

The AQUARIST AND PONDKEEPER

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Editorial

THE descent upon us in the past few weeks of a summer heat wave has had serious effects in the ponds of many aquarists. Fishes in rivers as well as in garden ponds have died suddenly in large numbers. The appearance of many fishy corpses in the Serpentine in Hyde Park moved the Ministry of Works to seek the cause, and analysis of the water indicated that a raised chlorine content, in combination with the abnormally high water temperatures, was the reason for the deaths.

Increased chlorination of water supplies, which takes place during hot weather, is one source of bother for the aquarist, but it is known that there is a lethal association of high water temperatures with many other factors not normally causing distress to fishes. Thus there is evidence that raised temperatures greatly increase the sensitivity of coldwater fishes to foreign materials in the water and to the presence of parasites which usually do not cause any serious harm to their hosts. Small amounts of polluting materials discharged into streams without signs of effects on fishes can become fatal when the mercury rises. This accounts for many of the instances of enormous numbers of dead fishes appearing in some rivers at this time of year. Ponds which are stocked to their full capacities can suffer heavy losses when continuously sunny days heat the water and lower its oxygen content by the small amount that brings the fishes gasping to the surface. The presence of small quantities of metal salts, formed from contact of the water with pipes and fittings of copper or brass, is another circumstance that can bring about deaths during hot spells. What may be tolerated in the normal temperature range quickly becomes lethal as the water warms up.

Small, shallow ponds and raised ponds are those most likely to be affected if they contain large numbers of fishes. Shading the small pond from the sun with screens of sack-ing if it is in an exposed position will help to avoid losses and, as long as we continue to have permission to use hoses in the garden, trickling fresh water continuously into the pond will do likewise.

A NEW AQUARIUM PLANT

by MASON SMITH

AMONGST the many species of cultivated indoor plants those of the genus *Tradescantia* are perhaps one of the most popular. The generic name *Tradescantia* is derived from a John Tradescant, who was gardener to Charles I round about the year 1636. According to L. H. Bailey's *Manual of Cultivated Plants*, there are more than 30 species of *Tradescantia* known to botanists. Of this 30 species *T. virginiana* (common spiderwort), a hardy border plant, and *T. fluminensis* (wandering jew), a common greenhouse and indoor plant, are the best known.

The plant which I am interested in is *T. fluminensis*. This plant, which incidentally is a native of Brazil, Uruguay and Paraguay, I have been experimenting with for aquarium cultivation. Herpetologists often use it for bog vivaria and seeing this plant growing in such profusion in a friend's vivarium, gave me the idea that it might be suitable for temperate and tropical-fish tanks.

T. fluminensis, in its native form, is a bright-green, medium-leaved plant, as is shown in the illustration, but botanists have evolved from this a variegated form which has whitish-coloured stripes on its leaves. This variety tends to revert to its original form in the winter months and in unfavourable growing conditions.

For my first experiments with this plant some rooted cuttings were planted in a well-established tank containing goldfish. The tank was kept at a temperature of about 60° F. After two months the cuttings had grown an inch and a half and the leaves at the base of the plant were still bright green and thriving, with no signs of rotting. Further experiments were carried out with some cuttings in a tropical tank, well established, and kept at a temperature of 75° F. Here again the cuttings continued to grow satisfactorily. In both experiments roots were thrown out at points along the main stem, and after three months the top-most leaves had pushed themselves through the surface of the water, in the temperate tank. From thereon growth was very rapid and eventually the plant was hanging over the edges of the aquarium, making a very decorative picture. The heat from the bulbs in the cover shade prevented the plant from making any headway in the tropical tank once it had broken through the surface of the water.

T. fluminensis when grown as an indoor plant requires a fairly rich soil mixed with peat, the whole being kept very moist. A good light is essential, whether the plant is grown in a tank or pot, but strong sunlight seems to retard growth. Cuttings from the plant can be made to root by placing their ends in a saucer of water and leaving in a good light in the fish house or home.

Here then it would seem we have the ideal aquarium plant. Quantities of it can be grown in pots in the house or fish house, and then when required for the aquarium, cuttings are taken, rooted, and placed in the aquarium compost. When the plant reaches the surface of the water it can then be trained to overhang the ends of the aquarium frame, making a very decorative effect.

T. fluminensis is generally obtainable from nurserymen or florists who deal in indoor cultivated plants. The price is usually around 3s. 6d. per pot. The variegated form which



A rooted cutting of the wandering jew
(*Tradescantia fluminensis*)

I mentioned might also be suitable for aquarium use. I have not tried it, but perhaps some readers will. If it does grow under water without reverting to its original form, it would certainly be a plant of striking appearance.

Cacti in the Fish House

IF any cacti have been raised from seed this year it is a good plan to see that they are kept in the warmest part of the house or room, and they can then have just sufficient water to keep them healthy, but go carefully with water as they can damp off if they remain wet for long.

The ROSY BARB

by JACK HEMS

HERE is a fish which positively scintillates, in appearance and behaviour. In mature specimens, the rather large scales which cover the basically olivaceous body reflect tinted mirror-like lights: gold and silver and metallic green. The underparts are normally silvery-white with an underlying blush of pink. The eyes are large, black, and encircled with gold rims touched with bright copper.

The male of the species almost transcends description when he is aroused by the mating instinct; for then his dark-tipped, orange- to red-hued fins and his breast become suffused with a fiery glow seldom observed in any freshwater species, though seen often enough in marine fishes of both temperate and tropical waters.

The fuller-sided female is more soberly coloured than the male. But her scales glitter, glitter and catch the eye as she swims about in open water; and every time she twists and turns, her body flashes various brassy to greeny-gold lights.

Both sexes have an ocellated spot where the body tapers away to the caudal peduncle; it is intense black with a golden aureole.

Barbus conchomius (*Puntius conchomius*, according to some authorities) is always on the move, swimming excitedly to and fro along the front glass of the aquarium, or threading its way impatiently through the plant life as though engaged in some highly important business.

It is most active when the interior of its aquarium is brightly illuminated, and the water is warm, say, about 78° F. But the species is a hardy one, and is not troubled in any way if the temperature sinks (gradually) to the middle sixties, or rises, if the water becomes overheated by direct sunlight, to the middle eighties.

Of the water itself, the fish prefers mature, well-aerated water free from suspended sediment; in fine, the sort of water, clear and sparkling, in which delicate-foiled plant life will usually thrive.

Feeding the rosy barb is no trouble at all, for all foods palatable to a fish will be taken freely: live food, dried food, finely cut scraps of cooked meat and even green vegetables: the left-overs from a dinner table.

Like angel fish, the rosy barb loves scrambled egg; and while it will take food falling through the water, it will also sift the sand most diligently for edible matter. In this respect it shows a typical carp-like characteristic.

Breeding the fish raises no problems. Even the neophyte fish-keeper should be able to spawn it successfully. For the instinctive urge to produce a family (if conditions are favourable) is quite easy to recognise.

The male enhances his colours; the female develops plumper sides; the couple show a steadily increasing liking for each other's company. The interest grows. It culminates in a frenzied dashing and flashing in and out of the water plants. During the pursuit-flight of the female, she scatters adhesive eggs. Several hundreds of eggs may be



Photo:

Laurence E. Perkins

Male (left) and female rosy barbs photographed during a spawning chase

scattered by a large female during a single spawning.

After egg laying is over, if not before, the couple will start to destroy their own eggs; so it is a wise precaution to transfer the parent fish to another tank as soon as they begin to look exhausted, and stay panting, as it were, in the vegetation or in a corner of the aquarium.

At a temperature of between 78° and 80° F., the eggs should hatch out within 3 days. For another 2 or 3 days, the fry will stay fairly quiescent in the plant life; that is, until they have absorbed the nourishment contained in their yolk sacs. Then they will start swimming about at all levels of the water, searching, always searching, for food.

Food at this stage must be microscopic: Infusoria, or, if this is not available, dust-fine dried food. Cupfuls of green water, or hard-boiled yolk of fowl's egg rubbed between the fingers to form a yellow cloud in the water, help the baby fish to forge ahead. As they develop, the fry may be given screened *Daphnia*, freshly hatched brine shrimps and micro worms.

The young fish are not brightly coloured, but they show the black spot on the body at an early age, and the mirror-like scales.

B. conchomius is one of the best known of our tropical aquarium fishes, and originally came from northern India. In the wild state, specimens sometimes grow to a length of 6 inches, but domestication over the past four or five decades has resulted in the evolution of a smaller race of tank-bred fish which average only 3 to 4 inches long.

Like most of the barbs, *B. conchomius* is a good-tempered fish, and does not go out of its way to bully or maim other occupants of a community tank. All the same, care should be taken in the choice of its companions, for it is not a wise policy to keep fully grown specimens in a tank containing other species not much larger than a mosquito "wiggler." For a hungry rosy barb, looking for a meal, is not above making a meal of a small male guppy or male *Heterandria formosa*.

B. conchomius is a reasonably long-lived fish, that is, for a medium-sized barb. Generally speaking, the average life span amounts to 4 years, but this may be extended another year or two if the fish is kept under ideal conditions.

THE HENDON SHOW

Reported by A. BOARDER

Photographs by ROY SKIPPER

THE Hendon Aquarists' Society are to be congratulated on putting on a very fine open show on 23rd-25th May. The Brotherhood Hall, West Hendon was tastefully decorated with some fine enlargements of photographs of furnished aquaria, all displayed on trellis above the tanks on the walls. The show was well supported and about 500 entries were received. There were about 50 furnished tanks entered in the various classes and the standard was very high, especially in the tropical classes. The tanks were well arranged and suitably lighted.

Many outstanding fishes were to be seen in the tropical classes, and the blue gularis, pompadour and angel fishes



Winning aquarium in the individual furnished tanks section was this one, entered by Mrs. R. Skipper



Part of the display of entries in the tropical fish class for gouramies



General view of part of the display. Hendon members cleared this show away, and the hall was laid out with carpets and chairs for the following day's church service 160 minutes after the fishes had been removed

were a treat to see. The coldwater classes were well supported and a very good common goldfish class was on show. The any variety fancy-goldfish class contained several veiltails, but none was awarded a card as they lost heavily on lack of colour, bad condition and deportment. The coldwater British and foreign class contained a very mixed bag, and included rudd, orfe, sun bass, golden tench, green tench, perch, gudgeon, carp and even a stickleback. The shubunkin class was a fairly large one containing both Bristol and London types. The Bristols, those in the cards, had the colour but lacked a good body shape.

A great deal of hard work must have been put in by the officials of the Hendon Society, as in some previous years their show has been held in conjunction with the Hendon Borough Council Show. As the Council had decided not to hold a show this year the Hendon Society organised their show on their own, and a very good job they made of it. Open shows have been getting rare in the vicinity of London, and so it is very encouraging to find such a grand effort so well supported.

Aquarists travelled many miles to see the show and two stalwarts from Ipswich were among the first to arrive.



Framed photographs of furnished aquaria were displayed on the trellis behind the show tanks

Bloodfins

(*Aphyocharax rubripinnis*)

ORDER:—Ostariophysi, from Greek *ostarion*—a little bone, and Greek *physis*—a bladder.

FAMILY: Characidae, from Greek *charax*—a sea fish.

SPECIES: *Aphyocharax*, from prefix *a-*—without, and Greek *physis*—growth (thus "small"), Greek *charax*—as above, Latin *rubra*, *rubrum*—red, and Latin *pinnula*—little fin.

THIS little fish is a native of South America, within reasonable distance of Buenos Aires. In an aquarium it seldom reaches 1½ in. in overall length. This "ideal" size, coupled with a slim streamlined shape, a certain claim to beauty and an equable temperament, has gained it many staunch admirers.

During the war years it completely disappeared from the few tanks that managed to survive the strain of that period. By 1946, however, a few had entered the country and were rapidly sold at prices which would make the newcomer to the hobby gasp. Fifteen shillings each was about average. In March of this year they were advertised at 2s. 6d. each, and may be cheaper yet. This places them within the purchasing power of most aquarists, the majority of whom will already have secured one or two.

If an attempt to breed them is to be made, it is as well to give them an aquarium of their own, one large enough to give them ample room to stretch their fins: say, a minimum of 24 in. by 12 in. by 12 in.

The female is identical in appearance with the male at normal times. It is only when she is swollen with roe that she appears fatter in the body than her mate. Live food such as *Daphnia*, brine shrimp and gnat larvae should be copiously given, and the temperature allowed to fluctuate between 72° and 78° F. This fluctuation of temperature seems to keep the fish happier and livelier. Maybe they are subjected to similar changes in their native habitat.

Innes describes the spawning as being in the nature of a mad pursuit, during which the fish leap clear of the water, their bodies contacting in the air. This is not always the way things go. The chase is always vigorous, but leaping into the air does not invariably form part of it.

Eggs are small and non-adhesive. They are also heavier than water and so fall to the bottom of the tank, where some protection is needed from the spawning fish. This is usually provided by dense layers of plants into which the eggs can roll or tumble. I suggest that a trap similar to that described in my article on the pearl danio (*The Aquarist*, May, 1956) might prove more useful.

In the same article I recommended the use of water drawn from the tap only the day previously, and this advice goes for bloodfins also. The fresh water seems to act as a stimulant, and often starts off a spawning drive when everything else has failed. I don't know why it should, but it does.

Small eggs—small fry. This seems axiomatic, but many aquarists are disappointed if they cannot see fry without



Bloodfin

difficulty as soon as the eggs are supposed to hatch, and too readily assume that the eggs have been infertile if after allowing a day or two to pass they still see no babies.

It is far better to assume that all is well, and start adding food for the babies even if these are invisible. The best food for small mouths is water green with free-swimming algae, or a fairly new culture of infusorians. Here is a use for blanket weed, that filamentous algae which is often such a nuisance in ponds. Take a portion out, and squeeze it into a compact ball. Place it in a jam jar, and weight it down with a fair-sized stone. Fill the jar to just below the shoulder with water, and leave it. Within a day or two a healthy culture of minute organisms suitable for feeding your fish fry will be present. The ones first appearing are very small, but within a day or two these are replaced by larger organisms, and eventually the predominant, and easily visible, one is *Paramecium*.

A series of these jars, one prepared each day, will give a succession of cultures of graduated food and should enable you to get the fry safely over the period when they are in the greatest danger of starving—the first fortnight of their lives. A little trouble in this direction is amply repaid.

Follow the larger infusorians with brine shrimp, micro worm, new-hatched *Cyclops* nauplii and small *Daphnia*, then gnat larvae, bloodworms, baby *Asellus* and so on.

With such a diet, growth should be steady and rapid. Within 2 months the youngsters should be ½ in. in length. Cull all mis-shapen or undersized specimens as soon as seen, and spread the young fish around into all available tanks. The result should be a brood of young worthy of exhibition in a "breeders' class" at any fish exhibition, national or local.

Silver-tipped Tetra

(*Hemigrammus nanus*)

THIS little Brazilian beauty has recently become fairly popular because it is often obtainable, not too expensive and very hardy. The name means "dwarf tetra" but at 1½ in. long it is no midget. The colour is silvery with a yellow sheen and the fin tips are an enamel white, which is the more obvious as these fish twist and dart about a densely planted tank. They are not individual fish. You need several to get the full effect. Males perhaps have more colour. A temperature of 70° to 85° F. suits it well and breeding may begin at 75°; the female is fuller and not so well coloured as the male. Soft water, pH 6.6, and conditioning on *Daphnia* are usually all that is necessary. Fry need plenty of Infusoria and follow up with the usual brine shrimp, sifted *Daphnia*, dried foods, etc. This is a difficult fish to catch in a large tank.

Rodney Yorke

The Aquarium at San Sebastian

by MARY R. BULL

AT San Sebastian, Spain's fashionable resort on the Bay of Biscay, there is an interesting Aquarium. This goes by the grand name of Palacio del Mar and entrance to the basement, where the live fishes are kept, is five pesetas (about 1s.).

The only light, apart from that above the tanks, comes from a few dim red lights. The walls are lined with glass "windows" through which one sees the fishes. Light comes from above the surface of the water. As the basement is beneath sea level during high tide, sea water is easily pumped into the tanks. In some the water is pumped in continuously, in others only from time to time according to the variety of fish. On Thursdays and Sundays one can see the fishes being fed at 4 p.m.

In size the tanks vary from approximately 36 in. by 36 in. to large ones measuring several yards. In some there are only a couple of fishes, in others several of the same species and sometimes two different kinds of fishes are together. Most of the fishes are those found round the coasts of Spain, but there are a few freshwater fishes also. Some tanks have a background of rocks, while others have painted scenes with sand and shells on the bottom. The names are in Latin, Spanish, French and English.

One of the most interesting fishes is in a small tank by itself. It is a sea horse, and when I saw it its tail was curled round a pale pink *Branchioma vesiculorum*, and its small, grey head nodded as if it was dozing. There were starfish, crabs, lobsters and crayfish. One large tank had five eight-armed devil fish. This name is usually applied to fishes of the ray family, but here they were octopuses. An attendant obligingly stirred them up from above with a long pole so that I should see how they propel themselves backwards by contracting their horrible tentacles.

There were also sea anemones and delicate *Spirographis spallanzani*, looking like delicate daisies, some pink, others white, their "heads" slowly gyrating round and round. The red and spiky sea scorpions were very ugly, and quite different from their land namesakes. Several of them came up to the glass and stared at me with their protruberant eyes topped with spiky "eyebrows."

Of course, there were the common fishes such as grey mullet, conger eels, striped *Diplodus trifasciatus*, sea perch, three large bream (*Sparus aurata*) and flounders half hidden under the sand. In one tank were two varieties of wrasse, their blue-green sheen turning to red as they swam about. One of the varieties one eats most of in Spain is corbina (*Umbria cirrhose*).

By itself was a very large tank containing a number of spotted dog fish. They shared their rock and sand abode with large sting rays. Some of the dog fish were at least 40 in. long and several lay together, their ugly black spots on greyish ground being an excellent camouflage against the background. One of the smaller ones had the tip of its tail missing, evidently just bitten off by one of the others, as it was still red and raw.

There were a few river fishes such as rainbow and common trout, which are found in rivers in northern Spain, and carp and tench. In one small tank, slim black eels glided round like snakes. Just at the foot of the stairs were some Japanese ornamental fish in a small tank.

On the floor above were glass cases full of shells, skeletons

of large fishes and stuffed sturgeon, shark, dolphin and swordfish, this last eaten extensively in Spain, and very good. One of the most interesting was a large black *Rivettus pretiosus*. This is a deep-sea fish which was caught by a fishing boat off San Sebastian. Hanging from the ceiling was the skeleton of a 15 yards-long whale which was washed up on the coast some years ago. In a place by themselves were three tortoises.

But most interesting of all were six small glass tanks with painted backgrounds containing tiny, red-and-black tropical fishes swimming among delicate grass-like seaweed. Each tank had a thermometer in it but no one seemed to know what the names of these brightly coloured miniature fishes were, or where they came from. I think they had just been donated.

Hygrophila polysperma

ALTHOUGH a comparatively new introduction as far as aquarium plants go, this subject has gained considerable popularity in this country, due, no doubt, to the ease with which it can be grown and the particular brightness of its green colouring.

A native of India, *Hygrophila polysperma* is, of course, listed as a subject for the tropical aquarium and appears to grow and propagate best at a temperature around 75° F.



Hygrophila

A bright light is needed for maximum results. Insufficient light produces stunted leaf development and thin stems which eventually rot off at the base.

The leaves are borne in opposite pairs and root fibres develop from the nodes of the leaves. Therefore, sections

(Please turn to page 79)

Plumose Anemones in the Marine Tank

by P. SCHOLES, B.A.

AS I have pointed out in a previous article (*The Aquarist*, March 1957) the maintenance of a marine aquarium is not an easy task for the aquarist, particularly if he lives some way from the sea and cannot easily renew his supply of sea water. However, I should like to describe in some detail the setting up and subsequent maintenance of a tank used mainly for keeping plumose sea anemones (*Metridium senile*) in which the water has not been changed for almost a year. The anemones are feeding, growing and reproducing quite happily.

The tank used is 48 in. long by 18 in. high by 18 in. wide and is filled to an inch from the top with sea water. Such a tank presents a large surface area and yet it is sufficiently deep and wide to show off the anemones to advantage. Also, in marine aquaria it is as well to use the largest tank possible since the greater the volume of water used the greater the stability. Temperature, pH and chemical changes do not vary and fluctuate so much in a large tank as they do in a small one. Any accumulation of harmful waste products is not felt so immediately and often such substances may be broken down and rendered harmless by the bacteria present before they reach harmful concentrations. In the large tank the relatively large surface area is one of the most important factors in ensuring an adequate oxygen content of the water. Carbon dioxide also is more easily driven off from such a surface and the whole gaseous exchange from air to water and water to air is hastened.

An incidental advantage in using a large tank is that surfaces on which bacteria can settle are not so great in proportion to the volume. Hence any deleterious metabolic products excreted in minute amounts from these bacteria are less likely to affect animals in a large tank than in a small one, since such products will be at a greater dilution. Also fewer bacteria per volume of water will be present to excrete them. This bacterial settlement and the numbers in the population is directly proportional to the exposed surfaces which they can colonise. Few bacteria float or are suspended in the sea water itself. These then are the main advantages to be gained by using a large tank.

The tank stands in position on a bench in a room where the temperature is at a steady 10° to 11° C. (50°-51.8° F.). I consider this steady temperature to be most important in maintaining marine forms which are not essentially rock-pool inhabitants. These can and will endure rapid extremes of temperature in these habitats when the tide rises and falls, but many of them do not seem to be able to survive in aquaria with similar sharp temperature fluctuations. A rise of 3° C. from 10° to 13° C. must be made over at least 48 hours for *Metridium senile*, and even so at the higher temperatures the animals are unhappy for a few days and close up into mere blobs and pats of coloured jelly. Shore crabs are less susceptible and common shrimps can undergo quite drastic changes and survive.

However, the very large and beautifully coloured anemones which are really worth keeping live off shore and can only be obtained by trawling. They occur on many fishing grounds in the North Sea and in such places live attached to shells, rocks, shell debris, etc., at depths of from 20 to 30 fathoms. And in these places temperature changes are very slow. A change of 3° C. up or down the scale would probably take three weeks in spring or autumn. In the

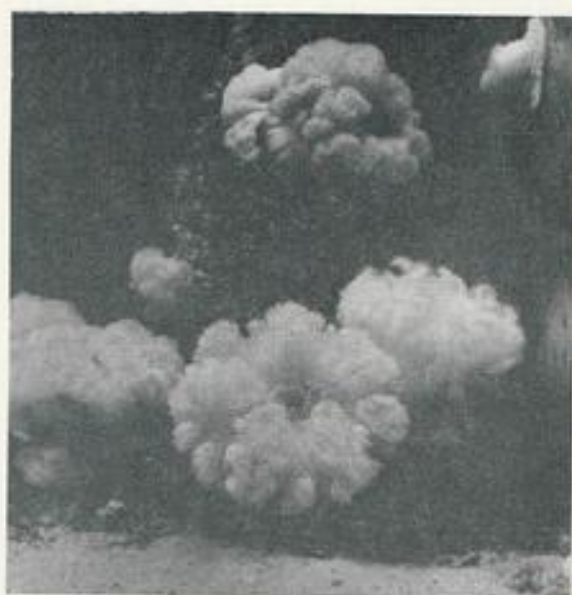


Photo:

W. Huggins

A group of plumose sea anemones, which were collected in a trawl, growing on an old bottle

summer and winter months the temperatures may remain the same with but 1° C. fluctuation for many weeks. The environment is essentially temperature stable and temperature differences are seasonal, not daily.

Given a large surface area to the tank and a steady temperature, two major snags are overcome. With marine tanks, however, the large surface area alone is not enough to ensure rapid and adequate gaseous exchange between the tank water and the air.

A Hy-flo double-piston air pump was used to remedy this. The two delivery pipes were connected to a Y tube which in turn was joined by rubber tubing to a three-way connector. From this passed the three rubber aeration tubes, into the ends of which were inserted short lengths of bamboo. These produced three streams of fine bubbles in the tank and created a good current. Since *Metridium* is mainly a filter feeder and cannot actively seek out its prey, the current produced in this way besides continually renewing the surface layer of water and so aerating the tank would, I thought, bring food to the waiting anemones. With such a vigorous aeration the pH of the water, which was originally 8.0, did not fluctuate markedly except in the first week or two of settling down, and even then the lowest reading recorded was 7.8. This fall of pH at first is a common experience in marine tanks. With inadequate aeration the carbon dioxide produced by the millions of bacteria which immediately settle and grow on the exposed sand, rocks and glass surfaces of a newly set-up tank, accumulates in the sea water and acidifies it such that the pH is lowered. With brisk aeration the initial lowering of pH can be minimised and any subsequent sudden increase of carbon dioxide, such as occurs after heavy feeding, can soon be expelled to the atmosphere.

After the aeration was fixed up a few water-worn rocks

were placed on the 2 in. bed of well-washed sand on the bottom of the aquarium, and it was almost ready for its future occupants.

The only light which entered the tank was from a 60-watt pearl bulb placed in a shade on the top glass and situated about 4 in. from the surface of the water. From previous experience I thought that the green alga *Enteromorpha intestinalis* (a common brackish-water and sea-shore form which looks like crumpled and coiled hollow green-glass tubing) would only flourish in daylight and only really well in direct sunlight. For this tank I decided I would try growing some of the red deeper-water sea weeds. I could have relied entirely on the aeration system, which was adequate, but if sea weeds can be induced to grow then some long-term troubles such as accumulation of non-volatile metabolic products do not arise, since such substances are quickly absorbed by the actively growing plants.

Some tanks kept in direct sunlight have no aeration, but so thick is the carpet of *Enteromorpha*, *Ulva* and other green growths present on the sides of these aquaria that they never show any signs of a lack of oxygen, and the pH is often as high as 9.0, owing to their using all the available carbon dioxide present. Such tanks can be treated most carelessly in feeding and maintenance, but no pollution ever seems to bother them and the water remains sweet and crystal clear. Bearing this in mind, a few red sea weeds gathered at low tide were placed together with the stones to which they were attached under the light in the centre of the tank. Red sea weeds were chosen as they can utilise a much less intense light than green ones. The 60-watt light was kept on for about 8 hours a day.

The sides of the tank after about 10 days were slimy, presumably with bacteria, the rocks were slightly discoloured, the sand was clean and the water crystal clear and sweet, and everything seemed to be in order. The pH was 8.0. Some *Metridium* were obtained from a trawling trip and placed in the tank. They looked at first like lumps of jelly and were dirty-white, grey, yellow, or orange in colour. I had picked them out of the trawl attached to scallop shells, and transported them home in a tub with the deck hose-pipe or "donkey" running into the tub and overflowing. The next morning these uninteresting blobs of jelly had expanded into the beautiful animals shown in the photograph. Some were attached to an old bottle, and are shown in the photograph. The scallop shells and bottle had a few barnacles attached, and in one case 20 to 30 small mussels in a clump. These were all added to the tank and all seem still to be thriving, although some of the barnacles appear to have died and only the shells of some now remain. I settled down to observe and learn.

Metridium senile occurs in two forms, a shore variety and a deeper-sea form. This latter type grows very big. The trunk or column may be 12 in. long and the crown of tentacles borne on it, resembling a fluffy chrysanthemum more than an animal, may be anything up to 8 in. in diameter when fully expanded. The lobed and indented appearance of this tentacle crown may be seen from the photograph. The animal half opened on the side of the bottle has a crown measuring 6 in. across when fully opened, and is a deep orange in colour. The colour varieties range from white, green, grey through a straw-yellow to deep orange. At first the animals tended to close and invert all the tentacles when in the light. In this position they resemble the teats on babies' milk bottles. Frequently a constricted band appears in the column, which itself can be long and thin or contracted and fat with the tentacles either fully extended or half drooping. Gradually the anemones came to expand in the light. There were 12 of them at first in the tank, ranging in size when fully expanded from 8 in. in diameter across the crown, to 2 in.

The tentacles are very small for such large animals and are covered with beating hair-like processes called cilia,

which direct a stream of water bearing food particles into the mouth. The question now arose as to what I could conveniently feed to them. Pieces of mussel the size of a half pea and smaller, dropped by a pipette on to the tentacles, seemed to be eaten with no difficulty. Two white anemones, however, would have no truck with such food. I had several cultures of brine shrimps (*Artemia*) in which these animals were at all stages of development from nauplii to sexually mature adults. A hundred or so were added to the tank and the anemones expanded, and my feeding troubles were over. Even the white ones, which had refused mussel in any shape or form, caught and devoured this prey. However, as I had read that these animals habitually fed on nannoplankton, that is the smallest of the floating animals of the sea, and also, as some authors believe, on very fine particles of detritus, I decided to experiment a little.

I took the two largest anemones and placed them in a smaller tank into which I dissolved a piece of yeast the size of a pea. In 24 hours no cloudiness was apparent in the water. I repeated this and always the tank was cleared of yeast. After a time these two anemones produced a crop of small ones at the bases of their columns by a process known as laceration. As the *Metridium* creeps slowly over a sharp-ridged substratum like a scallop shell small pieces of the base, which resembles the creeping foot of a snail, become torn off and eventually grow a crown of tentacles and become little editions of the parent. Anemones in the big tank moved around 6 in. or so in a week and produced a similar crop of small anemones. Since these two anemones produced this form of reproduction, which I presume would only occur if they are receiving enough to eat and are in good condition, I think it suggests that they were in fact filtering out the yeast from the water. When a little crowd of the young ones had been produced I placed scallop shells and large and small anemones back in the large tank and began regularly to feed with yeast as well as *Artemia*.

This small experiment lasted 3 months, and by this time various changes had occurred in the large tank. At first the red sea weed produced masses of hair-like whorls all along its main stems. When these were examined under the microscope they appeared to be normal chain-like algal cells. Quite a small bush began to take shape in the middle of the tank. Clustered at its base was the small colony of mussels attached *en masse* by their byssal threads to a small stone. The rocks themselves had quickly become discoloured, mainly with bacteria, and were very slimy. No diatoms at first could be discovered in the scrapings from them but gradually they became a rich velvet brown and chains of *Skeletonema costatum* could be identified under the microscope. The front glass became quickly covered with a similar growth and needed frequent servicing. The back and side glasses I left. I suspect that the mussels filtered most of the yeast placed in the tank but the rich diatom growth was perhaps encouraged by its break-down products.

The pH remained fairly constant and fluctuated but little from 8.2 to 8.0. The lowered reading could usually be correlated with a heavy feeding of *Artemia* the previous day.

One thing began to worry me a little. Frequently the anemones would close up and produce a mass of mucus in which skeins of a brownish material (amorphous when viewed under the microscope) would appear. Sometimes such skeins could be seen trailing out of the mouth of the animal. These I took to be the faeces or waste matter. Often a halo was produced, which would gradually be worked over the column of the beast, like a man wriggling head first through a hoop, until it lay in a thick coil at the foot of the column. Some of this mucus I siphoned off. After filtering the water obtained I returned it to the tank, but sometimes large quantities were produced and the

stones and rocks to which the animals were attached became quite unsightly. However, they did not become blackened, a sure sign of pollution, and much of the mucus seemed gradually to disappear.

By this time the surface of the sand in places was covered with a growth of *Skeletonema*. What I wanted was a scavenger to work through the sand like an earth worm. The sea mouse *Aphrodite*, a harmless creature which shovels sand or mud into its gut, and while buried breathes through its anus, would be ideal I thought. I obtained one and although I never actually see it, the sand is now as clean and fine looking as any on the beach. Occasionally I see a small hole in the sand with a water current going into it and the sand ahead heaving and working as if a mole were busy below the surface, and I know that all is well.

This then was the picture up to a month ago, and then I saw small plate-like flat growths appearing on the red sea weed and some few of the rocks. This has now grown so that the small red bush is obscured by flat strap-like brown algal growths. Since this alga has neither bladders nor yet fruiting bodies I cannot identify it, but presume it is a species of *Fucus* common here on the sea shore. The spores must have been present in the sea water originally. On sides and back of the tank a brown and tufted sea weed has become established in patches.

In all this time the tank has received no fresh sea water but it is occasionally topped up to the mark with fresh water. Occasionally a little fresh water thick with green algae is added to the tank. The tank is always crystal clear again after a few hours. Recently a few inch-long dabs and a small hermit crab were added to the tank, so far with no ill effects.

Such then is the so-far-successful story of this marine tank with no water change. The injurious effects of a high carbon dioxide content and accumulation of metabolic products are taken care of by adequate aeration and plant growth respectively. The other major long-term effect, namely a depletion of the excess of alkali content, has not in fact been realized. The number of animals is few and their waste products must be small. Perhaps the slow solution into the water of calcium carbonate from the scallop shells, etc., has counteracted this effect.

To conclude, I would like to stress the stability of the conditions under which the tank is maintained. There is little or no fluctuation of temperature. The pH remains remarkably constant and the aeration is at all times very brisk. It is due to these unchanging conditions that the tank remains clean and healthy despite the non-renewal of the sea water.

Hygrophila polysperma

(continued from page 76)

of the plant or cuttings are easily rooted and this forms the principal method of propagation. These sections or cuttings should not, however, be inserted into the gravel or compost too deeply in case rotting occurs. They should be lightly inserted into the top layer or weighted and permitted to rest on the surface of the gravel, where they will quickly root themselves.

Hygrophila is one of those subjects which looks better when massed; then the bright-green leaves form an excellent background against which the appearance of shorter-growing, dark-green subjects is greatly enhanced.

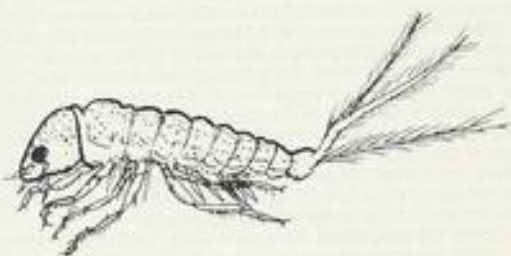
Jas. Stott

July, 1957

FRIENDS & FOES

No. 58

Water Beetles (continued)



Magnified view of the larva of the screech beetle

COLEOPTERA: Screech beetle

FAMILY: Hygrobidae, from Greek *hygros*, wet or moist.

THE sole British representative of this family is *Hygrobia tarda* (Latin *tardus*-sluggish), and is one of the few species of beetles which has been given a "popular" name.

The beetle is about $\frac{1}{2}$ in. in length, with a strongly arched and rounded body. The elytra or wing-covers are blackish, the rest of the body being reddish brown. Caught in a net, it draws attention to its presence by rubbing the end of its abdomen against the wing covers, thus making a noticeable squeak. Why it acts like this is at present an unsolved mystery. Nothing is more certain than that this attempt to frighten the net holder into releasing it, if it is such an effort, only renders more certain its retention as a peculiar creature worthy of closer inspection.

The larvae, too, are most unusual. They are sluggish creatures, keeping well below the water surface. Unlike more familiar larvae, they are independent of atmospheric air, being provided with bunches of gills, which are not apparent until the creature is seen from the side or turned on to its back. The three long, hairy filaments on the end of the abdomen, plus its gills and general shape, might well lead to its confusion with certain mayfly larvae. The filaments may assist it to swim; there seems little other purpose for them to serve.

Aquarists who find these will be struck by the enormous size of the head, this being wider than the body segments. Fully grown, the larvae are the same size as the beetles into which they will change after pupation.

C. E. C. Cole

Microscopy for the Aquarist—32 by C. E. C. COLE

WE have already discussed the great improvement in the quality and detail of images obtained when an image of the source of light is focused in the plane of the object being examined. This is known as "critical illumination."

Even better results may be obtained by a slight alteration in technique, which will enable us to view the object with "Kohler illumination," so called after the microscopist who first experimented with it. So once more let us set up our microscopes, very carefully, checking each step we take.

Place the lamp from 8 to 10 inches in front of the mirror, and direct the light towards the centre of the mirror. Close the iris diaphragm of the substage condenser, and focus an image of the lamp upon it. You can see the diaphragm quite plainly reflected in the mirror if you look at the correct angle. It is hopeless trying to see the actual diaphragm unless the microscope body is horizontal; you must work by its reflection. The condenser should have been racked up almost to stage level. If this has not been done, a slight adjustment of the lamp will be necessary.

Open the condenser iris just a little, sufficiently for you to see to focus a slide placed upon the stage. Take out the eyepiece and look down the body tube (with your eye close to it). Slowly open the condenser iris until it is only just visible within the circumference of the back lens of the objective. Now close the iris in the front of the lamp housing. Is it visible in the plane of the object? If so, is it plainly visible, or just dimly seen?

Kohler Illumination

Our aim is to focus it in the plane of the objective. The object is already in focus, so we use the substage condenser to focus the image of the lamp iris sharply. Only a slight adjustment should be necessary.

When it is focused properly, open the lamp iris until it just coincides with the field of view.

Note the crystal clarity of the image. This is Kohler illumination.

What we have done actually is to focus the light source near or in the back focal plane of the object glass instead of in the plane of the object, with quite an improvement all round.

Kohler illumination cannot be used for low or medium



Tail filaments of a mayfly nymph seen with a 1 in. objective, $\times 5$ eyepiece

powers. It is best for objective magnifications of from $40\times$ upwards. In other words, for use with powers of $1/6$ (4 mm.), $1/8$ (3 mm.), or oil immersion or water immersion $1/12$ (2 mm.).

This completes all I can tell you, or that you need to know about viewing with transmitted light. There are one or two other methods of lighting, however, which you may wish to use from time to time, and I propose to deal with these next month.

When on Holiday

Holidays are almost on us, in fact many may already have had them. Don't forget to take a few collecting bottles wherever you may go, and some preserving fluid (2 per cent. formalin, or acetic acid). Acetic acid keeps insects soft, and this is a boon if making of microscope slides is contemplated. Winter is not so many months ahead—start collecting material now for slide making then. I hope to cover this subject in sufficient detail to make you want to try your hand.



Leaf-like gill plates of a damselfly nymph seen with a 2 in. objective, $\times 5$ eyepiece. This nymph is often confused by aquarists with that of the mayfly



Teeth of *Dytiscus marginalis* (water beetle) seen with a 2 in. objective, $\times 5$ eyepiece. From a microscope slide prepared by the author

AQUARIST'S Notebook



by

RAYMOND YATES

WE have all had the bitter experience of losing a newly acquired fish, and this is all the more distressing when the fish in question is very rare, high priced and perhaps the only one available. Public aquariums are not immune from such disappointments and a case in point is the recent acquisition of a polka-dot trigger fish by the Belle Vue Aquarium in Manchester.

This fish, caught off Ceylon, was undoubtedly a beauty, it was certainly rare and the first to be exhibited in Britain, whilst its price (in the vicinity of £100) made it a very expensive showpiece. It arrived from Holland and was given a large tank to itself where it soon made itself quite at home, even to retiring within the confines of a very large shell when resting. It also became very tame. Like all good things this was not to last, and 11 weeks after its arrival it died for no apparent reason. It had the habit of resting on its side in the manner of clown loach, but this was no cause for alarm. However, one day it was noticed that its colours were rather pale and it refused its usual food of shell fish, etc. Fresh marine food was obtained from Blackpool but all to no purpose. Treatment with antibiotics livened it up but 4 days after it was first seen to be off colour it was found dead when the Aquarium was opened in the morning. Laboratory tests showed no obvious water faults and the cause of death has remained a mystery, although it may be the water had a pH which was unsuitable (pH 7.7). Large numbers of visitors saw it and it proved a great attraction. Another specimen has been caught off Ceylon and this is now in Europe, but (at the time of writing) it is suffering from a fungus infection.

Belle Vue have had rather an unlucky patch lately as they have lost their four blue angels (marine), which were on show for about a month. These fish seemed to suffer from nerves as they would dash about blindly (like scalares) at the slightest shock, usually into the gravel. A dragonfish died overnight on arrival, possibly from shock after travel. This fish disgorged three full-grown guppies. Two more of these fish are ordered. An elephant-nosed trunk fish is doing well, as also some *Distachodes*. The four large pompadour fish are doing very well and now share a community tank with about 60 other fishes. The angel tank has been thoroughly cleaned out, disinfected and the existing inferior stock disposed of. Twenty-five new angels of good size, finnage and deportment have been obtained, and also six black angels, which are small but good.

This Aquarium has recently introduced the new giant *Hygrophila* to its tanks, and excellent growth has resulted. An addition to the usual run of food for the fishes is freshwater shrimps. These are easily captured from the lake alongside the Aquarium by leaving weighted sacks in the water for a few days. Almost any bunch of water plants taken from a clear stream or river will produce many shrimps if the plants are shaken over a large piece of newspaper. Frogs are eaten by some of the fishes at the Aquarium, mainly by the snakehead, razor-finned fish, mudskippers, piranha and the giant gourami. This latter can eat a full-size lettuce at one meal and always reminds me somehow of the enormous carp at Regent's Park.

The 1957 show rules for the San Francisco fish show are very interesting, as there are many unusual aspects when they are compared with what obtains in Britain. Most classes are for amateurs only. I wonder if this excludes the back-room boys who are not considered to be dealers in this country? An elaborate method allows those entering fishes to indicate on their forms if they need a stand for their tank or will provide their own; if aged water or tap

water is wanted; if aeration is required; if no electric connections are needed and if brine shrimp is to be fed daily to the fishes to be shown. Fighters can be entered for showing in tanks, bowls or glasses. There is no entry fee for members of the club but non-members pay one dollar and can then have as many entries in as many classes as they wish. Exhibitors must provide their own tank or tanks complete with fishes, plants and gravel as well as tops, lighting, heaters, filters and thermostats as needed. The club provides stands, wired electricity points, aged water (hot or cold), compressed air and daily feedings of brine shrimp. Ribbons will be awarded for first, second and third places in all classes. In addition, all firsts will get a gold loving cup. There is also a cup for the best exhibit in the show. Dealers can exhibit but there is no entry fee and no prize offered; they are invited to display rare and marine fishes as non-competitive exhibits.

Most serious hobbyists have kept the blind cave fish from South America and have been entranced by the way these fish find their way about without the use of eyesight. Recently I was one of a party conducted a considerable distance down the great Peak Cavern, which lies below Peveril Castle at Castleton in the Peak District. This enormous cave has galleries which run for about 3 miles under the mountain, and it was when we were about half a mile down that I noticed ordinary bullheads in the underground river, which at this point was very shallow. I made enquiries and it seems these are quite common there. This cavern, the haunt of pot holers, frogmen and geologists, seems to have something to offer the aquarist. Dyes in the water (to show where the water comes out into the open) have not proved injurious to the fish. Local fishes in this area are almost entirely trout, grayling, bullhead and loach.

Readers who are in the vicinity of Blackpool during the summer should not miss a visit to the famous Aquarium at the Tower. The serious fire last year, which destroyed the great ballroom, did not affect the Aquarium in any way. Entrance to the Tower building includes the Aquarium and this must make it just the best shop window for the hobby in Britain, because all visitors to the Tower (apart from late-night dancers) walk through the Aquarium, which is at ground level. The curator, Mr. Raymond Legge, tells me that work has now started on the construction of a coral section, something he has wanted for years. Materials are proving a little difficult, however, and it is doubtful whether the project will be completed before late summer. As a matter of interest, Mr. Legge's appeal and advertisements for coral, after a promising start, met with only partial success and he is still eagerly seeking odd pieces or whole collections. Hobbyists with any unwanted coral should contact Mr. Legge, who will be pleased to hear from them.

When you come to think of it, it is rather surprising how few people have names based on those of animals. This may be due to animals being considered rather low in the social order, and those whose names are used (e.g. wolf) represent animals which are respected. Insects, as might be expected, are right out of the picture. Birds come much

more into view as for example Wren, Robin, Rook, Crow, etc., but fishes are not so far behind. Naturally most of these are freshwater local fishes but there are others. You can probably think of people you have met with "fishy" names; here are some I have known: Salmon, Roach, Rudd, Gudgeon, Pike, Eels, Chubb, Shadd, Jack Sharp, Pope, Fish, Mackerel, Tunny, Weever, Spratt, Ray, Trout, Archer, Rice, Herring, Gar, Bass and Shark. Perhaps it would be unfair to include Molly.

I am always interested to hear of clubs publishing a magazine or news-sheet but this has become rather a rare event of late. It was therefore with pleasure that I recently received a copy of *The Ichthyologist*, the official organ of the Sheffield Aquarist Society. At present it is rather small, running to just over four foolscap pages, but it is better to start small and grow, rather than begin with a big splash and fade away. The intention at present is to issue three times yearly, and the editor makes a plea in this first issue for copy from members. How often have I read similar appeals in other club magazines! Articles include notes on Food for Fishes, Our Hobby, A Bluebottle Saga, Hatching Brine Shrimps and Altering pH. The editor is Mr. E. R. Jones, of 18, Hough Lane, Sheffield 11, who will be pleased to hear from other clubs who issue magazines or news sheets.

Garden ponds are not within the reach of all and many are put off by the amount of work involved and the waiting period for the pond concrete to become "safe." I have often wondered why no enterprising firm has not thought of putting something suitable on the market in the form of a ready-made small pond. True, it has been possible to obtain circular trays or tins which have looked wonderful at shows but which lacked depth and which would not have been much use in hot weather owing to this lack of depth. Recently a Manchester firm has offered a waterproofed reinforced pre-cast concrete pool for sale at £12 12s. 6d. The approximate size is 6 ft. 6 in. long, 2 ft. 9 in. wide, the shape approximating to a rough figure of eight. The firm is I. Macdonald Ltd., of Trafford Bar, Manchester 16.

Visitors to Cleethorpes and the Grimsby district this summer should make a point of visiting the Grotto Aquarium on the promenade. This public Aquarium is somewhat unique insofar as it is not run by a private company for profit but by the local aquarium club (Grimsby and Cleethorpes Aquarists' Society). The building is rented from the Corporation, the Aquarium now being in its tenth season, so this is no new venture. It contains about 50 tanks of various sizes ranging from 24 in. by 12 in. by 12 in. to 72 in. by 24 in. by 30 in., which contain fishes and reptiles. The latest tank installed is for marine specimens, and is over 14 ft. long. The main work has been undertaken by club members at weekends. A reservoir serves the large tank, this being formed out of a concrete pit formerly used as a seal pen; this is 5½ ft. long, 4½ ft. wide and 4 ft. in depth. A continuous flow of water is possible, the overflow being filtered and returned to the pen.

The Aquarium is open from 10 a.m. to 9 p.m. every day, except Fridays when the hours are 1 p.m. to 6 p.m. Admission is 6d. for adults and 3d. for children. As well as individual visitors, clubs may care to consider including Cleethorpes and its club Aquarium for a day's outing. Club members feel that their effort has helped to foster interest in the hobby and they are only too pleased to give information when asked. Perhaps members of other seaside societies, where no public Aquarium exists at present, would like further details. The secretary is Mr. Albert E. Parker, of 19, Lichfield Road, Grimsby. For obvious reasons, this Aquarium is open only during the summer

months, and fishes cannot be kept throughout the year in every instance. This means that the club has to obtain reasonably sized specimens each year for putting on show and these are not always easy to come by. Readers with any fishes of good size which they wish to dispose of should contact Mr. Parker, giving full details.

The common earthworm is one of the very best foods you can give your fishes, but even those aquarists with large gardens often just don't bother, possibly because it is easy for them to feed dried foods or purchase "live" food from dealers. Nobody is going to go round digging up the garden looking for worms every other day, but in any case it is not necessary. Choose some odd corner of the garden which is not wanted and make this the site for your compost heap. On this put all your old leaves, dead flowers, mown grass, pulled-up weeds and a little soil. Add to it any large worms you come across when digging and keep it from getting too dry in really hot weather. Before long you will have a happy hunting ground for a worm colony and all the small worms you want. A heap like this can become quite high. I used to have one about 6 ft. square and it was teeming with worms. Unfortunately a day came when I had to share it with somebody else, not a fish-fan. This chap kept snakes and mere fishes cannot compete with the appetite for worms evinced by snakes and it was not long before my eldorado ran out. All worms, however small, are better chopped up, even for eager fishes like perch, cichlids and golden orfe. A trip in the country after rain will reveal many suitable-sized worms if you look under stones on grassy banks, but perhaps the best place is underneath patches of old, rotted sheep manure.

The angler boasts of the size of his catches or the one which got away, but often the hobbyist takes pleasure in the diminutive size of his pets. Weight is a thing which rarely enters into the calculations of fish-keepers, but it has one or two interesting aspects. Most animals live about five times the length of time it has taken them to reach maturity, and this also applies with many of our aquarium fishes. However, cold-blooded creatures tend to continue growing after maturity (the period when fishes are able to spawn), and the rate of such growth depends on the amount of suitable food obtainable over and above the normal requirements of body wear-and-tear and sex functions. The younger the fish the faster the growth, the older the slower. Brian Curtis, in his fascinating book *The Life Story of the Fish* (Jonathan Cape, 12s. 6d.), goes into this point in some detail and mentions some interesting examples.

Jewel fish are ready to spawn when only 4 months old and 2 inches long, but live for 5 years and reach 5 inches. This means the jewel matures when it has reached only one-fifteenth of its possible life span and its possible weight. Golden trout mature when 3 or 4 years old and 10 inches long, which means they do not mature until they have reached approximately two-thirds of their life span and possible weight. The Pacific salmon spawns in its fourth or fifth year and dies immediately afterwards, so that it matures at the end of its life at its maximum weight.

Mr. Curtis give a useful table for fish weight and size. This is based on the fact that for almost all fishes, weight is proportional to the cube of length; that is, a 2 inch jewel weighs only one-fifteenth of a 5 inch Jewel.

$$2^3/5^3 = 8/125 = 1/15 \text{ (approximately)}$$

Coarse-fish records in Britain at present are as follows: carp 44 lb., chub 10½ lb., perch 6 lb., pike 53 lb., roach 4 lb., rudd 4½ lb., tench 8½ lb., eel 8½ lb., dace 1½ lb., bream 13½ lb. British sea fishes: dogfish 13 lb., angler 61½ lb., bass 18 lb., mackerel 4 lb., plaice 7½ lb., whiting 6 lb., tunny 851 lb., wrasse 13 lb. The foregoing are approximate figures only, but give some idea of maximum weights.

Horsehair Worms, Gordian Knots—and Aquarium Fishes

by Dr. MYRON GORDON

(Geneticist, New York Aquarium)

"HE who unties the intricate knot of Gordius shall become master of Asia," proclaimed a Greek oracle. Alexander the Great is supposed to have solved the problem by cutting the knot with his sword, and thus a "Gordian knot" has come to mean an inextricable difficulty that can be resolved only by bold measures.

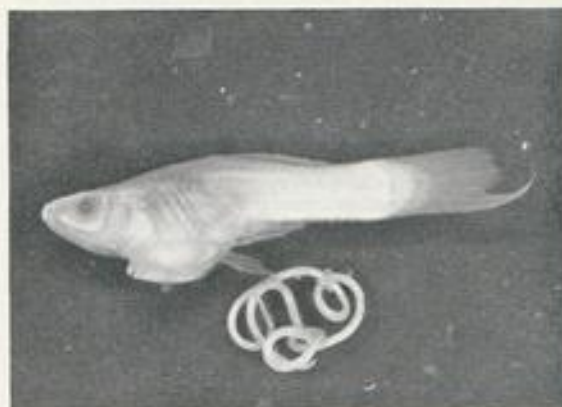
But to a zoologist, the name of *Gordius* has a different meaning; it denotes a genus of long and slender roundworms. Since the worms are typically found coiled intricately about each other, they reminded Linnaeus of the mythical Gordian knot and he gave them the generic name of *Gordius*.

"Horsehair Snakes"

Perhaps farm boys nowadays learn so much biology that they no longer believe that "horsehair snakes" are hairs from a horse's tail that have turned into snakes. At any rate, the presence of long, thin, brown, wriggling "snakes" in horse troughs and other animal watering places is no mystery. They are simply the larvae of gordian worms, which develop as parasites usually within the bodies of insects such as beetles or grasshoppers. When some of the parasitised and feebly flying insects fall into watering troughs and die, the roundworms emerge from their dead hosts in a fully grown condition. By some subtle sensory mechanism, which all animals have in common, the male hairworm detects the presence of the female, and moves to it through the water with spasmodic coiling and uncoiling of its body. The male hairworm, it has been said, can distinguish between a virgin worm and one which is already mated and gravid.

Once the male has found a receptive female, he coils about her and rarely lets her go. Often, especially in the spring, 10 to 20 worms may form a single cluster, and thus entwined they may be found by horsemen in watering troughs. From these fragments of their life cycle, it is easy to understand the old belief that links horsehairs with gordian worms.

The fully developed gordian worms are not parasites; indeed, the adults lack mouths, their digestive tubes are degenerate and they have no excretory system. Despite these deficiencies the adults accomplish their most important purpose in life, which is to mate and propagate their kind. During reproduction, in their intricate coiling about each other, the male gordian worm deposits a quota of sperm near the anal opening of the female and then, having accomplished its function in producing and delivering sperm, in some species the male soon dies. The spermatozoa travel, apparently under their own powers of locomotion, towards the female's seminal vesicle and eventually fertilise her eggs. The female horsehair worm lays her fertilised eggs in water in sticky, bead-like strings which swell with water; sometimes they become several feet long, many times longer than the worm itself. She winds the egg



In one albino male swordtail, one gordian worm measured three and one-half inches long; it was light brown, tough, wiry and wound around like a coiled spring

string about aquatic plants when the weeds are available but the strings may be broken into many pieces by waves and wind.

The adults of some species of worms often remain coiled about their own strings of egg masses for many days, seemingly as if to protect them, but the female worms of other species die soon after they deposit their eggs. It has been asserted that the Gordiacea place their eggs in brooks or other running water but the late Dr. Henry B. Ward, senior author of the monumental *Fresh Water Biology*, usually found them along the shores of lakes. On one occasion, he saw a conspicuous windrow of adult worms and their egg masses along the shore of an inland lake. His guess was that they were washed ashore by the wind.

When the eggs of the horsehair worms hatch, within 15 to 80 days, depending upon the warmth of the spring sun, they release microscopically small embryos, each of which soon develops a conspicuous eversible proboscis and a set of effective backward-pointing hooks. The larvae are totally different in appearance at this time from their parents.

Larval Development

Some zoologists say that the minute larvae force their way into aquatic insects with their efficient boring mechanism. Others say that, within 24 hours after hatching, they encyst on vegetation near the water's edge. In these well-protected packets, they remain immobile until some aquatic animal swallows it with its food. If the water level should drop before it is ingested, the cysts are capable of resisting desiccation for a month or so. Some terrestrial insect such as a beetle, grasshopper or cricket may swallow the gordian cysts as it eats its plant food. One inside, the larvae escape from their armoured cysts, aided ironically by their host's digestive juices which dissolve the outer coats of the cysts. The freed parasitic worm bores through the host's intestinal wall and takes up residence within the body cavities. On an ever-ready source of food the *Gordius* larvae develop almost to complete sexual maturity; then it is ready to emerge from its host's body.

If the parasitised insect happens to be near water, the horsehair worms survive; if not, it may die. Robert W. Pennak, author of the encyclopaedic *Fresh Water Inverte-*

brates of the United States, gives credence to the thought that parasitised insect hosts tend to seek water when their worms are ready to emerge. Moralists might cite this obliging behavior on the part of a suffering and exploited animal as the epitome of offering the other "check."

The life of the roundworm appears to be chancy indeed. Successive generations of worms are assured, however, if only one pair in every thousand reaches water to mate and lay their eggs, because a solitary female can produce several million eggs.

During spring and summer the worms usually emerge from their hosts. If they were to emerge during the winter, freezing temperatures and icy waters would certainly delay, if not prevent, their advancement. Despite the hazards of emergence in the autumn, one species of *Gordius* leaves its grasshopper host in September or October and passes the winter hibernating in the grass or roots of plants.

Horsehair worms have been found not only in the bodies of insects but also less frequently in spiders, earthworms and snails. The presence of the Gordiacea in fishes, amphibians and mammals including man is regarded as purely fortuitous and accounted for by the accidental swallowing of worms in water or by eating raw, worm-infested animals.

Worms causing Deaths of Fishes

At the old New York Aquarium Dr. Ross F. Nigrelli, the Aquarium's pathologist, found that gordioid worms of the genus *Chorodes* caused the death of four species of tropical aquarium fishes: the live-bearing killifish *Poecilia vivipara*, a tetra *Poecilibrycon* sp., the platyfish *Xiphophorus maculatus* and the swordtail *X. helleri*. He reported that the swordtail's body was greatly distended by the presence of roundworms. When alive it had swum with great difficulty and could hardly keep itself upright. When he dissected this and the other aquarium fishes, Nigrelli found a pair of active worms within each fish. The worms measured from about 2½ to 8½ in. and were strongly coiled around each other. Each worm was many times larger than its host and when they were alive they had damaged and displaced the internal organs of the host fish. Nigrelli said that horsehair worms have caused death in a black bass and a trout by penetrating their heart chambers.

In the Genetics Laboratory, during a period when small



"Stop mumbling, Gromley, and finish unloading the rest of that salt-water shipment!"

live tubificid worms were fed regularly, four *Xiphophorus* fishes had died, and when they were autopsied they contained gordian worms. Occasionally *Gordius* larvae have been known to enter segmented worms (annelids) of which the tubificids *Aulophorus* and *Tubifex* are members; thus it would appear that the fish had eaten "worms within worms."

I found a single *Gordius* in each of two female *X. maculatus* platyfish, in a male *X. xiphidium* purple platyfish, and in an albino male *X. helleri* swordtail. The worms were light brown, tough, wiry and wound around like a coiled steel spring. One worm penetrated a platyfish's ovary. Another was so intricately coiled about the intestinal tube of a male spike-tailed platy that I could not extricate the worm without tearing the internal organs. Two worms were just more than 2 in., one was 3 in. and one was 4½ in. long, all longer than their hosts.

Biologists still cannot explain completely how the microscopic, aquatic gordian worm embryo finds a terrestrial insect to parasitise. Biologists are mystified even more so by their presence in fishes, amphibians and mammals. Our lack of knowledge of their complete life cycle is evidence that scientists have yet to untie this biological Gordian knot.

Water Purification in Aquaria

A DEVELOPMENT in water purification for aquaria is the introduction of a filtering and purifying medium which employs an entirely different principle from those in current use. This is the 'Sterasyl' principle, which makes use of the bactericidal properties of silver.

It has long been known that certain metals, among which is silver, have bactericidal properties, also that when metals are placed in water minute quantities are dissolved, but it is only recently that the principle has been applied commercially. British Berkefeld Filters Ltd., the well-known water purification specialists, after prolonged research have perfected a method of treating their filter candles with finely divided silver for the production of domestic filters providing germ-free water for drinking purposes by means of silver ionisation.

"Sterasyl for Aquaria" is available in the form of silver-coated granules with which is supplied a sheet of porous plastic filtering material, which can be cut to fit any type of filter. This plastic sheeting is easily washable in cold water and can replace glass wool and carbon in filters.

After this has been some time in use, the silver ions are

gradually deposited on all the surfaces inside the aquarium such as the tank walls, plants, sand and sediment and on the gill membranes of the fishes. The germicidal effect of the silver reduces the number of bacteria, particularly on the surfaces mentioned. The fishes are kept in a healthier state, are more vigorous and grow more rapidly because there are fewer oxygen-consuming bacteria in the water. The silver-ionisation process also suppresses the development of algae and green water, whilst increasing normal plant growth.

Whereas livebearers will breed perfectly well in a 'Sterasyl' treated aquarium, eggglayers should be removed to a non-treated tank a few days before spawning takes place, as any eggs would otherwise be rendered infertile by the sterilising action of the silver ions. As, however, the porous plastic filtering sheet is untreated, this may be used with safety during spawning.

("Sterasyl for Aquaria" is packed and distributed to aquarists for British Berkefeld Filters Ltd., by the Liquify Company Ltd., of Dorking, Surrey.)

Fancy Goldfish Breeding—6

YOUNG fish should now be making good progress and can take most kinds of food. Once the fry are a month old they can eat the same kinds of food as adult fish but, of course, it must be small enough for them to take. It is surprising, however, what large pieces of foods, like Bemax, the youngsters are able to ingest. When feeding with small earthworms it is important to see that pieces too large are not given, as it is possible for a fish to get a large piece stuck in its throat, when it can soon be in trouble. Give as varied a diet as possible and do not neglect the live foods. Adult *Daphnia* can now be given, and it will be noticed how well the fry will grow on, especially if the feeds are varied with occasional items such as dried shrimp, Bemax, mashed earthworms and enchytrae. Actually the enchytrae need not be broken up for fish of this age, but it is a good plan to mash up all types of worms and mix them with some dried or packed foods now and then.

The frequency of feeds will depend to a large extent on the temperature of the water. As long as it is between 65° and 75° F., it will be found that the fish feed well, but the water must be in good condition to enable them to get sufficient oxygen. Without it they will not be able to digest the food and will soon go off colour and lose all interest in food. There may be no need to give any artificial heating at this time of the year, as the water should be in the upper sixties in rearing tanks kept under cover. It should not be necessary to continue with artificial aeration from now on. If the tanks had been kept without water plants when the fry were first removed from their hatching tank it is probable that the water will keep in good condition if a few plants are added now. Do not forget to change

by A. BOARDER

fish should show no visible scales at all and appear as matt or nacreous. The body should be less in depth than half the length, with an equal contour above and below. The body should be plump without being deep-bellied, and the upper contour should be a gradual curve without any humps or snout tendencies. The finnage is reasonably formed without any excesses in length. The colour should be a bright combination of blue, violet, red, yellow and brown with a scattering of black markings almost all over.

When sorting the youngsters it will be necessary to see first of all that no fish have paired anal fins; this would disqualify them at a show. Place the fish in clear-sided tanks and examine for body and fin shapes. Now sort for colour. Those which are practically colourless or almost transparent will never make show fish. You should look for those with a good depth of colour; the darker they appear the better they generally turn out to be. The shubunkins should show their colour very early in life, not like the scaled types, which may be months before turning from the original dark bronze to the required red.

Obviously it will not be possible to pick out the winners at this early age, but it is possible to be able to discard all those which will never make a show fish or one it would pay you to use for breeding from later on. What you do with the discarded ones is up to you. Many writers say put them down the drain, but personally I have never been able to bring myself to destroy any healthy fish. I usually keep most for children or place them in the local pond. One point I must emphasise, and that is, do not waste time, space and food on fish which can never make good specimens. Give all your care and attention to the better fish and then you will be more likely to keep them growing healthily than if you try to rear every fish in the hatching.

The Bristol shubunkin is shaped differently from the London as it is more streamlined in the body and has larger finnage. The colouring is the same as for the London but it is in the shape of body and finnage that the chief points necessary will be found. The body should be well proportioned, without being coarse and stout. A certain streamlining is required, with a small waist or caudal peduncle. The fins are all larger than those of the London shubunkin and the tail is very well developed. The spread of the caudal should be greater than its length and the lobes must be broad and rounded at the tips.

Carriage of the Tail

Many fish carry the caudal fin or tail very badly, and it has been stated by some that it is impossible to breed any fish which could carry the tail in the required manner. This is not true, as I have seen fish which do carry the tail properly. It has been said that the top ray or rib in the tail fin is not strong enough to be able to carry erect the rest of the upper lobe, but anyone who has examined a fish will know that the upper lobe of the tail is not held up by one fin rib but by several. Each rib helps to keep spread the tissue in between, and there is absolutely no reason at all why fish cannot be bred which are able to carry the upper lobe of the tail in the required position.

Once the best fish have been sorted out they must have

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6. Sorting Shubunkins

some of the water occasionally, say, once a week. A partial change will do, and you will be surprised how the fish will appreciate this. Water is bound to get foul when a number of fish are constantly discharging their droppings into the water, and uneaten foods are always a danger.

If one has a small outdoor pond available it is possible to place the fish into this once they are from three-quarters of an inch to an inch in length overall. Be very careful though that there are no pests present in the pond which might eat or injure the fry. Some aquarists have placed their youngsters in an outdoor pond only to find that they gradually disappear. They may have been eaten by the larvae of dragonflies, water beetles, water boatmen or water lice (*Asellus*). If you have the space it is far safer to keep the young fish in tanks or indoor small ponds in a fish house where they can be watched and kept fairly safe from predatory creatures.

It will now become imperative to sort out the fish for quality. It will be remembered that the sorting for size has already been dealt with, but now the actual show possibilities of the fish should be assessed. In this series of articles all the fancy goldfish types will be dealt with, and in this article the shubunkin will be described.

Shubunkins

Under the standards introduced by the Federation of British Aquatic Societies in 1947, the London shubunkin was not recognised, but under the new standards it is included under those for the common goldfish. This fish conforms to the shape of the common goldfish entirely, but instead of being visibly scaled, or metallic as it is called, the

In the Water Garden in JULY by ASTILBES

NOW is the time when the water gardener can sit back and relax to enjoy the beauty of the pond. Water lilies should be flowering well and many other flowering plants can be at their best. There are so many different types of water plants which flower well and others which give colour with variegated leaves. Naturally, to get a really fine selection one needs a good-sized pond, but even in a small one it is possible to have a few choice plants which can give pleasure over long periods.

Few of the plants for the pond grow naturally in fairly deep water, except the under-water oxygenating plants and the lilies. Most of the others are essentially bog plants and prefer a position where their roots are never dry but yet the crown of the plant is barely in the water. Many pond owners go wrong with some of these types of plants by trying to grow them in water that is too deep. If the pond is deep and some flowering plants are needed it is possible to build up steps of bricks or broken paving stones so that the pot containing the plants can be brought up to the required level.

Many of the lilies can grow in shallow water and, as has been said before in these articles, before making up your mind as to which water lilies you are going to grow consult the growers' lists, and order only those plants which are suitable for your pond. The depths for these lilies vary from 2 feet to 9 inches. For the latter depth the *Pygmaea* types are suitable. If you have a very small pond do not think that because it looks a bit bare when first constructed, you have to plant several plants therein to fill it up. One water lily only is sufficient for a pond which has an area of no more than 16-feet square. Once it gets established the leaves can spread over a good deal of the surface of the water and look really well. If on the other hand too many lilies are planted then each one will be unable to spread its leaves properly and the whole effect will be spoiled. Many of the lilies, especially the *Marliacea*



Photo:

Laurence E. Perkins

Flower of the water lily *Nymphaea escarboucle*

types, have handsome variegated leaves, and even when not in bloom the plants are very attractive.

The pond side should never be neglected and there are many attractive specimens which can be grown there. Often a rockery is built adjacent to the pond. The soil removed when the pond is made can be built up and studded with a few suitable rocks to form the basis of the rockery. This gets over the problem of what to do with the spare soil and takes away the flatness which might otherwise have been apparent. Also, when some plants on the rockery are in flower the reflection in the water can give an added attraction. On one side of the pond it may be possible to construct a bog garden where so many fine plants can flourish. This can be situated where the overflow from the pond is placed so that it will be kept damp after rains or when some fresh water is run into the pond; this can be done occasionally, especially in hot weather, as it not only freshens up the water but will benefit any fishes in the pond. Water lilies do not like running water but some new water added with the hose will do them no harm.

Among the favourite plants for the pond side are the irises. These can be had in many lovely shades and some are quite suitable for the higher drier ground, whereas other types prefer damp conditions. Make sure when you are considering the planting of irises that you get the right kinds for the position, as otherwise you may be in for a disappointment. The tall bearded irises are very handsome but must not be planted in the bog garden. They will do splendidly though, on the lower slopes of the rockery or on some slightly raised ground near the pond. They love the sunshine and so it is not of much use setting them in a shady position. The soil must be well drained but need not be particularly rich. If the soil is wet then the bed must be raised. Manure need not be used but a good dressing of bone meal or hoof-and-horn grit may be incorporated in the soil at planting time. The best planting time for these subjects is from mid-July to late August but it is still possible to plant them later in the autumn or even in the spring, but the late-summer planting will usually give the best flowering results the following year. When planting see that the roots are well spread out and covered, but the top of the rhizome can be just above soil level.

The main flowering times of these irises will be in May and early June. There are so many different species or varieties that it would be impossible to include many here; some of the specialist growers list over 150 different varieties. Most of them flower at about 36 inches high, but some are about 6 inches less and others 6 inches more.

For early May flowering choose from: *Iris florentina*, white with a touch of lavender, scented; *I. kochii*, deep claret purple, short growth; *I. sarah*, white, free flowering; *I. Sunbeam*, self-canary yellow.

For flowering mid to end of May; *I. alme*, sky blue, very choice; *I. argus Pheasant*, golden brown with coppery sheen; *I. Black banner*, rich velvety blue, almost black; *I. Burlesque*, golden yellow and purple garnet, edged with yellow; *I. Constance Meyer*, near self pink; *I. Friar's crag*, darkish brown; *I. melodis*, golden apricot, with golden-brown blendings; and *I. Rose of England*, lilac pink to deep red.

For later flowering types choose from: *I. Blue ensign*, deep royal-blue self; *I. City of Stratford*, dark reddish purple, very velvety; *I. Desert song*, cream to primrose; *I. Lamplight*, flesh-buff with a rose glow; *I. loutois*, light chocolate-brown standards, falls a glossy red-maroon; and *I. Pluie d'or*, a deep yellow.

For a damp position the bearded flag irises are fine but do not like lime in the soil. Some of the varieties are:



Photo:

Lily pond in a Sussex garden lawn

H. Joel

I. siberica Bracknell, *I. siberica* Camberley, *I. siberica* Heavenly blue and *I. siberica* Snow queen; these are very suitable.

The type known as *Iris kaempferi* are also suitable for the pond side but if they can be kept drier once they have flowered until growth recommences they will do better. There are many lovely colours among this type of iris and most will benefit from a more liberal addition of fertilisers



The pond-skater (*Gerris*) is a harmless inhabitant of the pond surface

and mulching. They can be planted in September and October, or March and April. Where they can be fairly dry most of the winter the earlier planting will give the better results the following year. Some good kinds are: *I. kaempferi galatea*, mauve with white centre; *I. kaempferi hendersoni*, claret-purple; *I. kaempferi* Juno, light rosy purple; *I. kaempferi* Morning mist, white faintly shaded with blue; *I. kaempferi* Olympus, pale purplish blue; *I. kaempferi* Violet queen, rich violet.

Do not overdo the artificial feeding of the fish in the pond as at this time of the year there will probably be plenty of natural food available.

Some pondkeepers are curious as to whether their fishes can eat the pond skaters (*Gerris*), which skid about on the surface of the water. I have never seen any fish even attempt to eat one. These insects eat flies, etc., which drop on the water, and will do no harm to the other occupants of the pond.

Fancy Goldfish Breeding—6

(continued from page 85)

the maximum amount of space at all times, if they are to develop quickly and grow into healthy fish. Once they are an inch long overall they should have not less than 24 square inches of surface area for each fish; that is, not more than 12 fish to a standard tank (24 in. by 12 in. by 15 in.). Try to keep the temperature of the water from falling much below 60° F., and feed as often as the fish will take food. If a little food is sprinkled on the top of the water the youngsters should soon be up after it. If they do not appear eager to take any food no more should be added for some time. At least three feeds a day should be given in quantities which can be cleared up in a matter of 5 minutes or so. No snails should be in the tanks as they can eat quite a lot of the food and spoil much of that which they do not actually eat.

When considering which fish to grow on for breeding from it is better to concentrate on those which come up to the standards. Any fish with obvious faults may pass these on to their offspring. The possibility of showing the fish later on should be borne in mind, and it may be useful to intending exhibitors if a list of the more common faults is given here. Hump backs and snouts are bad faults and, of course, double anal fins would disqualify immediately. London shubunkins with excessive finnage should not be kept, as these tend to show that the strain is from a Bristol type. A few odd scales showing up need not mean that the fish must be discarded. I have seen many fish win which had an odd scale or two. These scales show up very plainly on the matt surface of a fish. The gill plates should also be soft, that is, must not show the metallic shine of ordinary scales or gill covers. However, an otherwise good fish can win if it has one or two gill plates hard, but the preference would always go to the soft gill-plated fish over a hard type.

The colour is most important, as without it the fish is not a shubunkin. Many fail in that they have no or insufficient red; some show no blue and others are too black. The fish which will catch the judge's eye is the one with a bright-blue ground colour with red, brown, yellow and violet in well-defined patches. Too much of one colour, such as a preponderance of red, can go against a fish. The pointings are: size, 20; body, 20; colour, 20; fins, 20; condition and deportment, 20. As can be seen, a big fish in good condition can start off with 40 points and so beat a much better-shaped but smaller fish.

Next month's article in this series will deal with subsequent treatment of fry and will describe the fantail variety.

The Scavenger

NOT far from my house is an ornamental pond tended by a council gardener. A number of ducks are always there ready for the scraps of bread thrown to them by the children. A fairly large wire waste-paper basket is provided near it for litter. Someone, probably without a decent hobby to keep him sane, did not like the



Unexpected catch

wire basket and so threw it out into the pond. After a few days the gardener thought it had been there long enough

and with the aid of a long stick he managed to drag it into the side. He was then able to pull it up onto the bank. He was then scared out of his wits by a sudden violent thrashing about inside the basket among the paper. Eventually he found that a huge tench had found its way into the basket. It was so large that it could not lie straight, its length being much greater than the width of the basket. The gardener thought that no-one would ever believe him without proof, and so he carefully lowered the basket into the water again and called another gardener to verify his catch.

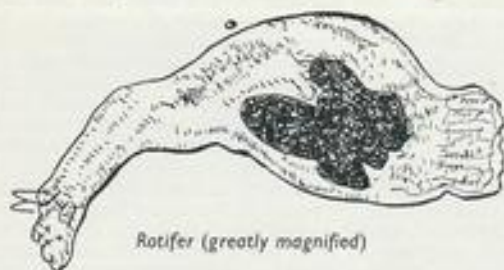
When the gardener told me of this occurrence he said: "Of course, you don't believe me." But I told him not only that I believed him but that I was not a bit surprised, as in 1949 I had placed three large tench in the pond! They had grown too large for me, and I told him that some young tench, which I had bred from them in 1947, had themselves bred and so I had kept a trio of them. I still have them and they have made fine large fish now.

The tench has often been described as a scavenger fish, but I never knew one go to the lengths of trying to eat up the waste paper from a basket! The fish was returned to the pond, and I wonder whether it will be another eight years before it is seen again. I have no knowledge of this tench having been seen by anyone from the day I put it into the pond till its capture in the basket.

A. Boarder

Friends, not Foes

In the article on *Hemigranous ocellifer* in your February issue a warning was given about planarians. I would be glad if you will identify the creatures I am sending from my aquarium, for I think they might be planarians and the cause of my spawning failures. They were introduced with water fleas and have multiplied at an alarming rate.



Rotifer (greatly magnified)

Let me reassure you straightaway. The creatures are not planarians, but specimens of several species of Rotifera, which far from harming your fish should be excellent live food for them when they are big enough to eat them. Planarians are very much bigger. It does not require a microscope to identify them. They are usually greyish or black, and glide over the glass and plants with a smooth movement reminiscent of a slug. When a light is switched on after several hours of darkness it is frequently possible to see them making for shelter. They dislike light, and this is the reason so many aquarists have never seen them. If they were present in your aquarium, free-swimming fry would disappear (during the dark hours) just as easily as younger ones.

Twenty-five Years Ago

BRIGHTON Aquarium's world-famous tank, with its 110,000 gallons of sea water, is no more. After 60 years' service it has "passed" unlamented. This is not altogether true, for the great tank still exists, but emptied of its sea water, which is partially replaced by a new series of smaller tanks that have been designed with attractive scenic settings. This "Scenic section," which was opened to public view on Whit Sunday, is something new and original, unique in the world of Public Aquaria and, in consequence, distinctive to Brighton. One setting depicts a gorgeous sunset on the Cornish coast, the spectator obtaining an impression of standing inside a cave and looking out to sea at low tide. The subdued lighting within the cave discovers pendant stalactites beneath the arching roof and sombre rocks that line its sides. A subtle air of haunting mystery is emphasised by the glowing colours of a setting sun, which flood the cavern floor and gild the outlines of a grey-toned castle on the edge of a jutting headland in the middle distance. The tide is running out, and here, amid the rocks and shingle and sand, may be seen the flotsam and jetsam of the foreshore, together with the living creatures that inhabit the ocean's fringe. In the foreground is a lobster pot, its captive crustacean showing through the wicker bars. An ancient anchor, draped with seaweed, lies embedded in the sand. . . . (An extract from an article with the sub-title "A Submarine World Tour for Sixpence," by the Curator of the Brighton Aquarium at that time, in the July, 1932 issue of "The Aquarist".)

British Aquarists' Festival 1957

5th and 6th October

at Belle Vue Zoological Gardens, Manchester

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

We recently acquired a tropical fish tank complete with a small collection of fishes, among them: black mollies, guppies, scissortails, swordtails, zebra cichlids, angel fish and two young shubunkins. Within a few days after setting up the tank we found the guppies, black mollies and scissortails dead on the bottom, and the shubunkins soon followed them. Can you give us any idea why these fish died so suddenly?

You began with an ill-assorted collection of fishes! Zebra cichlids are very pugnacious, and soon kill such species as guppies, mollies, swordtails and the like. Shubunkins like plenty of room in well-aerated water, and are really more suited to the outdoor pond or large coldwater tank than the tropical aquarium. We can only advise you to dispose of the zebra cichlids as soon as possible, or else it will not be long before the other fishes you have in your aquarium will meet an untimely end.

My tropical aquarium has been set up for just over two months but already a dirty brown scum has formed on the plant life and sides of the aquarium. I have been told that this scum is known as brown algae. How can I get rid of it, please?

Brown algae is not always easy to get rid of in the aquarium, but it can be kept well under control by scraping it from the sides of the tank and siphoning it from the aquarium as often as possible. If you leave it alone, it will cover everything in a brown slimy growth. Once it has been cleared from the glass sides, and scrubbed off rockwork, try planting the aquarium more thickly with higher plant life, and giving the tank as much bright light as possible. A good growth of plants such as *Vallisneria* will often starve algae growths out of existence. Acid water inhibits the growth of algae; so try straining your aquarium water through peat.

I bought a tropical aquarium a few days ago and set it up as instructed by the dealer; that is to say, I covered the bottom with washed sand, introduced plants, and switched the heater on. But when I chanced to look up into the underside of the canopy, I was horrified to see it had become covered with droplets of water—condensation from the water just a few inches below the roof of the canopy. What should I do to prevent a short-circuit occurring when I attempt to switch the lights on?

As the lights had not been switched on the cold roof of the canopy contributed to the excessive amount of water gathered on its underside. If the lights had been switched on from the start, the warm air inside the canopy or hood would have dried the moisture-laden atmosphere between water and canopy. Most canopies are provided with a few holes or slit-like apertures to allow for proper ventilation. If your canopy is not provided with these, then it might be a good idea to equip the lamp-sockets with tight-fitting rubber sleeves cut from old bicycle inner tubes. If these rubber sleeves are pushed over the base of the lamps they should provide a water-tight sheath between the lamp and the actual socket.

I have been told that the water in a tropical aquarium need not be changed for years. Is this true?

The water in a tropical aquarium should remain pure for many years if certain rules are observed. For instance, all uneaten food should be siphoned from the bottom as soon as it is noticed. Dead snails and fishes should be removed from the aquarium as quickly as possible. The plants should be looked over every now and again, and dead and unhealthy-looking growth cut away. Cupfuls of water should be added every so often to make good the water lost by evaporation from the aquarium. If the aquarium receives too much bright light during the summer, shading with tissue paper will help to preclude the growth of free-swimming algae, the cause of so-called green water. When the dark days of winter come round, some artificial illumination (electric light) should be provided to keep light-loving plants in growing condition, and prevent their rotting away and polluting the water.

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

Some time ago I bought four three-spot gouramies. Since placing them in a community tank they have remained very quiet in the plant life and seem to have lost their spots. Is this species "nervy" by nature?

The three-spot gourami often remains hidden in the plant life until it becomes really used to its surroundings and its companions in the aquarium. But when it does finally settle down it often becomes a nuisance, for large specimens will bully smaller fishes and, during courtship, a male may seriously injure his mate and kill any other fish which ventures near him. The spots on the side of a three-spot gourami come and go according to the mood of the fish.

I have been thinking about constructing a plywood hood equipped with strip-lighting for my tropical aquarium. Do you think such a hood would prove successful?

Plywood suffers from a tendency to warp when subjected to a damp atmosphere; so we strongly advise you to provide adequate ventilation in the form of a number of holes in each end of the hood, and to give the wood on both sides at least three coats of aluminium paint before applying white enamel to the inside to provide good reflection of the light on to the top of the water.

I have noticed that when I switch the top light on over my aquarium, the flame fish often spiral to the bottom and lie, as though panting, on the compost. After a short while, they seem to recover and swim about in a normal fashion. Please can you tell me what is wrong with them?

It is not a good plan to subject fishes in an aquarium to a sudden flood of bright light. Most fishes "sleep" or rest after dark, and the sudden lighting-up of the aquarium gives them a shock. If the room light is on, the additional lighting up of the aquarium will have little or no effect on the inmates, but if the room is dark, and the aquarium light is switched on, some species will be very upset, and it is not unknown for a fish subjected to such treatment to die of fright.

A chalky deposit keeps forming on the sides of my aquarium and on the heater tube. Is this bad for the fishes?

Chalky deposits often form on fixed objects in the aquarium. So long as the fishes appear to remain in good health do not worry about them. The chalky formations can be removed from the heater tube by careful scraping with an old knife. It appears that you live in a district with a hard water supply.

I have some loaches of the genus *Acanthopneustes*. Please will you tell me the sort of conditions these quaint little fish prefer?

These loaches like to live in a thickly planted aquarium with a soft bottom; that is to say, a bottom of fine sand or fine gravel covered with a layer of rich brown sediment. A temperature of between 72° and 78° F. suits them very well. They are bottom-feeders and flourish well if provided with chopped earthworms, white worms, tiny scraps of meat, Tubifex worms and the like. They will also take dried food. They do not like too much bright light, and are most active in a well-shaded aquarium or after dark.

A friend has suggested my using an aspidistra leaf for the purpose of spawning angel fish. Do you think this idea is a good one?

We have never heard of aspidistra leaves being used as a

spawning plant for angel fish, and would not care to try out the idea in case the leaves poisoned the water. It would be safer to use the following: well-washed bamboo canes, or narrow strips of frosted glass or clean slate stood upright against the side of the aquarium, or rubber tubing stiffened by a piece of stick and inserted in deep sand, or a small mound of heavy pebbles.

Some of my fishes have developed a hump on the back. Can you tell me the cause of the trouble?

A lot of fishes, when they reach old age, develop a hump on the back. On the other hand, a few species, some of the cichlids for instance, often develop a bump or hump on the back just behind the head.

I am a comparative newcomer to the tropical fish-keeping hobby, and have just bought several zebra fish. These fish continually chase after the other fishes in my community tank. Will they do any harm?

Zebra fish are harmless. They are very active little fish and love to swim after other fishes. If you have several zebra fish you will notice that they will keep close together most of the time, but if one starts to follow a neon tetra or flame fish, the others will follow suit. It's a case of "follow my leader." A tank containing about two dozen zebra fish makes an attractive sight.

I like the clean appearance of silver sand. Do you think well-washed silver sand would be suitable to place in my aquarium?

We agree with you that silver sand looks very attractive on the floor of an aquarium, but it packs much too tightly, and does not provide a good rooting medium for plant life. Why not use ordinary aquarium compost on the bottom, and spread silver sand to a depth of about half an inch on top of this?

Is it possible for you to give me some idea of the average life span of the popular livebearers?

Generally speaking, live-bearing fishes are not long-lived. A guppy may live for so long as 2 years; a swordtail for 3 years. But if you take it that between 2 and 3 years is the maximum age for a livebearer to reach, then you will include most, if not all of the well-known livebearers.

My aquarium is situated in a partial shady corner of a room, and *Valisneria*, *Cabomba* and Indian fern does not grow well in it. Will you kindly tell me the names of some plants which will flourish in partial shade?

You cannot do better than plant your aquarium with the so-called water aspidistra (*Ambias lanceolata*), and *Cryptocoryne*. There are about a dozen species of *Cryptocoryne* on the market, and most of them grow very well in semi-shade.

I have a large aquarium, and it is my fond wish to create an interesting above-water scene by building a ledge holding soil in which to plant exotic moisture-loving plants. The top of the aquarium will be totally enclosed by a glass structure to allow for plants sending up aerial foliage and to conserve moisture in the atmosphere. Can you suggest some plants which would look decorative and thrive under such conditions?

We suggest the following plants: *Helxine seleroi* and *Ficus pumilus* for carpeting the ledge, though *F. pumilus* will grow over anything, even a vertical surface such as a rockwork background or tree bark; *Tradescantia* in all its many decorative forms; *Zebrina pendula*, very much like *Tradescantia*, but the purplish leaves are prettily marked with silver; *Scindapsus*, a lovely plant with heart-shaped leaves; any of the smaller-growing *Philodendron*; dwarf rushes; and the many ornamental-leaved ivies (*Hedera*). Of these, we strongly recommend *H. canariensis*, an ivy having the edges of the leaves marked with creamy-white to ivory. It is best to plant all such acquisitions in pots filled with a mixture of John Innes compost no. 2 to which has been added a good proportion of peat moss or mould and horticultural charcoal. The pots should be placed on the ledge and their edges masked by heaping peat around them.

I am a comparative newcomer to tropical fish-keeping; so I should appreciate your advice on the best food to give my mollies. I have been told that these fish should have plenty of green food in their diet. What sort of green food please?

Mollies always seem to flourish best on a diet of soft mossy algae (substitute duckweed or spinach if algae is not available), live food such as small water fleas and finely minced earthworms, and the better-class cereal foods such as Bemax, Froment or Encervyte. Mollies like small meals at rather frequent intervals; that is to say, whenever you are around, make it a practice to scatter a pinch of dried food on the surface of the water so that the fish are kept busy hunting for tit-bits. Mollies also appreciate strong artificial light or some direct sunlight. They also like about a teaspoonful of evaporated sea salt added to every gallon of water in their aquarium. Once the initial quantity of salt has been added, do not add any more or else you will make the water too saline for the plant life.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

Will a large goldfish eat or molest a small catfish if they are placed in the same tank?

I do not think that the goldfish will interfere in any way with the catfish. Goldfish rarely touch any other fishes except when they are so small that they look to them like the larvae of mosquitoes. I consider that once a fish is an inch in length overall, there is no fear that it might be eaten by a goldfish. The tiny fry of goldfish are often eaten by their parents, but this is often when they are very unlike an actual fish and are sucked up whilst the fishes are browsing among the water plants.

I am anticipating making some brick ponds along the bottom sides of my fish house. They will be about 18 in. high. How can I make them waterproof?

You can render over the bricks with a coating of concrete an inch thick. Use one part of cement to three parts of sand, some of this to be sharp. Try to float over the brickwork in one go, as if you leave off for a time the spot where you restart may develop a crack later on, perhaps after a year. Even a half inch of this mixture will be quite waterproof if it is applied correctly.

I had some goldfish which had a bad attack of fin rot. I lost some but wonder when the remainder will be safe to put back with other fish. Does one attack render the fish immune from a second attack?

Once the fish has been cured there is no reason why it should not be returned with others. The frayed fins will soon grow again; speed of this depends on the temperature of the water. The warmer, within reason, the sooner will the fin grow again. One attack does not render a fish immune from a second or further attack. The only thing will be to see that the fish are kept in good health and that the tank is not allowed to get in a foul condition. If a fish is healthy it has a good mucous covering all over the body which is able to repel the invasion of germs. Once this protective covering is destroyed or deranged the fish is open to attack.

I made a pond in the garden some years ago and then had to move away for some time. On returning recently I found that the pond had developed cracks and had leaked. I have tried several different ways of sealing the cracks and have used bituminous preparations. This seemed to do the trick for a time but later peeled off in large sections. I was told that one of the preparations could be painted on even if the concrete was still

damp, but I do not see how this could be. Is there anything else I could try to fill the cracks?

Like you, I do not see how the bituminous preparation would adhere to a damp concrete. The whole nature of the bitumen is to be waterproof, and so it is unlikely to stick to a wet surface. I have used some and find that it will peel off in time unless the concrete is allowed to dry out completely; I have even used a blow lamp to assist the drying out. Where there are only a few distinct cracks the best way to repair them is to clean them out well and scratch down as far as possible, and see that all loose bits are removed. When the crack is quite clean make a mixture of one part of fresh cement to one part of fine sharp sand; sand sifted from washed river sand is best, but it must be fine. Make a paste with this and force it firmly into the crack, seeing that as much as possible goes well down into it. Do not allow the cement to overlap the sides, as this is where trouble can come from later on when this layer tends to peel off. Do not allow the mixture to dry out too quickly and, in fact, you can carefully refill the pond after about eight hours, making sure that when refilling you do not allow water from a hose to play directly on to the repaired crack. This method will prove quite successful for some time but, of course, if the water is allowed to freeze over and there is too big a pressure on the sides the cracks might open again. It is a good plan then to see that thick ice is not left for long on the water.

I have an outdoor concrete pond which is 7 ft. by 3ft. I have a baby daughter, who is beginning to walk, and I would like to know how I can make the pond safe.

Your pond is not over large and so it can soon be fenced around. Get some of the Peerless type of fencing, 3 ft. high. You can get iron stakes to support it, which are easily driven into the ground outside the pond. The wire netting is then wired to it. The whole job can be done in an hour and the cost would not be very large. Once your little daughter is older and steadier you could easily remove the fencing.

Can you tell me of any breeders of good veiltails, fantails and moors in Lancashire? I know I could get some from the south but prefer to see the fishes before buying.

I am sorry I am unable to give you the information you require. I have not personally come across any such breeders in Lancashire. You say you want private breeders and if there are many around your district they keep their fishes hidden away fairly well, from me at any rate. When I travelled to Manchester last to judge the coldwater section I found that among all the exhibits a pair of young undeveloped orandas and a pair of black-banded sunfish (*Mesogonistius chaetodon*) were all I was asked to judge! There is no doubt that there is a great scarcity of good coldwater fishes in your area; all the more reason why you should make every effort to get some stock from any district even if it means a bit of travelling to obtain them. However, you must realise that very few good fishes are bred from these types and you may have to be content with inferior fishes from a good strain. It is quite probable that these fishes will breed at least some youngsters as good as any they came from originally and much better than the actual fishes you have used for breeding. Apparently aquarists will never learn that one gets about one in a hundred of tip-top quality with a few very good ones; the rest may be well away from the standards, although having the strain in them they are capable of producing good young ones. Strangely enough I find the failure to acknowledge this most common among experienced tropical-fish breeders. I wonder why?

I have a show case 3 ft. by 2 ft. by 1 ft., and would like to make it into an aquarium. Please can you tell me how to fill up the cracks and make it water-tight?

I do not want to dishearten you but I cannot hold out

Can a Fish Smell?

Can you please give an answer to a question asked at a meeting of North Birmingham Pond and Aquarium Society? It was: Can a fish smell?

By smell we usually mean that sensation which is aroused when some substances reach the specially sensitive nerve endings in the nose with the air that is being inspired. Since fishes do not normally make contact with atmospheric air it could be said that such airborne substances cannot reach them and so they cannot smell. They do, however, perceive substances dissolved in the water which reach special nerve endings in a number of positions, including the olfactory or smelling pits opening on their snouts. Since substances that we smell probably first dissolve in fluid over the nose membranes before we are conscious of them there is probably little difference in the nature of the basic process in fish and man. In fishes the process could hardly be separated from the sensation of taste; also the result of substances dissolved in the water affecting nerve endings on the body surface of a fish as well as in the mouth. Fishes are certainly incapable of sampling odours as we do, by deep sniffs, and, as commonly seen in the aquarium, they will identify objects suspected of being food for example by taking them into their mouths, whereas other animals can sniff the unknown material.

much hope of you being able to make a success of your project. A show case would not be made with strong enough frame-work for it to hold the weight of water the tank would contain. The timber used might not be the right kind and it is quite probable that the base of wood would warp badly once dampness was near it. Your tank would be 6 cub. ft. in capacity and would hold about 36 gallons of water. Each gallon weighs 10 lb., and so the whole mass of water would weigh somewhere in the region of 360 lb., well over three hundred-weights! If you intend to have a go I suggest that the base is covered with one of the bitumastic preparations, and the glass will have to be bedded into the same material or else another form of glazing compound.

I am contemplating making a garden pond 8 ft. by 4 ft. and 2 ft. deep. Is this big enough to keep goldfish in; how many, and what plants would be best? How can I build the pond and would the water need constant changing?

Your proposed pond would be large enough to keep goldfish in, and you would not need more than a dozen fish. If they thrived it is probable that they would breed, but in any case the fish would have a good chance to grow on well and thrive. Over-crowding with fish in a comparatively small pond is the surest way to court disaster. There is another point, however, I would like to emphasise before you start and that is, the larger you can make your pond, within reason, the easier will it be to maintain ever after. The smaller it is the more trouble it is likely to be. Small areas of water are subject to sudden changes of temperature and become too hot in the summer for the comfort of the fishes. Also the water could cool too quickly in bad weather. Another 6 in. in depth in at least one part would be an advantage. To build the pond I suggest that you make up your mind at the start to construct the pond with sloping sides. This will save you an enormous amount of trouble and expense; if the sides were to be perpendicular this would mean that some form of shuttering would be necessary. This is not only expensive to buy but fixing it and removing it later can be a task rather more than the average handyman can tackle. There is no need whatever to make the pond with perpendicular sides, even if it is to be strictly formal in shape. A square or oblong pond with

perfectly straight sides to it can still be constructed so that the sides under water slope well. The sloping sides mean that all forms of shuttering can be dispensed with and the job made far easier.

Mark out the shape of the pond with pegs. If it is to be irregular in shape lay a clothes line on the ground and push it into the required shape. Then mark it out plainly by cutting the turf or removing some of the soil as a guide. The removed soil can be heaped up at one side of the pond to form the basis of a rockery later on. This disposes of the spare soil, and believe me this can be quite a heap, even from a cavity the size you propose to make. See that your concrete is about 3 in. thick. It can be laid in one go if the ballast and finer aggregate are mixed with the cement so that the whole laying of the concrete can be done at once. The alternative way is to lay the foundation with very coarse ballast and cement and then add a second coat with finer material and cement. This top layer should be at least three-quarters of an inch in thickness and should be laid soon after the first coat is in position and has started to set.

If you can get a couple of friends to help you when concreting it will not only make the job much easier for you but the finished project is likely to be much stronger than if you tried to do the task by yourself. You see, once the cement is wetted it soon starts to set, or "go off" as it is called. If you leave off for a short time to make a fresh mix, the part where you commence again may always be a weak spot. It seems impossible to get fresh mixture to adhere correctly to old, and so the more compost which can be mixed at a time and placed in position the better. The ideal way would be to hire a small concrete mixer from a local builder and have a friend mixing whilst another kept up a ready supply of material for you to put in position. Hundreds of ponds develop a leak at a later date solely because the concrete was not laid quickly enough and too long waits had to be made between the application of each mix. I do not think that one man working alone would be able to mix and lay all the concrete correctly so that all the compost was placed in position before any of it started to go off.

As for planting the pond, so much has already been written about planting in ponds that further instruction on this point seems unnecessary. You have dozens of water lilies and other flowering plants to choose from and one or two under-water plants will be enough. Do not try to plant a bit of everything but just have one or two lilies with a couple of other flowering plants for a start. If all goes well they will soon give you all the coverage you need. If the pond is correctly planted there will be no need to change the water, but an occasional replacing of some of it during hot spells will be a great advantage to the fish.

I have lost a few fish in my pond and the water smells. I placed some loam covered with gravel on the bottom of the pond for the plants to grow in, so it should be all right. What is the cause of the fish dying?

The very fact that you placed a quantity of loam at the bottom of the pond may be the cause of the deaths of the fish. The water has become polluted, and when this happens there is insufficient oxygen in the water and the fish die. The smell is caused by foul gases formed when the loam decays. In small ponds it is not a good plan to place loam at the bottom. It is much better to keep the base quite clear as long as possible and plant all subjects in containers so that the amount of soil used is strictly limited. Loam may be all right in a fairly large pond, but even then if too deep it can cause pollution not long after the pond is set up with plants and fish. Most water plants need only a little soil to get them started, and then when fishes are introduced into the pond their droppings will form a ready source of fertilisers for the benefit of the plants.

I have made a pond in my garden and before introducing the fish I would be pleased to have your advice on how to prevent the lime from the fresh cement from causing the fish to develop fungus disease.

The free lime from fresh cement does not give fishes fungus, although indirectly it could be a cause. Fishes are covered with a protective mucous covering which acts as a repellent to many diseases, fungus included. Once a portion of the covering is removed it is possible for the spores of fungus to gain an entry to the skin and then cause trouble. Excessive lime in the water would tend to remove some of the mucus from the fish and so leave it more vulnerable to contract any disease present in the water. So many makers of ponds are worried about this lime problem and I am inclined to think that this is overdone. When one of my ponds was made over 20 years ago it had one filling and washing round with a stiff yard broom, was refilled and left for a day or two. A friend called and immediately rushed my daughter off to the local pet shop to get some fish to put in. They showed no signs of trouble and so I am inclined to the belief that as long as the pond is of a reasonable depth one good scrubbing after the pond has held water for a few days is sufficient. Of course, the shallower the water the stronger would the concentration of free lime be, and that is when there might be danger.

I have been recommended by my pet shop dealer to have a dozen small goldfish in my tank 18 in. by 10 in. by 10 in. Do you think that this is too many?

Of course it is too many. You will lose more than half the fish if you are foolish enough to place so many in your tank. It will only hold 7 in. of fish with safety. I cannot understand the attitude of some pet-shop dealers. They complain that there are not enough fish-keepers to buy their stock, but yet they do everything to discourage permanent aquarists! When beginners go to them for advice they think only about getting rid of as many fish and mussels, etc., as possible. Yet if they sold the beginner two or three fish which he could keep successfully they would make an aquarist who would be inclined to increase his tanks and stock, to the dealer's benefit. By selling the beginner too many fish for a start it is quite obvious that he will lose most of them, if not all, and then become discouraged and give up the hobby. The remedy is in the dealers' hands.

I have read that German breeders use a form of Paprika pepper to increase the colour of their fishes. Can you tell me how this is done and would its use have any harmful effects to the fishes later on?

This colour feeding is done by incorporating the pepper into softened artificial food. If Bemax is used it would have to be moistened and then the red pepper worked into it. The fishes eat the food and the colour spreads over them. I do not think that this is to be encouraged as it would give a fish a false colour, and as I presume the enquirer only wants to do this to his fishes for exhibition purposes it may be that the judge would overlook the fish on the grounds that it was not a natural colour. This colour feeding used to cause many flutters in the cage-bird fancy, and when I was breeding and exhibiting Norwich canaries about 35 years ago the problem of colour feeding was in great discussion; some were for it and others against. I do not know that there was much evidence that the birds were actually harmed by it, but I do not think that fishes would be improved by it as it is quite unnatural. In any case all the colour feeding possible would have no effect on the youngsters bred from an artificially-coloured fish; they would all remain normally coloured. My advice is to leave well alone; the colour of a fish can be increased by keeping it in perfect condition. Only then can its true colours be seen and enjoyed.

Our Readers Write

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

Successful Cure

THIS letter is written in gratitude for advice given to me in a letter from Mr. A. Boarder.

I am delighted that my two orandas, that were almost dead when I got your letter, have now fully recovered, although it was only last week that all fins were stretched to the utmost. Although I have kept goldfish for 50 years, I seem to have been lucky in as much as I seldom have trouble. Therefore, when I did get something really serious, or shall I say fish that were worth saving, I didn't know what to do, and I certainly would never have dared to use Dettol, until you advised it.

I discovered the cause of the trouble when I stripped the tank. In the thick layer of muck at the back of the tank behind the rocks, were over 20 dead snail shells. They were of the small red variety.

Needless to say there are no snails going to be kept in future. Many thanks for your help.

(Mrs.) O. M. MATTHEW, Lymm, Cheshire

Shubunkins and Velvet Disease

I SHOULD like to report an experience with five shubunkins and a calico fantail which I keep in a 36 in. by 12 in. by 12 in. tank. On returning home after a week-end away a month ago I was shocked to see a shubunkin covered in a film or "bloom." I will stress now that this was not fungus and I am convinced it was velvet disease.

My first reaction was to isolate this fish, and I did so by placing it in a tank 18 in. by 16 in. by 10 in. containing thick green water. When placed in this tank the fish was in bad condition, with its dorsal fin down and all other fins close to its body. The following morning on looking at the fish, after placing it in a container of clear water, I noticed a slight improvement. I then replaced the fish in the tank of green water, and after 3 days the fish was completely clear.

I watched for a further week, during which I fed it with chopped worms, and returned the fish to the original tank. None of the other six fish showed any signs of velvet disease, and all were in perfect condition.

The shubunkin today is in perfect condition and is a picture of health.

C. N. O'CONNOR, Steeton, Yorks.

Aquarium Temperatures

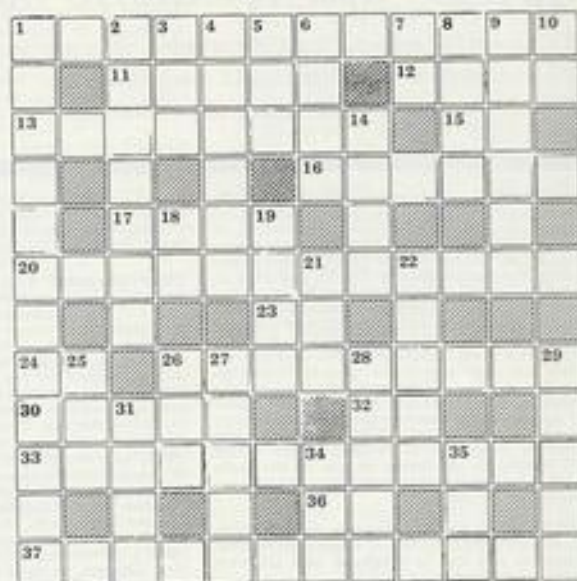
SOMETHING I can never understand is why temperature of water to within a few degrees is given such importance in relation to keeping and breeding tropical fishes. I have periodically tested the temperatures of my tanks, starting at the bottom and gradually working my way to the top and the difference has been something like 10-15°F. in many cases. The obvious cause of this, where no glass cover is used, is the heat from the electric light bulb installed in the canopy heating the top surface layers of the water, and, of course, the higher wattage of bulb used the greater the difference in temperature.

As all my thermostats are submersible ones, another problem which develops is setting one to give the desired temperature, as these always occupy the top half of the tank, which as I have stated is partially heated by the canopy light. There seems to be two solutions; either

(Please turn to page 95)

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- These naturally would require a marine aquarium (6, 6)
- Car in A.A. for aquarium fish (5)
- O. Henry reverses glory. Fit for 20 Across? (4)
- Ruddy horse in the tank? No, *Barbus conchostis* (4, 4)
- Not bivalve; not even o.h.v. (1, 1)
- One of two (6)
- , Sesame (4)
- Macropodus opercularis* (8, 4)
- Don't look more than half way for this (2)
- Short measure (2)
- Without petals (9)
- Doctor, perhaps; fish, perhaps; but not the doctor fish (that is the tench) (5)
- Another short measure (2)
- Chap lip to eel for larva of latter (1, 1)
- Mater in short (2)
- Comic rat lure (anagram) (5, 7)

CLUES DOWN

- Bronze-red relation of the millfoils (12)
- Harlequin fish is one (7)
- Very cold (3)
- Colloquially collared (6)
- Age of the genus (3)
- To feed (4)
- Hush! (2)
- Chop small (4)
- They are in the stage between 33 and eels (6)
- Sic (2)
- Anglers want this—but not from midges (4)
- Fish head—of 20 Across (2)
- Line for river (4)
- One who "drinks like a fish" (3)
- Dirt (5)
- Welsh salmon river (3)
- Performs (3)
- This synthesis is the basis of earthly life (5)
- Fail; decay (5)
- Protective coating of fishes, especially of tench (5)
- Heroic poem (4)
- Bird in bemused condition (3)
- Trade union (1, 1, 1)

PICK YOUR ANSWER

- Ambassis baracensis* is named after a town in: (a) Borneo; (b) Celebes; (c) Java; (d) Sumatra.
- A barbel adjacent to the snout of a fish is described as: (a) labial; (b) mandibular; (c) maxillary; (d) rostral.
- Otocentrus* species are included in the family: (a) Bunocephalidae; (b) Doradidae; (c) Loricariidae; (d) Pimelodidae.
- The number of colour varieties of swordtails (*Xiphophorus*) recognised by the Federation of British Aquatic Societies is: (a) 8; (b) 10; (c) 12; (d) 14.
- Deccan killifish is the popular name of: (a) *Aplochelichthys blochii*; (b) *A. lineatus*; (c) *A. melanogmus*; (d) *A. panchar*.
- In *Tilapia* species the dorsal fin contains: (a) 9-17 spines; (b) 10-18 spines; (c) 11-19 spines; (d) 12-20 spines.

G.F.H.

(Solution on page 96)



from AQUARISTS' SOCIETIES

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

A RECENT achievement of the **Dublin Society of Aquarists** has been to become the champion club at the Irish Federation of Aquarist Societies annual show with a best ever win of six points. Four trophies were won during the competition by Dublin and Mrs. E. Spurling Jewell as secretary is to be congratulated not only upon the club's success but also for her own entries which gained two trophies.

MEMBERS and friends of the **Perth Aquarist Club** held their annual excursion to Edinburgh Zoo last month. They were taken behind the scenes by the curator Mr. Beveridge and shown all the necessary features for the maintenance of a public aquarium. The opportunity was taken to acquire some leopards plants which will shortly be on display in one of the tanks at the museum and art galleries which are maintained by the club.

BULLETINS received recently include those issued by the **Federation of Guppy Breeders' Societies** and the **Nottingham and District Aquarists' Society**.

THE third annual show of the **North Staffs Aquarist Society** attracted 147 entries. Trophy winners were Mr. J. Brookes and Mr. D. I. Cadman.

AN open show is to be held by **Oldham and District Aquarists' Society** on the 28th and 29th September. Schedules may be obtained from Mr. F. Greasley (hon. secretary), 346, Featherhall Road, Oldham, Lancs.

THE annual general meeting of the **Ilford Aquarists' Society** was held on the 17th June, at their headquarters, Newbury Hall, Perryman's Farm Road, Newbury Park.

The following officers were elected: Chairman, Mr. Jarvis; vice-chairman, Mr. Hynson; treasurer, Mr. Adkins; secretary, Mr. Price; press and social secretary, Mr. Stebbing; librarian, Mr. Charter; committee, Messrs. Knott, Davison, O'Keefe.

THE **Merseyside Aquarists' Society** opened their new year with a quiz, the opposition being the Southport Aquarist Society. The contest was won by Merseyside.

Membership has been almost doubled and all activities are being increased. Four shows are scheduled and possibly a fifth, and details will be announced later. The introduction of a newsletter has met with considerable success.

Anyone desirous of contacting the Merseyside Aquarists' Society should write Mr. B. Roe, hon. secretary, 9, The Westway, Liverpool, 15.

AN interesting talk was given to the **East London Aquarists' and Pondkeepers' Association** by Mrs. Meadows, the subject being Characins, Barbs and A.O.V.

The annual show will be held at Ripple School, Ripple Road, Barking, on Saturday, 21st September. Open classes include furnished aquaria and breeders' classes. Show schedules can be obtained from show secretary, Mr. J. Bryden, 22, Kingston Road, Ilford, Essex.

THE main activity recently of the **Tyneside Aquatic & Biological Society** was the bi-annual show. It was well attended and there were 24 tropical and coldwater aquaria. The judges were Mr. Brunton and Mr. Cantos of the **Sunderland and District Aquatic Club**.

More central premises have been found and future meetings will be held fortnightly on Tuesday evenings at 7.30 p.m. in the Blue Bell Hotel, Shields Road, Newcastle-on-Tyne.

THE **Sheffield and District Aquarists' Society** have commenced a new magazine called "The Ichthyologist," which is to be published three times a year. The editor is Mr. Eric R. Jones. This year a plaque is being awarded to the best home aquarium. These will be judged by Mr. Chapman, one of the judges for the F.N.A.S. New members are welcome and the secretary is Mr. K. Colton, 35, Delves Avenue, Hackenshorpe, Sheffield, 12.

THIS year the **North-West London Group of Aquarists' Societies** held their furnished aquaria competition at the open show staged by **Hendon and District A.S.** As this club organised the show, they did not compete in the club furnished aquaria classes but nominated a private exhibitor by a Hendon member, Mrs. Skipper, as their entry against the other five clubs. This tank, prominent because of the perfect condition and excellent positioning of the massed plants, gained first place.

At the beginning of the year, **Harrow A.C.** kindly loaned the London Inter-club Challenge Cup to the group and it was decided to use it for the furnished aquaria class each year. This cup was therefore presented to **Hendon and District A.S.**

THE second annual congress of **Hendon A.S.** will be held in September this year. Arrangements have been made to accommodate 1,000 visitors to hear, among other interesting items, Mr. Lambert, the eminent Belgian aquarist and authority on African aquarium fishes. There will be a three-hour film show included, and as it is expected that many aquarists from all over the country will wish to see this show, early application for details is advised. These may be obtained from Mr. Richardson at 59, North Hill, Highgate, N.4. Ample parking space for cars and coaches, and refreshments will be available. Mr. Lambert has only recently completed his second tour of the Belgian Congo, and has many pictures to show of the known fishes in their natural environment.

A LECTURE on "Live Foods" was given to **Middleton and District Aquarists' Society** by Mr. McDowell recently. A party also attended Belle Vue Society's 21st birthday party, lecture and table show.

THE third annual show of **Corby and District Aquarists' Society** will be held on the 8-10th August, and this year the F.B.A.S. trophy will be competed for in the catfish class.

BARBS and their breeding habits was the subject of an interesting talk given to the **Sunderland and District Aquarists' Club** by Mr. J. R. Innes of the Tyneside Aquatic and Biological Society. He also judged the table show, the placings being: 1st, Mr. B. Hodgson; 2nd, Mr. T. Pearson; 3rd, Mr. J. Vipend.

FUTURE items in the **Mansfield and District Aquarists' programme** include a talk by Mr. R. Howarth on "Plants and fish suitable for tropical aquariums" (29th July), and it is also proposed to visit Leeds for a pet shops visit and also to see the Leeds A.S. show and to attend the B.A.F. annual event in October.

MEMBERS of the **Derwent Aquarist Club** recently visited the Trent Trout Farm, where they were taken round by Mr. M. Leney, the proprietor.

RECENT activities of the **Aylesbury Aqualife Association** included a talk by Mr. A. Boarder on "Coldwater Fish." Table show awards were won by Mr. E. Weightman and Mr. L. Macpherson.

CHELSEA **Aquarium Society's** exhibition has had to be postponed until later in the year, it is announced. At the society's last meeting an interesting talk on fish diseases was given by Mr. P. Hewitt, of A.S.L.A.S. Chelsea were victorious over Streatham at a recent inter-club show.

AT their June meeting the **Cambridge and District Aquarists' Society** had as their lecturer Mrs. Meadows, who is a leading figure in the fancy.

Mrs. Meadows lectured from her own experiences as a breeder, and took her audience through the procedure of the breeding of many of the egg-laying tropical fish. Three points were made which were of the greatest interest, and which applied, not to all, but to most of the species mentioned—a small spawning tank, the addition of 50 per cent. rain water, and a few drops of acriflavine as soon as possible after spawning has taken place. The tanks have no compost or sand, and no plants. The spawning medium varied from nylon pot scourers to willow root.

As a prolific breeder of the ever-popular angel fish, Mrs. Meadows was able to give one member particularly good advice—a high temperature, 80-85° F.—spawning medium a strip of green glass—and a little methylene blue in the water.

Advice was also given on the feeding of fry. As an initial food either infusoria or Liquifry, then graduating on to brine shrimp, sifted daphnia and mashed white worms. Mrs. Meadows stressed that both daphnia and white worms should be fed, as one was a laxative and the other was fattening. As soon as the fry became free swimming they should be given these foods as often as possible and at about two weeks old should then be moved to larger quarters.



The Aquarist's Badge

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

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

Aquarist's Calendar

12th-13th July: **Macclesfield Aquarium Society** exhibition in conjunction with the National Cactus and Succulent Society in the Brocklehurst Memorial Hall, Queen Victoria Street, Macclesfield.

8th-10th August: **Corby and District Aquarists' Society** third annual open show at the Territorial Army Hall, Elizabeth Street, Corby. Show schedules are available from show secretary, Mr. D. Brett, 78, James Watt Avenue, Corby.

23rd-24th August: **Bath Aquarists' Society** annual open show at St. Mary's Church House, Grove Street, Bath. Details are available from show secretary, Mr. J. Wheeler, 53, Cameley Green, Twerton, Bath.

28th-31st August: **Midland Aquarium and Pool Society** annual show at Princes Hall, Broad Street, Birmingham.

30th-31st August: **Walthamstow and District Aquarists' Society** annual open show at Hawthorne Road Hall, Walthamstow, London, E.17. Details are available from show secretary Mr. D. E. Goodbody, 54, Somerset Road, Walthamstow, London E.17.

6th-7th September: **Bethnal Green Aquatic Society** annual show at the Men's Institute, 229, Bethnal Green Road, London, E.2.

7th-8th September: **Chester and District Aquarist Society** annual show in conjunction with the Cactus Show at St. Peter's Parish Hall, Hamilton Place, Chester.

14th-15th September: **Willesden and District Aquarists' Club** open show. Schedule are available from Mr. F. W. Keen, 18, Walton Close, Cricklewood, London, N.W.2.

18th-21st September: **Leeds and District Aquarists' Society** annual open show. Entry forms are available from show secretary, Mr. G. Boothroyd, 6, Wellhouse Drive, Leeds 8.

28th-29th September: **Oldham and District Aquarists' Society** open show. Schedules are available from Mr. F. Greasley, 346, Feather-stall Road, Oldham, Lancs.

1st-2nd November: **Bristol Aquarists' Society** annual open show at Bishopston Hall, Bristol.

Secretary Changes

Changes of secretaries and addresses have been reported from the following societies: **Riverside Aquarium Society** (T. Thewless, "White Building", Barley Mow Passage, Chiswick, London, W.4). **Stourbridge and District Aquarists' Society** (L. B. Hargest, 4, Dorset Road, Wellaston, Stourbridge). **Dukeries Aquarists' Society** (P. Foster, 44, Milton Drive, Worksop, Notts).

Crossword Solution

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

PICK YOUR ANSWER (Solution)

1 (A), 2 (L), 3 (L), 4 (B), 5 (B), 6 (C)

Egeria densa

THIS excellent water plant once was known as *Elodea densa* and has proved a very popular plant both for the garden pond and for the tank. The true *Elodea* bear very small flowers which are fertilised under water, but this plant has three-petaled flowers which grow above the surface of the water and are pollinated by insects. There is a variety, *E. densa* var. *longifolia*, which has longer leaves than the type and is found in Brazil.

E. densa grows with very long, rather brittle stems; up to three or more feet can grow in a season. The stems branch well and have many whorls of rather long, narrow leaves which make the plant a very useful one in the furnished aquarium. It is an underwater type and so gives off much oxygen when in favourable conditions. In a small pond it can rapidly get out of hand if left unpruned for long. The stems form many roots, which become embedded in the mud at the pond bottom and increase the rate of growth of the plant alarmingly. However, it can easily be kept under control as it is quite simple to pull out portions from the pond now and again.

In the tank it is especially useful for hiding the back corners, and it is always better to plant it well to the rear, as it will make such rapid growth once it gets established that it would soon hide much of the tank if placed too near the front. Under good conditions the leaves grow in whorls one above the other, very close together, but if in a tank where there is insufficient light it has a tendency to run up more straggly with leaves at wider intervals. It can be kept quite green but under poor conditions the leaves look rather yellow. Being a rather rampant grower it is fond of a good nourishing soil. For this reason I advise that the cuttings are first struck in a pot of loam; some John Innes potting soil would be much better for giving the cuttings a good start. When taking cuttings do not take too long pieces but look to see if there are any roots running down from the stem fairly high up. Take the cutting just below this point so that you are using only young vigorous pieces for the new plants.

Place a little coarse sand on the top of the pot of soil, then

lay the cutting on top with a fairly large stone to hold it from floating to the top of the water. The pot can be placed in a separate container until the cutting is well rooted and fresh growth is apparent. Once the plant has a good root system it can be carefully removed from the pot with most of the soil and the whole planted in the back of the tank or in the pond.

So many aquarists complain that when they put fresh plants in their tank they soon die and never appear to get growing quickly. They usually have a fairly well-planted tank to begin with and there are roots practically all over its base. Any fresh cutting has a tough task trying to get established there under such conditions. When the plant is growing well in the tank it is a good plan to cut some of the stems down to about two inches from the base so that the plant is encouraged to become more bushy. The cuttings can be used for fresh plants.

If this type of oxygenating plant is left unpruned many of the stems will soon get to the surface and once there, will run around just below making an almost jungle-like tangle. Such a condition is, of course, ideal for spawning the fishes but if left to get too dense the plants will prevent much light from entering the tank.

Our Readers Write

(continued from page 93)

to incorporate a glass cover with the canopy or else have continuous aeration circulating the water. I have neither and still manage to keep and breed healthy fishes, but I sometimes wonder how I do this when they swim through 10-15° of different water temperatures in a matter of seconds.

It would seem that water temperature, like pH and water hardness, is perhaps not so important after all.

K. SMITH,
Bradford, Yorks.

Even without overhead lamps there is, of course, an increasing temperature gradient from the base to the top of the aquarium because of the ascent of the heated water, and this occurs also in natural waters.—EDITOR.

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