathes in the leaf axils. The female floral tube elongates, pushing the flower to the surface, where it opens and exposes its three receptive stigmas. The male flowers of E. canadensis break away and float to the surface; those of E. Wims-Michx. and E. californica L. are carried up on thread-like stalks. At the surface they all burst open, the pollen sacs of the stamens explode, and the buoyant pollen grains float until, by chance, they reach a stigma. The male flowers of E. canadensis are extremely rare in Britain. E. australis Goert. has also been introduced to British waters, though
only the male flowers have been observed here. Its white flowers secrete nectar and are pollinated by insects, this being one of the reasons why the plant is now placed in a different genus, *Egeria*.

*E. calthophyllus* is distinguished from *E. canadensis* by its paler green, twisted and recurved leaves whose bases are brick-red. *E. minor* L., whose leaves are not in whorls of three, is mid-green and is the smallest species. The leaves of *Egeria densa* are smooth and in whorls of four.

*E. parviflora*, previously known as *Elodea canadensis* Hort. have short, stiff hairs and are inserted closely on the stem, though not usually in whorls.

*E. calthophyllus* and *E. minor* are excellent tropical-aquarium plants, thriving under a wide range of light intensities. *E. canadensis* makes a fine, if somewhat vigorous, pool plant, but often becomes isolated under artificial light. *Lagarosiphon major*, from Africa, is a superb plant for the outdoor pool, forming luxuriant planes of dense foliage. Under artificial light it does not flourish and is not easily acclimatized to warm water. This is perplexing for in Morocco it flourishes in brightly lit water at temperatures between 75 and 85°F. *Egeria densa* similarly needs good illumination and should be allowed to hug the surface if it is to maintain its profuse foliage. Grown as cuttings all these species form strong, unbranched roots which, on entering the compost, develop innumerable root-hairs.

The third native genus, *Hydrilla*, is represented by species known only from the North Lanceshies lake of Esthwaite Water. This species is probably *H. liliomusa* (Besser) Dandy but it has never yet flowered. It resembles *Elodea canadensis* in habit, floral structure, pollination mechanism and propagation by winter-buds, and may be distinguished only by its paler green colour, and the arrangement of the narrower, toothed leaves in whorls of four.

The leaves of *Vallisneria gigantea* Griseb., from New Guinea and the Philippines, grow to over a yard in length.
and appreciate a temperature of 65° to 80°F, whereas *V. spiralis* L., *V. spiralis* var. toria and *V. spiralis* var. rubrinervis, a 6- to 8-inch tall, red variety, come from temperate regions and are suited to both coldwater and tropical aquaria, where they quickly form screens of foliage. They all grow in sand, gravel or a sand/soil mixture, and they need a bright overhead light.

In its method of pollination *Vallumina spiralis* shows a development of the *Elodea* method. Male and female plants are separate; the solitary female flowers reach the surface on the elongated stalks of their spathes. Each submerged male spathe near the crown of the plant holds hundreds of flowers, each containing two stamens and an air bubble. The spathe having broken, the flowers float to the surface where they burst open. The heavy female flowers depress the surface film and the males are blown to them, sliding down the slope and rubbing the sticky pollen of the dehiscent stamens on to the stigma. The maturing fruit reaches the submergence partly by its own weight, and partly by the spiral contraction of the stalk.

Pollination in the marine genus *Elbadus* is similar, and true hydrophilous flowers occur in *Halophila*, in the sea near Mauritius. Male and female flowers remain submerged and the pollen grains, united into strings, become entangled with the thread-like, receptive stigmata.

An elaboration of the ribbon-shaped leaf of *Vallumina* is found in the genus *Ottelia*, of which one species is rarely available to aquarists. *Ottelia alismoides* Buchenau, from tropical Africa and Madagascar, has broad, translucent, green leaves of a similar size and furred habitat to those of *Alisma plantago-aquatica* L., and with parallel, carmine-tinted veins. This fragile plant grows well in aquaria at a temperature of 65° to 80°F, rooted in sand, and producing its hermaphrodite, creamy-yellow flowers, which later set seed.

It is thus the floral characters and pollination mechanisms which provide the main interest of the family. Only in *Ottelia* do hermaphrodite flowers occur, and of those with unusual flowers, only *Hydrocharis* and *Lemnastrum*, the two floating genera, have male and female on the same plant. These two genera, together with *Stratiotes*, bear aerial, conspicuous flowers pollinated by insects. The remaining genera have the sexes on different plants and show various mechanisms which, at their simplest, effect pollination at the water surface, and at the most specialised, in the marinel genera such as *Halophila*, effect it completely under water.

Finally, the pattern of distribution of those species occurring in the British Isles is worthy of note. *Hydrocharis morsus-ranae* is locally common in England and Wales, favouring the more calcareous waters, but is absent from Scotland. Similarly, *Stratiotes aloides* is a local plant believed to be diminishing, occurring mainly in waters rich in base salts, in eastern counties, but occasionally present as something of a rarity in western districts, such as the Wirral. This species occurs all over Europe and north-west Asia; in the north, including this country, all the plants are female, in the south they are almost entirely male. There are a few records of hermaphrodite plants but these may be errors, and merely indications of the known fact that male and female flowers of all *Hydrocharitacea* usually contain rudimentary female and male organs respectively. The spread of *Elodea canadensis* I discussed in a previous article; the only records of male plants are from Scotland in 1879. *Hydrochaeris litoralum*, of course, has never flowered here yet, and only male flowers of *Egeria densa* have been found where this species has been introduced, as for example in several canals in south Lancashire. *Vallumina spiralis* is naturalised in south-east Lancashire, south-west Yorkshire, Worcestershire and Gloucestershire where the water is naturally warm or where it is heated by effluents from textile mills. It appears that the continued existence of these interesting genera in our flora is only assured by vegetative reproduction and successful germination.
I have now kept tropical fish for 4 years, and, during this time, I have found my interests progressing through what seems to be the normal pattern of tropical-fish-keeping hobbyists. Initially one begins with a single tank and tries to cram in as many different types of fishes as possible, then comes the desire for more tanks and finally the keeping, and possibly breeding, of one or two species follows.

My first tank, a 24 in. by 12 in. by 15 in., was stocked with the usual types of fishes to which the beginner is attracted; and when at last I became convinced that eight or ten pairs, according to their size, was the most which my tank would hold, I acquired a second tank of the same size and assembled a two-tier arrangement on a single thermostat. However, my plans to stock even more types of fishes were thwarted by the birth of a number of neon platys, which were excitedly rescued from the community tank, installed in their new home and gazed at.

by B. POPLAND

for most of the next few days with feelings of amusement and pride:

After rearing and disposing of these down to as platys I isolated and bred other species and finally bought a 36 in. by 12 in. by 15 in. tank, transferred my mixed collection to this and reserved my two-tier stand for breeding. After the first enthusiasm had worn off, however, I began to be interested in the presentation of the tanks almost in preference to the actual fishes and I now find that it is the picture presented by the whole assemblage, fishes, rocks, plants etc., which intrigues me.

By profession I am an architectural assistant and am therefore concerned in decoration, colour and interior

July, 1960
design. Even without such artificialities as synthetic plants, rocks, divers etc., a variety of colour is available to the aquarist, to blend as he will, and in most cases I feel that this aspect of fishkeeping is overlooked. At a recent exhibition, for instance, I saw a tank in which a bluish slate had been used for the rocks, the floor of the aquarium was in chippings of the same material and the fish were zebra damselfish. The steel blue of their stripes matched their surroundings admirably and I felt that this tank, installed in a room with a colour scheme dominantly blue, would have been so much more in harmony, than, say, the usual set-up which I suppose is dominantly green. I realise that a large section of the aquarist world support the view that a natural appearance should be aimed for, and therefore include in their set-ups a profusion of plant life. Provided, however, that sufficient plants are included and that the rocks are not of a harmful nature, I feel that the dominant colour of an aquarium could quite successfully be designed...
to harmonise with the room in which it is situated rather
than present a neutral or even discordant colour.

In my own home I have at present one tank set up in
black. Coal has been used for the rock and a backing of
copper foil, screwed up and then roughly flattened to
simulate a rough rock face, was fastened on the outside
after being painted black. As the larger pieces of coal
rise towards the back of the tank, they seem to merge into
the backing and an impression of depth is created, the
whole tank appearing startlingly clear and the general
appearance most convincing. Chippings of coal, labori-
ously broken but well worth it, have been used for the

can be very cheap to maintain as no new fishes need be
bought to replenish stocks and only a single pair are
necessary to begin with. The coal chippings need only be
a half inch or so deep with normal gravel below.

Another tank in my home is basically red. This, of
course, is a classic in fish-tank set-up: red sandstone,
normal brownish gravel and tiger bars. However, try
this with a backing of copper or tin foil, fashioned as I have
previously described, and with red, white and black paint;
stipple one colour on another until a shade very like the
colour of the rocks is obtained. Don't overplant the tank
so as to hide the backing sheet and rocks and use reddish

floor, and only plants of pale apple green included. This
pale-green plant life glintens almost jewel-like against its
set-black setting. Imagine the exotic effect if we now
introduce three or four male green swordtails and perhaps
a green Siamese fighting fish, or the contemporary effect of
albino fish, swordtails or paradise fish with their pure white
body colour and pink eyes. My own choice, however, was
one pair of platys: their fiery red glowed against the black-
ness of their background and they soon obliged me by
presenting offspring.

With a single species in a tank, any fry of live-bearing
fish have a fair chance of survival, and a set-up such as this

coloured plants (Cryptocoryne, with their dull pinkiness,
and possibly red Myriophyllum).

Green tanks are, of course, easy. Green background,
Westmorland green rocks and a profusion of green plants
can make a luxuriant setting for silver, white and neutral-
coloured fishes. Angelos, pearl danios, beacons and black
mollies would blend beautifully and this tank could look
really well in the lime-green colour schemes so often used
in contemporary decoration.

A tank can be designed to complement almost any colour
scheme employed in a room, and by using gentle contrasts
between fishes and plants a monotonous appearance is
avoided. In a basically blue room, where it may be desirable to avoid any green colour whatsoever, a tank could be furnished to house a large cichlid which does not need and, indeed, might not even tolerate, plants. Such fishes as Jack Dempseys or firemouth cichlids could be housed in a tank with high banks of black coal or blue slate and with a gravel floor of the same material broken in chips.

However, tanks which do not contain plants are not always successful in appearance and a very interesting and imaginative rock lay-out would have to be conceived. So many colour combinations are possible that the imagination will soon be swamped by the number of striking colour combinations that can be achieved. Some examples are given in the panel on this page.

Some of the main fish available in many colours to be used as contrasts or matches, and all neutral-coloured fishes, angels, beacons etc., could be included in any of the tanks noted in the panel. When one next considers the addition of plants in their various shades the combinations increase again. On black tanks I should favour the pale apple greens, in red tanks Cryptocoryne or the lush deep green of Cabomba etc., and a green tank could support all shades. Blue tanks would be a problem unless no plants are included but this will restrict the breeds of fishes which would welcome the omission and necessitate more frequent siphoning.

I have purposely left out white and yellow tanks as fishes,

**Limnophila sessiliflora**

**by JACK HEMS**

It seems that this plant has lost the popularity it enjoyed immediately before the war and during the war years. In those days it was much in demand as a decorative plant, as a protective plant for nervous or very young fishes and also for growing in semi-shade. In other words, it prepared behind a light-diffusing screen of Vallisneria, or under electric light, and looked extremely attractive when massed together to form a screen, or used as a centerpiece or feature plant in the tastefully laid out tropical aquarium. At that time it was known as Ambulia. Even in the present day it is usually spoken of as Ambulia; but how often does one see it in an aquarium? Or in a dealer's collection of "plants for sale"?

It is not easy to find a reason why the plant has gone out of fashion, because it has all the virtues needed for success: and, indeed, it has virtues far in excess of plants which have held their own against all newcomers over the last three or four decades. We still, for instance, find Egeria (Elodea) densa being sought after by the plant enthusiast, and the ubiquitous Vallisneria and the feathery-foliated Myriophyllum and Cabomba. Yet all these plants need a bright light and, apart from the Vallisneria species, soon grow stringy or leggy in the aquarium. But not Limnophila.

**Strong Light not Essential**

As mentioned above, Limnophila will grow well in semi-shade, and it does not grow so rampant as to prove an embarrassment in the aquarium. Moreover, its stems and foliage remain fresh-looking and green for months on end. And it is not a favoured green food of greenstuff-eating fishes. They much prefer to nibble and devour the leaves of Cabomba or Egeria; and if these are not available, they will bite off the leaves of Vallisneria. Monochoria octo-lepis will soon make short work of Vallisneria if there is not enough money algae or duckweed to keep their appetite at bay.

**Suggestions for colour combinations of fishes and background**

**Black tanks:** Red platts; green swordtails; albino fish; yellow wagtails.

**Red tanks:** Tiger barbs; barlequins; glowlight tetra; mosaic gourami; rosy tetra; red platts.

**Blue tanks:** Black mollies; aebra danios; pearl danios; three-spot gourami.

**Green tanks:** Pearl danios; green swordtails; angel fish; black mollies.

Generally speaking, do not favour light backgrounds and also the growth of algae would be extremely noticeable. A deep yellow is perhaps a possibility, but I do not think that this colour would look quite so good as those previously discussed or is this perhaps any personal prejudice? I feel that this side of fishkeeping is very interesting. By careful colour blending, choice of slow-growing plants and inclusion of long-lived fishes or species which readily reproduce, a tank can be an easily maintained, inexpensive accessory designed to blend with contemporary decoration of the highest standard.

**Potting for Best Results**

To obtain the best results with *L. sessiliflora*, a stem with roots, or bushy plant, should be set in a small pot of yellow clay or peat, lightened or made more friable by the addition of some charcoal and coarse grit. The pot should be topped with about an inch depth of sand to prevent the fishes stirring up the planting medium.

There are about 30 species of Limnophila known to botanists, but two only appear to be known to aquarists, namely *L. sessiliflora* and *L. heterophylla*. The latter species is similar in appearance to *L. sessiliflora*, but produces, in addition to the attractive submerged foliage, Roroniels-like floating leaves.

The genus is widely distributed over Asia and the East Indies. The two species mentioned in this article need a temperature above 70°F if they are to stay delightfully green and survive. Both species, when bunches, form a first-class spawning plant for barbs, goldfish and other fishes which scatter adhesive eggs in thickets of aquatic vegetation.
emerged some hours or days previously he refused it but when another emerged and climbed up the wall he ate it.

The many peculiar features of chameleons, together with further information on keeping them, are the subject of next month's article.

Dwarf chameleons

I had read much about the hardy and attractive S. African dwarf chameleon (Microsura pumila) and was delighted when a number came my way. These 3- to 6-inch specimens are beautifully coloured in bright green with brick-red markings and blue patches. Being of small size they are much easier to feed than, for instance, adult common chameleons. They are also very hardy; coming from extreme South Africa they are accustomed to cold nights. This species is vivacious and readers can imagine my delight when one evening I observed several baby chameleons. During the next hour or so I watched the birth of the rest of the brood, 11 in all. Readers who are interested will find further details in the British Journal of Herpetology (vol. 11, no. 1, December, 1955, pp. 5-8).

Later still I was to obtain a number of Chamadeo bitaeniata albinis from Kenya and to find them a very suitable species for life in the vivarium. With this specimen, to be described next month, chameleon keeping is brought well within the range of the keenest collector who is willing to spend some time with his animals. Many people following my example and instructions have also bred this species in close confinement.

FISHMONGER'S CANVAS—By HENRY TEGNER

IT was cool beneath the canvas canopy. Coming into the fish shop from the brilliant, hot, concrete pavement was like walking into a dimly lit cave. Suddenly the place reminded me of an aquarium only instead of live fishes there were plenty of dead ones lying about.

This was certainly no ordinary fish shop, although it was in the heart of the town. I did not want any fish, but when I saw all the fascinating species laid out on the great, sloping marble slab I just walked in. The fishmonger's marble slab was like a huge canvas. The colours the artist had used, however, were all of piscine materials.

A fine big halibut was the centerpiece of the picture, its dead-white belly provided a background on which the fish salesmen had exercised their skill. Tiny, silver-white baits formed a circle around a yellow scallop that had been placed in the halibut's middle. An outer fringe, consisting of the scarlet tails of a number of lobsters, added brilliant colour to the tableau. The display reminded me of a Salvador Dali painting.

The halibut itself was surrounded by various kinds of fish which intrigued the angler in me. Sables, plaice, herring, cod and mackerel were all there in their scintillating shades like rows of ordered soldiers—not one of them out of place. The red splash of raw salmon from Scotland, a split side of pink Bedford trout, large, dark-brown eels from the polders of Holland helped to fill out the fishmonger's marble canvas.

The whole picture was framed along its edges in cracked ice interspersed with little wreaths of seaweed amongst which tined pale-pink prawns. There was a touch of Louis Quinae about the frame, in contrast with its Surrealist contents.

I think it was the sight of the thick plebian cod which first lifted me from out of that London fishmonger's shop to the north-east coast, where, off the Northumbrian shore, I had fished in my youth for codlings in the bleak, bitter, raw dawn with long hand-lines arrayed with numerous triangular hooks which you worked on the sink-and-draw principle over the side of a high-bowed coble. It was cold work, but rewarding once you struck the codling shoals.

The scarlet tails of the lobsters reminded me of warm September days amongst the rocky shores of Cornwall, where at low tide you could sometimes find lobsters hiding amongst the seaweed beneath the ledges of stone. We used a long-handed, crooked, iron bar with which to rake out any unfortunate crustacean we discovered.

The white-belled halibut recalled a happy Sunday spent in the Channel out of Littlehampton, where we hoped for conger and perhaps a big halibut but all we got were a number of small sea perch; however, the sun had been warm and the weather beautiful so that we had all enjoyed ourselves.

The mackerel, too, brought back pleasant memories of trawling for these attractive fish off the uninhabited Isles of Farnes. I had gone out with a number of fishermen from Seahouses in one of their paraffin-engined mules, a boat which will stand any amount of rough weather—a necessity off this coast where storms rise quickly. The fishermen wanted bait for their lobster-pots and as whiting are easy to take at the tide-change we were using snatch lines, which are also tempting to mackerel.

The bait consisted, I remember, of herring's feathers dyed a brilliant crimson, orange and purple. They were certainly effective lures, for we chugged into the harbour 2 hours later with a boat-load of small whiting for the pots and two dozen nice mackerel.

While I was contemplating the pleasant past I heard a voice from behind me say: "What may I get you, Sir?"

I hesitated for a brief second before I replied: "Two mackerel, please."

I said this, I am sure, for of all the fishes displayed there on the fishmonger's slab mackerel held for me, I think, some of my happiest memories.
emerged some hours or days previously he refused it but
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The bait consisted of a small fish, used in the usual way
and with the result that we filled the hold of a small
vessel with mackerel that would net. The fish were
sent to London and sold at a good price.

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THE AQUARIST
AQUARIST’S Notebook

THE Barrow-in-Furness Aquarists’ Society are rather remotely situated on the edge of the Lake District and are quite a considerable distance by road and rail from the more densely populated parts of Lancashire. However, the hobby is quite flourishing there and has many real enthusiasts. As with most clubs, present membership is rather lower than at one time but things could be much worse. Never having had more than 40 members, Barrow cannot understand how a certain club could diminish when its membership fell to 30! Two meetings are held monthly, one being a beetle drive and get-together which provides much discussion and increases finances.

The club magazine has been issued since 1954 and is now being sent out to seven other clubs which include those at Portsmouth, Lowestoft, Oxford, Lancaster, Basingstoke and Middleton. The club is nearly 10 years old and in the early days had a precarious existence, commencing with nine members, who quickly dwindled to three. Present subscription is 6 shillings, which is one of the lowest in these prosperous times. At every meeting members’ queries are discussed and sometimes actually solved. A “Member of the Year” contest takes place, points being awarded for attendance at meetings within first half-hour (4), after first half-hour (3), notice of absence sent in due to illness or work (3), talk by member as main item of agenda (4), a short talk—not a main item (2), exhibiting at club shows (2), contributions to club magazine—the contribution per issue (4), contributions other than correspondence in national press (6), attendance at beetle drives (1), each new member introduced (2).

The latter merited, although frankly I would give ten points for every new member (subscription paid).

The club has been running a most unusual inter-club quiz competition with the clubs previously mentioned, also with those at Plymouth and Llandudno. Readers may be interested in a summary of the rules.

The competition consists of six quiz competitions held at 2-monthly intervals at the clubs’ conveniences. A quiz, with questions and answers, is prepared by a selected member of a society (a different society each time), the roster being arranged in alphabetical order. A team consists of six members selected from those present at the meeting. Officials needed are a quiz master and a scorer. The quiz itself consists of five rounds, each of six questions (30 in all) on subjects dealing with the hobby, covering as many aspects as possible.

There is a time limit of 30 seconds in which to begin to answer the question, but no limit within reason to actual length of answer. If a member realizes he is unable to answer the question he can say “I give in to the team”, provided that he does so within the time limit. Any member of the team can then be allowed to answer the question. A member is also allowed to ask a question to permit him to understand fully his own quiz question, but a leading question will not be allowed. Scoring is as follows: 2 points for a correct answer, 1 to 1 point for part-correct answer “given to team”, 1 point for part-correct answer “given to team”. The answers provided on the quiz papers are for guidance and the decision of the quiz master is final. Prompts by either another team member or the quiz master causes forfeiture of points for that question. The papers are prepared by the Society whose turn it is to select the questions. They will elect one member of their club to compile the 30 questions and answers. He will make sufficient copies to enable one copy to be sent in a sealed envelope marked “Quiz for month of…….” to each society participating, and to reach them by the 20th of the preceding month. Club scores are sent in to the central club (in this case Barrow) as soon as possible to enable the overall score card to be made up. Copiers are sent to all clubs.

Barrow have been running this Inter-Society Postal Quiz since 1956 and have found it very successful, as, in the words of one club secretary, “It provides a change from fish mattered”. The secretary is Mr. K. Ralke, of 8, Malton Crescent, Barrow-in-Furness if any other club feels the need for more information.

* * *

I called recently on Mr. Vernon, the well-known hobbyist of Romsey, near Stockport, and saw something really unusual. I thought I had seen everything in freaks and such like but this was quite new. He showed me an angel that appeared to have three dorsal fins. The main dorsal was quite normal but, branching out at right angles, about half way up the main dorsal, were two other fins. The effect was similar to the tail plane of an aircraft. All the fins were distinct and not due to damaged parts of the original dorsal. The effect was not pleasing; of course, such freaks are purely of side-show interest. Mr. Vernon told me that he had found veterinary terramycin a certain cure with cases of such fungus.

* * *

Since my recent notes on pet crocodiles appeared a reader in U.S.A. has sent me some notes about the pet alligator kept by Mr. and Mrs. William Kistner of Baltimore. Way back in 1917 Mr. Kistner brought home a specimen of a business trip to Florida, a 14-inch, 3-years-old alligator. Thrilling on special care this unusual pet took very well to captivity and soon reached a length of 6 feet long. Now 46 years old, the alligator is about 9 feet long and weighs in the region of 300 lb. Her two saurian companions are a 16-years-old b footer and a baby little over a foot long. They have never always gone smoothly as one would expect with such pets, plus eight monkeys, a skunk and 200 foreign birds. On one occasion the big alligator slipped away from her rock-garden pool into the nearby streets, and getting her back, inch by inch, by prodding and coaxing was no easy task. The garden pool is 15 ft. long and 4 ft. wide and serves until autumn, when semi-hibernation takes place in a cell. During this time food is taken only once a month, as against three times weekly in summer. Noise is practically nil but lack of sun appears to irritate and the alligator than makes a sort of barking sound. About the only attention given is in the washing of the teeth with a salt solution to free them of fungus growth, common where regular access to salt water is denied. The reptile’s 2-feet jaws have never snapped at her owner since those early days and Mr. Kistner considers that alligators, just like any domestic animal, appreciate affection and care.

* * *

It used to be a well-known maxim “To try anything once” and I think this can be recommended for hobbyists.

July, 1960
too. The newcomer to the hobby is only too ready to try each and every fresh fish variety that comes his way, but, as experience increases, this urge diminishes. One gets likes and dislikes, and some varieties are shelved mentally as “not wanted” without ever having been tried. One hears tales from other aquarists which make the blood curdle and even after the very name of some poor fish produces a shudder. I know because it has all happened to me long ago. There were some kinds of fishes I swore I would never keep because of their habits, colour, ugly looks, bad reputation etc. but, at long last, I kept them and often regretted not having introduced myself to this particular, variety sooner.

The thing to remember is that in time we tire of almost any fish that has been with us for a protracted period. Just because it is rare or large is no reason for keeping it if you have lost interest; sell it or better still give it away. Change in the tank set-up is essential and unwounded fishes prevent you having a “new look”. Many club members take them down to club meetings where they are auctioned off to other members but any school with a tropical tank (and many have them nowadays) will welcome gifts of this nature as school funds do not run to many expensive fishes.

Recently I got rid of my enormous silver shark, which had reached the staggering size of 8 inches. I wasn’t a bit sorry to see it go because I immediately filled the tank which had so long dominated with numerous small, attractive fishes and dozens of new plants. I always hate to see a single large show fish in a tank, so many hobbyists have these odd tanks hidden away. Fish which cannot be made part and parcel of a community set-up make dull viewing—like a tiger in a bare cage. It is as well to remember that activity makes an aquarium and a well-planted tank, well lit and populated with numerous small fishes which constantly dash backwards and forwards makes a pleasing picture to everyone, not least to the visitor. How drab the other sort of tank where the fish, motionless, lie at you with oriental incuriosity, or the owner, with stick, juts about and says “It’s hiding about somewhere, I’ll drive it out soon”.

“Try anything once,” but this is what many aquarists do, only once. I have long ago discovered that the mere keeping of a pair of fish for a period does not thereafter entitle you to say that you know all about that variety. Pur from it; after an interval, come back to them. My suggestion is “Try everything twice—at least”. Some fishes are quite an acquired taste.

We are used to hearing of water pollution, the throwing into natural waters of old bedsheets, unwanted cats and dogs, and I mentioned recently the deliberate draining of a large lake by ditches being opened. In May a drained boating lake at Kirk Hallam, Ilkeston, Derbyshire caught fire and it took 12 firemen more than an hour to put out the flames. It appeared that engine oil, which had been poured on the water, had caught fire. It was not explained how the oil came to be poured on the water but it is hard to understand how anyone could have done such a thing: What are we coming to?

A CONCRETE BRIDGE

A LITTLE carefully arranged stonework, natural or artificial, can sometimes be an eye-catcher feature in a water garden.

Quite recently I decided that a cement archway, or miniature bridge, could be sited to make one of my small pools look more interesting, so after carefully making a suitable mould, I filled it with dry earth for measuring purposes, and found that one large bucket of sand would suffice for the job.

I have always found that very strong concrete can be made by getting a 1 cu. ft. bag of fresh cement direct from a wholesale builder’s merchant, but as I did not require such a large quantity this time, I carried a large bucket up to a local store to get the required material. I was offered some ready-mixed cement and sand, but I prefer to dry mix it myself. The cement that I purchased, I was told, was “water repellent” and “would not go hard”; this appeared to mean that it would not “go hard” in stock in the shop, so I carried my loaded bucket back to the garden, and proceeded to dry mix it in cement-manufacturer’s specification.

I have always found it best to measure the proportion carefully as specified. Attempts to make the mixture “stronger” by one’s own variations sometimes lead to disappointment.

Turning the mixture “three times dry and three times wet” is an old rule which should be regarded as the minimum; streaks of sand or streaks of cement visible in the mixture show that more turning and mixing is required before putting the material into the mould.

Having dry mixed the concrete upon a nice area of clean, level concrete, I brought the water in into use, and found the description “water repellent” was appropriate indeed. The water from the spout and sprinkler seemed to want to run anywhere in the garden, but not into my cement, so I fell back upon an old friend in need, the clean lid of a domestic dustbin, and wetted the material in that, a little bit at a time. I then made one large heap of it again and finished off the thorough mixing. Then I was able to pack the mixture well down into the mould, and leave it there in the shade to harden slowly, away from the sunshine until it could be put into position.

Now my thoughts are of the time when the mellow brown colour of my romantic little archway will be reflected in the water, and mingle with the colour of the goldfish as they manoeuvre near it for shade or shelter.

THOMAS S. COX

THE GARDEN POND IN JULY

(continued from page 75)

some ponds whereas in others they may do so in April.

It must be realised that all varieties of fancy goldfish have been bred from the same stock and so they will all interbreed. When good kinds of fancy goldfish are introduced into a pond indiscriminately the resultant youngsters may be nothing but useless types of fish with scarcely a properly shaped fish amongst the whole brood.

All healthy fish have the urge to reproduce their kind but may do so only when the conditions in the pond are to their liking. The water must have a good oxygen content and any dullness of the water may mean no spawnings. See then that the water is clean and clear, feed the fish with some broken garden worms and there should be spawnings before the end of the summer.

THE AQUARIST
Natural Foods for Small Reptiles and Amphibians

by DAVID MORRIS

I HAVE been a field naturalist all my life, and as a result I did not find feeding any problem when I decided to keep reptiles and amphibians some 12 years ago. I have spent many hours turning stones and logs over and studying the habits of insects, to say nothing of small moths and butterflies. When it came to finding food for my new animals I had only to go out and look for what I required in the way of live food.

My feeding methods have always paid dividends, and I have been able to breed all the British lizards in controlled captivity; by this I mean in small vivaria and not large indoor reptaria. I am sure my success is due to feeding with natural foods plus the necessary direct sunlight at the right time of day.

It may require a little more time and effort, but I am sure that if my readers will follow this article they will find it well worth while, to say nothing of adding to their knowledge of field and hedgegrow. To simplify things I would like to go through the seasons with particulars of what may be found and where to look for it.

February and March bring hibernating insects and other creatures are beginning to move around into their familiar haunts. This movement, of course, coincides with the awakening of the reptiles and amphibians who will require food after their long sleep.

Worms and slugs are usually the first things to be seen, in fact they can be found all the year round, and a piece of old sacking or similar matter placed in an unused spot in the garden will soon provide a hiding place for such creatures. Spiders and centipedes will also be found here. A good way of catching them is by sucking back again onto its original position after lifting. This also applies to bricks, logs and rocks moved during a country walk. By doing this you will not disturb the ground and any insects that have escaped will return again for another day. They will find plenty of the material has been moved to a fresh spot.

During February and March the ground spiders are on the move and may be found under any old rubbish in the garden from which the dead leaves are cleared. They are easily caught as they are sluggish after their hibernation.

Another useful food supply is the larvae of the crane fly, commonly known as the leatherjack. It is a fat greyish grub found just under the ground, usually in the roots of grasses. My eyed lizard is particularly fond of them; his strong jaws make short work of the grub's tough skin and he will eat as many as I can find.

At the end of March already we have found a varied diet for our pets, and such a change from mealworms and gentle — I do not think gentle are good for small lizards or even frogs and toads. I find they pass through the animal's system undigested and cannot be beneficial in any way.

I had an unusual experience some time ago. A green lizard had been feeding on gentle and one had managed to get into its car. I could see it crouching around inside the protective ear skin, which was smeared with blood. The reptile was obviously uncomfortable, to say the least, as it was shaking its head from side to side and trying to scratch the maggots from its ear. It died shortly afterwards and I have never used gentle for food since that time. The late Jack Lester could not account for this unusual happening and agreed with my decision not to use them.

The above-mentioned foods will now take us into early summer and now the real variety begins. The young green leaves on the trees and bushes bring a host of caterpillars to feed on them. They are found on the underside of the leaves or curled up inside. Favourite trees are lime, oak, hazel and elm. They may be gathered by hand, when care should be taken or the grub will fall to the ground before the leaf can be opened. A good method is to place a sheet on the ground under the trees and shake the branches. An open umbrella will also serve the same purpose. This will always produce a good haul of caterpillars and other insects too.

When the bramble leaves are fully grown several species of spiders will be found curled up in a similar manner to the caterpillars. They may be collected by opening the leaf over a jar and letting the spider fall into it. Care should again be taken as these creatures also drop out of their hiding place as soon as it is disturbed.

Nestle bees also provide a good hunting ground. The larva of the lesser magpie moth feeds on the leaves, and curls them up in the same way as spiders and other grubs. It is a green juicy grub much relished by lizards. It is advisable to use gloves when collecting from nestles for obvious reasons.

We now come to the easiest of all collecting methods—the sweep net. I use a butterfly net, as its has a long bag so useful for retaining lively insects. It is only necessary to sweep the top of grass banks and hedges (taking care not to catch the netting on bramble thorns) and the net will be found to be alive with flies, spiders, grasshoppers and many other insects. This is the most interesting method of all as it provides the vivarium inmates with plenty to eat and to do, and the owner with a fine study of feeding habits.

I have learned a great deal from watching my animals feeding on the contents of a sweep net, and I am sure readers will do the same. Almost any waste land with some grass or weeds on it will be worth sweeping, and a watch of really long grass will be found to be most productive.

Grasshoppers are a most useful item of food, but must difficult to catch. The sweep net works well for a few and these may be supplemented by catching them by hand, I can catch them at any time, but I advise my readers to look for them in the early morning or late evening. They are less active at these times and may be picked up and popped into a jar without difficulty.

Late summer and autumn bring out the large garden spiders. I am sorry to say that spiders are my pet aversion, and I am only able to catch large ones with the aid of a net or jar. I merely hold a jar up opposite the spider as it sits in its web and put the lid on it. I have caught hundreds in this way without handling one. I have not discovered an easy way to catch wolf spiders so far. They move very quickly and are very easy to kill. The slightest injury seems to knock them out, but I find the animals will eat them if life is stimulated by moving with a small stick.

Another spider may be found in a small round web in the corners of windows, especially the garden shed or greenhouse. These again are difficult as they hide in the cylindrical web and drop to the ground at the slightest provocation. I have solved this problem by using empty matchboxes. It is only necessary to hold the open matchbox, flush with the window pane as near as the web as possible, touch the web with a small stick and the spider will drop obligingly into the box without any damage. You then slide the lid on and continue with another box. Although you may clear your windows, you will be surprised to find the webs occupied again within a very short time. This state of things will continue right through the season. The spiders are small but will be much enjoyed by small creatures such as fire-bellied toads and small lizards. My wife never throws matchboxes away; they are always kept for collecting purposes!

It is unfortunate that our countryside and near suburbs...
are being disgured by rubbish and slag heaps. We have many in our part of Surrey and I find these good hunting grounds for crickets. A great deal of heat is generated in the ground, and the crickets enjoy these conditions. They hide under lumps of slag and other rubbish. Often large numbers of all sizes will be found sheltering under the same stone. I usually gather them by hand—it is the easiest way.

Night hunting is very exciting. You will need a good torch, collecting tins or jars and wellington boots, as the grass is usually damp in the evenings. The sweep net will be most useful, and you will find many nocturnal insects in your catch. Field crickets will also be caught in the net, and if you are needing slugs they can be found on dandelion leaves and grass stalks and may be collected by hand with ease.

Among the beetles I find the violet ground beetle to be the most useful. My eyed lizard is very fond of them, and I think the soft wrapped shell of the egg is more readily eaten than the usual hard one found on most beetles. This is a large oval beetle with a violet or mauve line round the outer edge of the wing case. They may be found in all the usual insect hiding places.

With the approach of winter most insects either die or hibernate. Some of these may be traced to their winter quarters in cellars, sheds and outhouses. They may be collected by shaking out old sacks and moving boxes and other rubbish usually found in such places.

The damp, slycking outdoors will continue to provide worms and other insects throughout the winter if you keep the frost away from it. You may, if you wish, continue your outdoor hunting. I have turned stones over with 3 or 4 inches of snow on the ground and collected a good supply of worms etc., and on one such occasion a hibernating lizard!

Worms may be stored in damp moss and compost during the winter. They will keep lively and ready for use when the ground is too hard to tackle.

The production of flies for your tree frogs presents no difficulty at this time. It is only necessary to purchase some grubs from the fishing-tackle dealer, put them in jars with a lid on and place them in the airing cupboard at varying intervals, when they will hatch out and provide a good supply of bluebottles.

I hope I have given readers something to think about and work on during the seasons. To those who think this will take up too much time, may I suggest that they give it a trial. I am sure it will be found to be worth while. The countryside will take on a new look and, what is most important, your pets will benefit from a constant supply of natural live food.

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THE GUPPY—King of Tropical Fishes by P. DENDY

I ENDED the first article of this series by telling you to find out, when you buy basic stock, whether your guppies were from the same strain, were breeding true to type and for how many generations they had been inbred. In addition to this basic information you must use your eyes and look for lively fish with well-formed bodies and regular finnage, preferably of a good size, because in inexperienced hands the size of the fish greatly affects diseases and the end result is a collection of brightly coloured runts. The standard male body size is 1½ inches from nose to caudal peduncle and the ventral should have a tail length equal to that of the body. The female should be 2 inches from nose to caudal peduncle. Don’t expect to get fish up to this standard size, there aren’t many about, but try and get near it.

There are certain visible signs of present or incipient trouble which may be spotted amongst all or some of the fish on view, and if seen those particular fish should be avoided and others sought out. The main faults to look for are hollow belly in males and, more particularly in females, humped backs, crooked or twisted spines, listlessness, drooping or clamping caudal fins, general lack of colour and smallness of size. Many of these faults are due to debility consequent on too much inbreeding and some are due to plain bad feeding. I believe that it took me nearly a year to learn how to feed guppies properly and many a fine fish was lost in the process.

Now that you have some idea on the basic pair from which to breed I will deal with the mechanics of the business, where you will meet with triumph or disaster; which it is up to you. I shall be expressing definite opinions and many aquarists may well not agree with me, but the suggestions I make have been tried and found to work; after all there are more ways of killing a cat than drowning it! To illustrate this, at a recent guppy meeting a number of fish were taken and it was found that 25 different foods were currently being fed to their guppies by the 20 members present.

The hardness and pH value of the water is immaterial, though moving a breeding pair from one type of water to a vastly different type without proper acclimatization is asking for trouble obviously. The temperature should be round about 79°F and the basic space allowance is half a gallon per male and three-quarters of a gallon per female. This is a minimum and more space can be allowed with advantage. One of the best tank sizes is 24 in. by 12 in., although it does not really matter as long as the size is not below 18 in. by 10 in. for guppies.

Plenty of plants for the fish to swim about in and rubble at are required, and the so-called fagged varieties, such as Indian fern, seem to be best. I am a strong believer in sub-gravel filtration, which produces a crystal-clear water, and also aeration to produce a current for the guppies to swim against to promote growth. Crystal-clear water is a must with guppies as they are very sensitive to increase in bacteria from decomposing food or too much mussel.

The rise in the numbers of bacteria irritates their gills and makes them most unhappy, so that they either hang about dejectedly in odd corners or start “gill bashing” against the gravel or rocks. If you have any rockwork in your tanks, scrap it at once; it can play the devil with the tails of the long-tailed varieties.

Aquarium maintenance is rather more important with guppies than with most tropical fishes and I advise you to siphon off from the tank bottom one-quarter of the tank water weekly. This water can be replaced straight from the tap with no ageing as long as it is at the right temperature. If your water is heavily chlorinated, then you may have a little bother perhaps, but that could always be assayed by experiment.

Many guppy breeders believe in the addition of salts to the water, either sea salt or Epsom salts, at dosages ranging from one teaspoonful to 5 gallons to one teaspoonful to 1 gallon. I have tried both and found no particular advantage, though Epsom salts may help to remedy constipation if you are feeding incorrectly. It is much easier to use untreated water and a great deal less trouble on the weekly maintenance.

THE AQUARIST
our readers

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

Under-Gravel Filtration

The letter by P. Dendy of Evesham (The Aquarist, May) cannot be left unanswered. His suggestion that the trouble he is experiencing with his guppies dying off is due to the use of a biological filter is too absurd for words; he does not specify how this could occur, nor for that matter do his "experienced aquarist" friends who also are "dubious." He does suggest that the change from anaerobic conditions to aerobic may be the cause, but in saying this he obviously does not appreciate what happens physically, for I would say that over the whole history of aquarium keeping more than 100 times as many fishes have died from the effects of anaerobic conditions than from all other causes put together. I would go still further and say that most of the diseases to which aquatic fishes are heir emanate from conditions that start in the first place from this cause.

The build-up of organic matter in an aquarium has to be broken down into inorganic substances and this is done, broadly speaking, microbiologically and aerobically. Anaerobic conditions presuppose living in the presence of free oxygen, other gaseous or dissolved, which is surely what our fishes require and all our efforts should be directed towards providing optimum conditions. A base filter does just this, all other things being equal. The water is drawn down through the shingle and discharged at the water surface. In the course of this cycle the fine particles of suspended matter are oxidised chemically and biologically so that they are converted into other forms (nitrates etc.) in which they no longer have a demand for oxygen. Another side-effect is to increase the particle size to make it heavy enough to sink to the bottom and stay there. This latter reason explains why aquaria fitted with base filters are usually clear and free from cloudiness.

The advantage of a base filter over all others is that it does not rely on a straining action to clarify the water. Fundamentally it provides a medium upon which a healthy zoological film can develop and the water being drawn over and through this film, is purified in so doing by the various organisms which inhabit the film.

If Mr. Dendy is losing his guppies he should look elsewhere. He says guppies are "extremely delicate" fishes when bred intensively for the show bench. I cannot agree, as I have found them so tough as any other sort of aquarium fishes. If selection of parent is limited to maximum show characteristics, then each succeeding generation will get steadily weaker. If, however, constitutional vigour and size is the first consideration and show characteristics second, there is no reason why a strain should not go on indefinitely, provided that records are kept to avoid as far as possible repetitive brother to sister matings. Diet, too,

Address letters to The Editor, The Aquarist, The Batts, Half Acre, Brentford, Middlesex

has to be studied, for certain elements in the water are missing in the average guppy set-up. In my view all guppies should have 2 months at least, every summer, in the pond.

Finally, Mr. Dendy mentions the use of "salt and Epson salts" on his guppies. I have often read of this treatment —what exactly does this do and at what concentrations?

L. C. Bevis, Binstead, Surrey.

Reading Mr. Dendy's letter in The Aquarist (May, 1960) on the unaccountable losses and sickness of male fancy guppies, brings to mind a similar disaster I experienced when I first fitted under-gravel filters to my tanks.

I also breed guppies for competition and found that after the filters had been in constant operation for over 2 months my fish, for no apparent reason, became listless, disinterested and very sensitive. After a series of experiments I traced this to continual use of the filters. Now instead of running the filters 24 hours a day I use them only 10 hours daily, still keeping the water in my tanks crystal clear.

My findings were that the constant agitation of the water, produced by the filter's action, had a weakening effect on the fish and cutting down the operating time, and giving the fish a period of rest, brought about a satisfactory result.

I would suggest that Mr. Dendy follows my example by cutting down the operating time of his filters. He should not do what many aquarists would have him do, and take the filters out, because this system of filtration is really a boon to fish hobbyists.

G. J. Wilson, Hull, Yorkshire.

Reproduction in Water Fleas

In his article "What do you know about Daphnia?" (The Aquarist, April) C. E. C. Cole quotes observations showing that epiphragm in the genus Daphnia are produced by only one particular size group of female. Though interesting, I do not see how this proves or disproves anything about the causes of epiphragm production.

The weight of evidence, I think, favours the view that epiphragm production depends on (1) how much food a Daphnia has been getting in the past and (2) a fall in the amount of food it is getting in the present. Shidehodkin (1954), studying laboratory populations of Daphnia obtusa, concluded that the probability of resting eggs being laid was greatest when a high reproductive rate was reduced to the rate of two eggs per brood. Berg (1934), in a study of natural populations of Daphnia magna and Daphnia pulex, has shown that epiphragm are produced only when the mean

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number of eggs per female approaches two per broad. At one time it was thought that ephippial production was due to extreme starvation (Berg, 1934; Mortimer, 1956; Banta et al. 1939), but Slobodkin (1954) finds that starving Daphnia are hardly capable of any reproduction at all. Berg (1934) noted that one and the same female may sometimes produce several ephippia in succession, molting and increasing in size each time. Thus ephippial production is not necessarily limited to some particular size of female. Rodin (1930) has shown that size of Daphnia may vary greatly according to the amount of food eaten. In the light of these observations, a correlation between size and ephippial reproduction would be expected in nature, but not because they are causally related but because all are related to food supply.

With regard to C. E. C. Cole's observation that males are shaken off if a female is not "ephippia-minded," I wonder if the serious interpretation behind this fanciful expression is correct. Berg (1934) showed that resting eggs are produced in the absence of males, although viable young are produced as a general rule only if they are fertilised. I would suspect that a female ready to lay resting eggs is perhaps less vigorous than a parthenogenetic female and therefore less able to shake off males trying to attach themselves.

Finally, it may have been only a slip of the pen but an ephippium is not a resting egg but the protective sheath which encloses one or more resting eggs.

W. J. P. Smyly,
Ambleside, Westmorland.

REFERENCES

The AQUARIIST Crossword
Compiled by J. LAUGHLAND

Feeding and Losses of Fishes
I THINK Mrs. D. A. Hanning's sustained losses (The AQUARIIST, April 1966) are very likely due to insufficient feeding.

JOHN BOUROT
San Salvador, El Salvador, C.A.

Parental Care by Dwarf Cichlids
In the December 1950 issue of The AQUARIIST you kindly published my letter about my success with the dwarf cichlid *Pomacentrus bennetti*. I have since had over 40 inquiries, which have all been answered, and I thought that you or your readers may be interested in the latest behaviour of the parents.

They were in a 4 ft. community tank containing about 40 youngsters of the original spawning, varying from 1 to 2 inch (mainly males) and some smaller and various other fishes. I know they had spawned on a rock in the corner of the tank and thought I would leave them as I had too many of the same species. Naturally, I thought that the eggs would all be eaten. I have now seen what I thought to be impossible: the parents are swimming around the outside of the community tank and have a batch of 20 or 30 youngsters with them. In turn they are protecting them from the other fishes: first the male leaves the family group and scatters the others away, and then he comes back and the female has a go. These are the same pair that have previously eaten four spawnings, yet they raise this lot in a community tank of all places!

I do not know if any of your readers have seen anything like this before, but I can say that the sight of these parents protecting their family is the most amazing one I have ever seen. Friends of mine have visited me and spent hours watching them.

H. ROBSON
(Haslehurst, Isle of Wight Aquarist Society), East Cowes, Isle of Wight.

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The AQUARIIST Crossword

Across
1. Ald for raw mg produces tropical favourites (3, 7)
2. Honey manufacture (3)
3. Head or company is head of octopus (4)
4. Fruits, leaf beautiful tropical (4)
5. Morr (4)
6. Found with an unassuming (4)
7. Between sizes of amphibiids (4)
8. Kiln (3)
9. When I join the clue you may be sound (3)
10. It is the correct answer (2)
11. The creature on which a parasite lives (4)
12. Enemy of metal-threaded tanks (4)
13. Oris (3)
14. Outside bath overflows the room (4)
15. How much (3)
16. You can see through this fish! (1, 3)
17. A foot more than nothing comes not seldom in soft pets (4)
18. A little one (3)
19. Is the answer to the centre of fish? (2)
20. This way you might get a visit for an extra pound (3)
21. Next gill, in a way, this, Auberry (5)
22. Nick the name of this kind of fish (4)
23. Tiny living thing in that (4)
24. Muffins, sauce, cheese and bread for examples (5)
25. Condition (7)
26. Check is a loss (5)
27. Peculiar but not the fish (4)
28. The Old Country (1, 3)
29. Compares point of P8 across (4)
30. The letter half of the shell (3)

Solution on page 84

THE AQUARIIST
from AQUARIISTS' SOCIETIES

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

AT the last meeting of the British Aquarist Study Society, held in the London Zoological Society's last but one, the room was occupied by W.J. Kelly of the London Zoo Aquarium, Mr. E. F. Hedges, Mr. D. C. Jones, and Mr. J. D. Dempsey. The Secretary, Mr. A. W. Hedges, introduced the speakers, and the meeting was opened by Mr. E. F. Hedges. The discussion began with a talk on "The Care of the Aquarium" by Mr. W. J. Kelly, who gave an excellent talk on the subject. The meeting lasted for about an hour and a half, and was well attended. The next meeting will be held on the 5th of next month.

The second meeting of the district A.S. was held in the same place as the first meeting, but with a different programme. The meeting was opened by Mr. E. F. Hedges, who gave an introduction to the subject of aquarium care. The talks were given by Mr. W. J. Kelly, Mr. D. C. Jones, and Mr. J. D. Dempsey. The talks lasted for about an hour and a half, and were well attended. The next meeting will be held on the 5th of next month.

The third meeting of the district A.S. was held in the same place as the previous meetings, with Mr. E. F. Hedges as chairman. The talks were given by Mr. W. J. Kelly, Mr. D. C. Jones, and Mr. J. D. Dempsey. The talks lasted for about an hour and a half, and were well attended. The next meeting will be held on the 5th of next month.

The fourth meeting of the district A.S. was held in the same place as the previous meetings, with Mr. E. F. Hedges as chairman. The talks were given by Mr. W. J. Kelly, Mr. D. C. Jones, and Mr. J. D. Dempsey. The talks lasted for about an hour and a half, and were well attended. The next meeting will be held on the 5th of next month.

The fifth meeting of the district A.S. was held in the same place as the previous meetings, with Mr. E. F. Hedges as chairman. The talks were given by Mr. W. J. Kelly, Mr. D. C. Jones, and Mr. J. D. Dempsey. The talks lasted for about an hour and a half, and were well attended. The next meeting will be held on the 5th of next month.

The sixth meeting of the district A.S. was held in the same place as the previous meetings, with Mr. E. F. Hedges as chairman. The talks were given by Mr. W. J. Kelly, Mr. D. C. Jones, and Mr. J. D. Dempsey. The talks lasted for about an hour and a half, and were well attended. The next meeting will be held on the 5th of next month.

The seventh meeting of the district A.S. was held in the same place as the previous meetings, with Mr. E. F. Hedges as chairman. The talks were given by Mr. W. J. Kelly, Mr. D. C. Jones, and Mr. J. D. Dempsey. The talks lasted for about an hour and a half, and were well attended. The next meeting will be held on the 5th of next month.
An inter-club table show amongst local clubs has been arranged by this club, and the first heat was held on 16th June at the Bristol Tropical Fish Club meeting and will be followed later by heats at meetings of Bristol, Bath and Kensington Aquarium Societies. Judging at these shows will be carried out by the local Tropical Fish Group, and the chief judging the fish. The judges for the first heat were Mr. R. T. Ridout and Mr. A. H. G. Potter. The results were as follows: 1st Prize - Messrs. R. H. Potter, C. R. W. E. and D. W. C. Potter; 2nd Prize - Mr. H. G. Potter; 3rd Prize - Mr. R. H. G. Potter.

MONTHLY meetings of the Yeovil and District A.S. are held at the Elephant and Castle, Yeovil on the first Thursday of the month. All fish-keepers in the district are welcome. Recent activities of the society included a tropical fish table show in April, the report being given by Mr. J. F. Potter (Bath), and a display of live fish, including some from the north. The next meeting will be on 1st July, when a display of live fish, including some from the north, will be held.

At the June meeting, Mr. T. Perry gave the members an interesting talk on the breeding of opaline gourami, of its manners and eventual results. Many other speakers and incidents completed an enjoyable evening.

The Annual Show of the Muscularis A.S. will be held on Friday and Saturday, the 23rd and 24th September. This will be held with special permission with the Society's Council.

The main bathing event is an inter-club show between Bathseton, Southampton and Ipswich. This will be held on 20th July. New members are always welcome, all classes being run and prizes awarded for every month at the club room of the Cricket Club in Bath.

The May meetings of the Oxford A.S. have included talks and talks on fish and fish culture. The talks were given by Mr. R. L. Lewis. A talk on fish and fish culture was included, and several speakers were heard.

A NATURALIST at the weekend was the object of a large gathering of fish stockholders in the Saturday Market in Cambridge and District A.S. members at their meeting by Dr. Clifford, of Suffolk, who afterwards recommended the morris to the bathers. The week was devoted to the interest of the subject of life on the meadows and round the canals.

The June meeting was organized by Mr. C. D. Southcoote, to include on atmosphere where their interests in nature and aquatics. After interesting questions put by the members the speaker was watched by the chairman for a more interesting an interesting talk.

At the recent meetings held by the club, a new club was formed, the membership of which will be limited to the members of the club. The annual dinner was held by Mr. R. H. G. Potter, C. R. W. E. and D. W. C. Potter; 2nd Prize - Mr. H. G. Potter; 3rd Prize - Mr. R. H. G. Potter.
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<tr>
<td>4 Zebras</td>
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<tr>
<td>4 Lemon Tetras</td>
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<tr>
<td>4 Tigers</td>
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<td>4 Rainbows</td>
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<tr>
<td>4 Comb Tails</td>
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NEW STOCK

- Glassfish
- Gourmet Fish
- Acropora
- Live Coral
- Red Leather
- Pompadour
- Butterfly Fish
- Adult Lion Geurains
- Alcyon Clapper
- Euphytus Phloxheaders
- Argent Flag Tails
- Regal Flag Tails

PLASTIC AQUARIUM

<table>
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<th>Item</th>
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<td>Cleaning Appliances</td>
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<td>Air Requirer</td>
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<tr>
<td>Hand Requirer</td>
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<tr>
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<tr>
<td>Rags</td>
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<td>Resus Requirer</td>
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<td>Automatic Syphon</td>
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<td>Fish Tail Syphon</td>
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<td>15 in. Dry Tube</td>
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<tr>
<td>Hand Requirer</td>
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AERIAL SUPPLIES

- Breeding Traps
- E.P. £0.40, 40, 75, 100, 125, 150 watts
- Ex. Ex. Standard £25, 50, 75, 100 watts
- Ex. Ex. Super £25, 100, 125, 150 watts
- Tri-Phase £25, 50, 75, 100, 150 watts

THERMOMETERS

- Dumper Compass
- Coral Point Freez
- Perspex Aqu.

PUBLICATIONS

- Handbook of Tropical Fish
- The Encyclopedia of Tropical Fish
- Freshwater Fish
- All about Tropical Fish (Manual)
TROPICAL FISHES
of interest in July

INTERESTING FISHES FROM S.E. ASIA

ARCHER FISHES 12/6, 15/-, 17/6
PUFFER FISHES 5/- & 7/6
MONODACTYLS 10/-, 12/6, 15/-
SCATS 10/- & 12/6

all above are acclimatised to fresh water

HARLEQUINS — beautiful well-grown fishes 2/6 and 3/6 each. CLOWN LOACHES — 12/6 each. BLACK SHARKS — 10/6 each. FLYING FOXES — 12/6, 15/- and 17/6 each.

We have also our usual selection of well over 100 species — send S.A.E. for list.

Shirley Special this month

ANGEL FISHES IN VARIETY
Angel fishes (small) - 2/6
Velvettails - 5/- & 7/6
Black angels - 10/6 & 12/6
Shirley Blue fighters back again unisex 5/-, pairs 12/6, 20/6

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

GOOD STOCKS OF POND FISHES
AND PLANTS STILL AVAILABLE

Aquarium Plants
(Send S.A.E. for lists)

APONOGETON LORIAE
a useful introduction from AUSTRALIA
beautiful translucent foliage varying from pale green to reddish brown. Pale yellow flowers above the surface 10/- each

BUNCHES OF ELODEA CALYCTHOIDES
useful for spawning and decoration in cold or tropical aquaria
1/- each 12 for 10/-

SHIRLEY SPECIAL PLANT PARCELS
30 plants in variety 18/-
90 plants including unusual species 36/-
Free and 1/6 post & packing
From Cold or Tropical aquarium

Try your luck at rearing Madagascar lady plants
Tiny seedlings 12 for 1/-, 30 for 2/- (This month only)

Seeds available also of the following:
Echinodorus cordiformis 3/-, Ech. spectabilis 5/-, Ech. nords形成的 5/- per small packet.

A NEW RED-EALED FORM OF CAROMBA CAROLINIANA 2x each 6/6
for 10/6 each
VIOLET FLOWERED SPECIES 3/- each

PLEASE NOTE. — All enquiries requiring a reply MUST be accompanied by S.A.E. Our premises are situated on the main Stratford-Birmingham road, 6 miles from Birmingham, Badminton "Red" Bag. We have 179 from New Road, Stratford, and on the A21, just beyond the town. Hours of business: Weekdays 10 a.m. to 6 p.m. Saturday 10 a.m. to 6 p.m. Exclusive — last Sunday afternoon.

TERMS OF BUSINESS — Cash with order please. Fish sent by rail. Tropical minimum order 25, land size container and carriage 10/-; Cold-water minimum order 42 plus 15/- case and carriage. Plants by post minimum order 10/-) please add 1/6 post and packing.