

The AQUARIST AND PONDKEEPER

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Editorial

"CROSS by subway—it's safer and full of colour." Road-safety signs in Birmingham could read like this if an idea being considered by the Public Works Committee there is introduced to brighten the new pedestrian subways built in the new city centre. Aquaria and floral displays have been suggested for this purpose and we wish the idea well. With large and brilliantly illuminated tanks of fishes set in the walls of the subway many of its users would be able daily to recapture those thrilling "trips beneath the sea" that they enjoyed at the big store as children, when they piled into the cylindrical "submarine" and looked through the viewing panels at the weird and wonderful things swimming by as they set off on the journey to "Davy Jones' Locker." We hope that the idea will not come to nothing. So many notions for aquaria here and there to brighten this or that are dropped when the instigators learn a little more about what is involved, because of the expense or absence of labour to maintain the tanks. And the subway idea particularly appeals to us. For the imaginative pedestrian could live again in the submarine world without the one disadvantage of his remembered childhood voyages, the single disturbing feature shared by the modern toy-department counterpart—rocket flights to the moon, that only the outward journey was undertaken and never the return. At least the subway pedestrian can retrace his steps!

LESS is heard these days of the use of hormones in fish breeding. Aquarists who tried the products which were marketed for use with fishes a few years ago did not get the results expected, and as we forecast in *The Aquarist* at the time, the procedure fell into disrepute. But we also indicated then that with efficient preparations and with the technique of injection of the hormone into the female fish results can be obtained. A recent report in *The Progressive Fish Culturist* (U.S.A.) described ovulations induced in three species of fishes, including the goldfish, by injections of human chorionic gonadotrophin at the cost of about 2 shillings for each injection.

The Garden Pond in February—by ASTILBES

BEFORE the end of this month there will probably be signs of the approaching spring in and around the garden pond. It will be very unusual if February goes out without there appearing in the pond in the south at least a few frogs and newts. These come to breed each year at the first mild spell, although there may be many cold and frosty spells before these creatures actually lay their eggs. If the cold returns the frogs remain at the bottom of the pond and the newts become inactive. There seems little evidence that once frogs come to a pond they leave it again before they have laid their eggs.

Amphibians in the Pond

It is strange why some ponds are visited by frogs, toads and newts each year for spawning and yet other ponds which appear ideal for the purpose are neglected. Some ponds, even in towns, will have their complement of frogs and toads each year, whereas others have none. Again some ponds have frogs regularly coming to spawn in them but never a toad. Others have toads but no frogs. It does seem that once a frog spawns in a pond it will return to that pond again each year after unless anything untoward happens to prevent it from doing so. The same thing applies to newts. Some ponds have many newts each year, some have plenty of the small smooth newt and others have the large warty newt. In some cases both breed in the same pond.

It is fairly certain that if any type of newt is wanted in a pond the owner will have to introduce some when they are ripe for breeding. It is rare for newts to leave the water once they enter it, but frogs will often crawl out when brought from one pond to a garden one. With newts, however, when they enter the water in the spring a great change comes over them; their skin alters and their tails become broader and more useful for swimming. Their colours also change considerably. Once the water stage appears it is unlikely that the newts will leave the water before they lay their eggs. Whether they return to that pond the following year is a matter for conjecture but it is almost certain that some young newts will have been hatched and these are almost sure to come to the pond to breed when they are sufficiently mature.

Many pondkeepers have introduced newts in their ponds in the hope that they will remain there all through the year. This they will not do as they are terrestrial creatures, resorting to the water for breeding purposes only. Newts lay their eggs on water plants and the type similar to *Sagittaria natans* or *Vallisneria spiralis* are favoured by them. The eggs are laid individually in a fold of a leaf. If these leaves or plants with eggs attached are put in glass jars or small tanks it is interesting to watch the development of the egg. The skin of the egg is quite transparent and the embryo can be plainly seen through it and all through the stage of development. The small brown almost round embryo gradually lengthens and so grows that it takes on the shape of the ultimate tadpole. The outside gills can be seen and once the tadpole leaves the egg it is still very interesting and makes a wonderful nature study for any child.

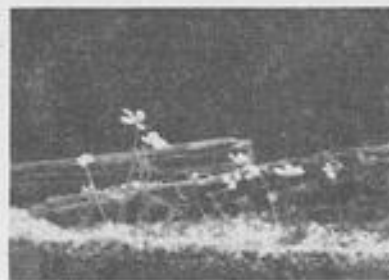
Some pondkeepers are scared that the frogs or toads will do harm to their goldfish in the pond. It does happen occasionally that a male frog will clasp a goldfish as it would a female frog. If the creature is not removed fairly quickly it is possible that the fish could be killed. This does not happen very often and it is possible that only a sluggish old or ailing fish would be liable to attack. What is the advantage then of allowing these amphibians to remain in

the pond? Frog tadpoles will make excellent food for the fishes but toad tadpoles will not be eaten. Both are very good scavengers in the pond and so there is little doubt that their usefulness far outweighs any harm which they might cause.

Early Bulbs

If some early bulbs have been planted round the edges of the pond some of these will soon be in flower. Crocuses will usually be the first spring bulbs to bloom and from then on a succession can be had. It is, of course, too late to do anything about bulb planting for spring flowers but it is well to make a note to plant some bulbs during the coming autumn. Very few of the water plants will show any sign of new growth yet and some kinds are very slow indeed to show signs of life until well into spring. Some water lilies are loathe to start into growth and the pondkeeper needs to have plenty of patience; it is of no use becoming impatient with many types of water plants. Provided that they were not left out of the water for any length of time before being planted it is very rare for water plants to fail to grow.

Four-Leafed Clovers



Marsilea hirsuta, a bright-green species seen growing in the foreground of a tropical aquarium

SPECIES of *Marsilea* are well known for the resemblance of their fronds to a "four-leafed clover." Although they are bog plants, *M. quadrifolia* and *M. hirsuta* grow well under water and their creeping rhizomes produce a carpet of foliage which looks attractive in the foreground of an aquarium. In a bright light they tend to form floating and aerial leaves and this should be discouraged by pruning. Their temperature tolerance facilitates their use in coldwater as well as tropical aquaria. All the other available species form delightful glades when they are planted at the water's edge or in a moist site in an aquaterarium. Here they flourish in a muddy, peaty compost, though in an aquarium sand or gravel are adequate rooting media. The fronds of all species uncoil in the circinnate manner characteristic of ferns. The height they attain depends on the culture method; the brighter the light and the less they are cut back, the higher they will be, but few species grow more than 6 inches tall. Hard, brown globules containing spores develop near the frond bases in exposed specimens; these imbibe water and burst, liberating a gelatinous body from which the spores are shed.

C. D. SCULTHORPE

Freshwater Aquarium Fishes of Ceylon

by HEPTULLA ABDULALLY (Colombo, Ceylon)

NATURE has not been so liberal in its quota of freshwater tropicals peculiar to Ceylon, as compared with other S.E. Asiatic countries. We can, however, boast of five barbids of exceptional beauty, a single *Rasbora*, three distinctive loaches, a single cyprinodont and two anabantids or air-breathers. All these species, except the loaches, which are rather delicate, have been successfully reared in aquaria.

Barbus (Puntius) nigrofasciatus (Sinhalese name: Bulath Sapeya), better known to foreign aquarists as the purple dawn barb, is found in the shady jungle streams of the foothills in the S.W. sector of the Island. Apart from being one of the prettiest of its family, it is unique in colour and shape.

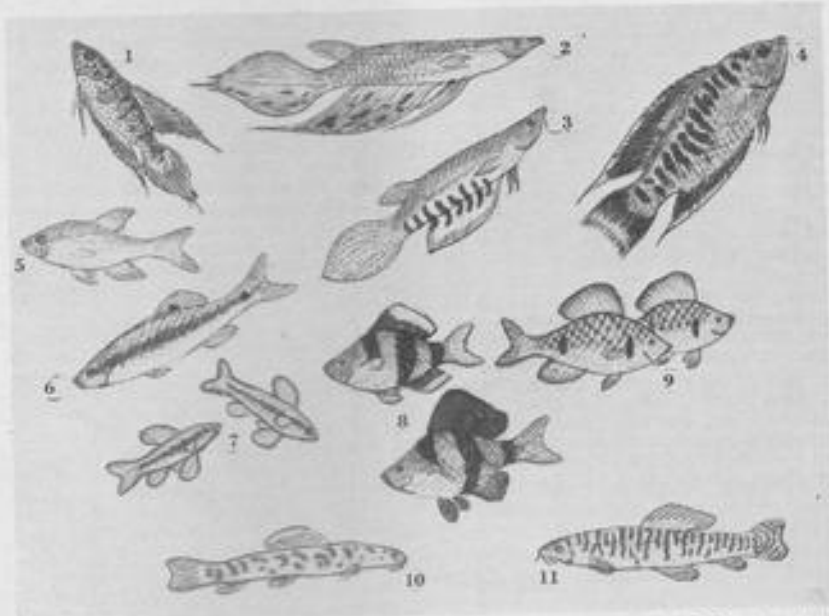
It is a rather slow-moving fish, with large wavy fins, which appear to add to its width. The male is more brilliantly coloured than the female. Normally, its ground colour is pale olive with a pinkish tinge from snout to belly. Three broad black vertical bars are present on each side. When the fish is excited while feeding, fighting or making love it blushes most violently, the pink changing into glowing crimson. In older males the dorsal ventral and anal fins are black and the caudal is orange. The black bands also tend to disappear with age, being replaced with a dull crimson flush.

The female has little or no crimson, the black bars are always distinct, as in the immature specimens. The dorsal and anal fins are only partially black. Mature specimens, especially males, are further enhanced with metallic flecks of silver or gold on each scale within the black bands. The

pupil of the eye is yellow or orange. Viewed from above in its native streams, the crimson colouring casts off a greenish iridescence in tropical sunlight.

In the moss-lined rippling streams of the wet-zone high forests the dawn barb may be seen lazily swimming against the currents, almost resembling some brightly coloured flower petals. On watching closely one sees that they could be quite active when fighting or chasing elusive females. They are not timid, and often nibble at bathers; often they would be so bold as to enter a cooking pot for scraps, while it is being scoured by some jungle visitor! Their pugnacious nature is subdued in aquaria by keeping sufficiently large numbers, who, as in many other quarrelsome fishes, seem to lose their opponents in a lively crowd. Only sturdy plants should be used, preferably on a bottom of river gravel from its native streams. As a barb it has few rivals, when given the approximate tropical rain-forest shade together with the cool green of water plants in aquaria. Its breeding has been successful in captivity.

Barbus (Puntius) cummingi (Sin Pothaya), the two-spot barb, is much less known to foreign aquarists. It resembles the dawn barb and is probably related, as natural crosses have been seen in the wild state. The body of this barb is of a light yellowish brown, paling off to white on its belly; each scale is darker at the base. Two large spots ornament each side of the body. Two distinct colour varieties are known. The commoner is the yellow-finned, and, as the name implies, all its fins are of a pleasing transparent yellow tinge. The sides of the body are also tinted with yellow.



Some fishes from Ceylon: 1, *Malpalluta krestteri*; 2, *Panchax dayii*, male; 3, *Panchax dayii*, female; 4, *Belontia signata*, young; 5, *Rasbora vaterifloris*; 6, *Barbus bimaculatus*; 7, *Barbus titteya*; 8, *Barbus nigrofasciatus*; 9, *Barbus cummingii*; 10, *Nemacheilus notostigma*; 11, *Nemacheilus botia*

The other form is decidedly rarer and more beautiful. This is the "red-finned" two-spot barb. Here the finnage assumes a lovely transparent red-pink, which deepens on the outer edges; the body is flushed with pale pink. The two-spot is of an amiable disposition and can be well recommended for the community tank.

Barbus (Puntius) titteya (Iri titteya) or cherry barb is quite different in shape from the two preceding forms, and would remind one of a rather elongated specimen of the E. Indian *Barbus oligolepis*. As in the two-spot barb, two pleasing colour varieties occur. The low-country form is more commonly found: the male is light brown with a broad horizontal red-brown bar from snout to tail and the fins are pink or orange-pink. Greenish reflections appear when it is viewed from above. The female is lighter; the transverse band is shown off more prominently against a white belly.

The coldwater form of the cherry barb is exceedingly colourful. The adult males at their best are entirely venous crimson, with the fin edges outlined in black. It is an unforgettable sight to see a group of these beauties flit about in the limpid streams at the foot of the Adam's Peak ranges. I remember a certain forest stream in which an elephant used to bathe: while the lazy pachyderm lay on its side dozens of these scarlet flecks seemed to "peck" angrily—as if with Lilliputian courage—at the invading monster. The keeper assured me, however, that this was a daily occurrence, and the fish helped him by feasting on the mites off Jumbo's hide. In captivity the cherry barb is a good mixer and together with its lively movements it is certainly a very desirable freshwater tropical.

Barbus (Puntius) bimaculatus and *Barbus (Puntius) amphibius* ("Ippily" Kaddeya) are both very much alike. They are light greenish olive dorsally and silvery white ventrally; a broad scarlet horizontal band is present from eye to base of tail. The former has two black spots at the bases of the dorsal fin and the tail, the latter an oblique black stripe on the dorsal fin and a spot at the base of the tail. The males are more brightly coloured, especially during the breeding season. Both species are narrow and resemble minnows in shape. They are sociable in habit, and are not commonly available to foreign aquarists.

Rasbora waterfloris (Hal Mal titteya) is a beauty that hails from the same habitat as the cherry barb and has a striking elegance of its own. It is somewhat similar in shape to the popular harlequin fish (*Rasbora heteromorpha*) but for its longer finnage. It is tinted very delicately with pale transparent orange, deepening on to the fin tips. The iris is bright orange. The lower lobe of the tail is longer than the upper.

The Sinhalese name Hal Mal Titteya means "Little Hal Flower Fish," and has been very aptly latinised into *Rasbora waterfloris* after the flower of *Vateria acuminata* (Hal Tree), which it resembles closely in colour.

This fish is very sociable and gregarious. Though delicate to transport, it is quite hardy once it settles down. In an extremely rare colour variety, the orange tints are entirely replaced by pale smoky blue.

Loaches of Ceylon

The three loaches peculiar to Ceylon are hardly known to aquarists: (1) *Nemacheilus botia botia* (Pol Ahitawa); (2) *Nemacheilus botia aurea*; (3) *Nemacheilus notostigma*.

The species 1 and 2 are similar in shape, being slightly more laterally compressed than the usual loach. They are coloured similarly except that in the variety *aurea* the ground colour is golden yellow instead of pink. The vertical brown wavy bars are present in both species. *N. notostigma* is found in cold hill streams, and has a more typically loach body. Its pale-brown body is blotched with irregular

bars of darker brown. This form lives in highly oxygenated mountain streams, and consequently dies on the slightest fouling of water. The other two forms are slightly heavier.

The single cyprinodont or toothed carp of habitat Ceylon only is *Panchax dayii* (Nalla Nandeya). This very useful larvicidal fish is brilliantly coloured like most of its family. When viewed from above it is comparatively drab and most inconspicuous. In the aquarium, however, its narrow sides seem to glisten with rows of shiny green lights. In the male, as in most fishes, the colours excel. The dorsal fin, anal fin and tail are sometimes blotched and streaked with black on a background of orange-red. The same fins end in white-blue elongated filaments. The female is so alarmingly different in colour pattern that it resembles the allied Indian form *Panchax lineatus*. Here the green "lights" are nearly always absent. The lower posterior half is boldly barred in black. These bars seem to continue halfway into the deep orange of the tail. The edging of the fins may be deeper orange-red. The rays of the dorsal and tail fin are usually spotted with fine rows of black dots. This fish is widely distributed in the wet zone from the foothills to the coast, and exhibit many colours for us. In captivity they soon learn to feed at the bottom, instead of their usual habit of skimming the surface for mosquito larvae.

Anabantids

The two anabantids or air-breathers peculiar to Ceylon are *Belontia signata* and *Malpallutta kresteri*. This latter species was recently discovered and is very rare. It is a small fish resembling the croaking gourami (*Ctenopoma vittatus*), brown with dark-brown markings. The iris is scarlet, the ventral, dorsal, anal and caudal fins end in blue fin-tips. This shy fish may be found in the low country around paddy fields and swamps.

Belontia signata (Thal Kossa or the Ceylon paradise fish) is the largest of our tropicals. Adults often grow up to 6 inches in length. This fish naturally cannot be placed in the community tank. As this species is widely distributed, from muddy low country streams to the clear waters of Adam's Peak range, it exhibits varying tones in colour. The best colour forms come from clear cool water.

The shape and graceful movements of these fish remind one of the demoiselle fish of the coral seas. The body is of a rich brown with wavy irregular reddish bars. All paired fins are predominantly crimson-red, ending in pale-blue filaments, which are most numerous on the tail. The gleaming gold of the iris, set off with a jet-black pupil, gives the fish an extremely cold look. This very handsome but predatory species may be kept effectively in a group where plenty of rock work is provided.



SCAVENGERS

by A. BOARDER

MENTION the word scavengers and most aquarists' minds will turn immediately to snails and catfish. One would imagine that these were the only two worth considering. There are in fact many scavengers for pond and tank, and some I intend to deal with will perhaps come as a surprise to many. The work of a scavenger is to clear up waste matter in the tank or pond. Some well-known scavengers are not perfect for their task by any means and one has only to take notice of the copious droppings which water snails leave in a tank to realise this point. Let us then consider what scavengers are available and then examine their usefulness.

Among the list of scavengers are: water snails, catfish, tadpoles, water lice, freshwater shrimps, tench, mussels, *Daphnia*, *Tubifex*, goldfish and water plants. The two last-named are very good scavengers in their own particular field. The ideal scavenger is one which will clear up waste matter and assist in helping to keep the water pure, but should not pollute the water to any great extent whilst doing so. Let us consider the merits of each one named and so help the beginner to choose the best type for his purpose.

All snails discharge their droppings in the water and the more matter they eat the more do they foul the water. They will eat much of the uneaten dried food in a tank but they will also eat a lot of the food which is given to the fishes. This bad characteristic is very noticeable in the fry tank, or where small food is given. The water snails appear to be able to smell out the fresh food instantly and will make their way to it very quickly. With a sucking movement of their mouths they draw quantities of the food in and they not only devour a great amount but they also slime up much of the other so that very small fishes cannot eat it. Some of the water snails also eat the water plants and so their presence in any tank which contains plants needed for exhibition work or where there are young fishes is undesirable. Water snails should never be allowed in any breeding tank where egg-layers are housed. Once the fry are hatched water snails might not be so harmful if only live foods are to be used, but if dried foods are to be fed then all water snails must be omitted. The great pond snail, *Lymnaea stagnalis*, is a well-known one which has a voracious appetite both for all types of dried fish food and for soft water-plant leaves. The very young snails can be eaten by many types of fish but the adult ones have such a hard shell that few of our tank specimens would be able to tackle them. Another popular one is the ramshorn snail, *Planorbis cornus*, with a red variety which is quite attractive and often used in a tropical tank. This snail may not be quite so harmful as the former as it does seem to leave healthy leaves alone and concentrates mostly on decaying vegetation. The young of this species are also eaten by fishes but the mature ones are not likely to be touched by any but large fishes. The freshwater winkle, *Viviparus viviparus*, is a live-bearer and will flourish in most tanks. It does not appear to do a lot of harm except that it too will quickly find any fresh dried food offered to the young fish.

The good that snails can do is in my opinion outweighed by the harm. They are, of course, very interesting creatures to keep in special tanks for individual study and are very



Photo:

W. J. Howes

Green tench (*Tinca tinca*), a fish that is with good reason often recommended as a scavenger for ponds or coldwater aquaria

instructive to young people. The aquarist can therefore decide himself whether to use them or not.

The next well-known scavenger is the catfish. The one in common use among coldwater enthusiasts is the European catfish, *Silurus*, a large-headed species which is mostly a bottom-feeder. There are several tropical species which are very good fishes for the community tank and are very attractive. The coldwater catfish appears to be almost a must among pondkeepers and also it is considered by many to be valuable as a scavenger in the coldwater tank. One would think from the importance many aquarists put on this fish that no tank could be run successfully without at least one of these catfish. As for them being useful scavengers it is certain that they will eat plenty of food which is given to the fishes as well as eating any fish small enough to get into their huge gaping mouths! These fish can grow to a huge size and in a pond could grow large enough in a few years to eat quite large goldfish or any other occupant of the pond. They are fin-nippers when even quite small, but once they grow a bit they are able to swallow any fish which they can get into their mouth, and when one considers that this is about their biggest feature their use as scavengers in any tank containing small fishes is very dangerous indeed.

Another scavenger is the tadpole, especially those of toads and frogs. From the time these are free swimming they eat voraciously and will consume any vegetable or carnivorous matter soft enough for them to tackle. They continue to eat ravenously until their front legs break through the skin, and from then on they exist mainly on their tails. I once saw it stated in a letter to a newspaper that tadpoles never ate but lived on their tails. What a tale! I rate the tadpoles fairly high on the list of useful scavengers as they can clean the leaves of the plants and also the sides of the tank. They are very fond of the soft filamentous algae and can soon improve the look of an indoor tank.

The use of tadpoles as scavengers can, of course, only be temporary as they soon develop and then must leave the water. Once the front legs appear it is better to remove them. A piece of cork floating in a tank is a safe place for the young amphibians to climb on. Their use is confined to a few months of the late spring and early summer, but it will be noticed that unless the tadpoles get plenty of the right kinds of food their development will be retarded. One point which must be borne in mind is that fishes will eat frog tadpoles if they are small enough but they will not eat the toad tadpoles. Where fishes are kept in a tank it is

better to have toad tadpoles as these will at least survive in a tank until fully grown. When a well-planted tank has a great deal of soft blackish-green algae on the water-plant leaves it is surprising what a splendid job a number of tadpoles can do to clear up this mess if no other foods are placed in the tank for a few days.

The water louse, *Asellus*, is also a good scavenger as it feeds on decaying vegetation and also soft algae. Where a number are in a tank it will be found that they work mostly by night and can assist in keeping the base of the tank clean. They multiply fairly quickly, the females carry the eggs under their bodies until they hatch. However, as tank scavengers they have their limitations, as most fishes will eat them if they can root them out from under the rocks or from among dense vegetation. It may be thought then that their better place would be as scavengers in the fry tank, but this has its dangers. It is a fact that the water louse will attack any small or ailing fish, and as they work mostly at night their depredations in a tank are not often discovered. They have been seen to stalk a stationary young fish and then suddenly to pounce on it. Once one is attacked many other lice will appear and the fish is soon completely consumed.

Freshwater shrimps are another crustacean which has some use, but, again, small ones would be eaten by many kinds of fishes. These shrimps, *Gammarus*, are somewhat similar to the water louse in feeding habits and they can

also eat small fishes if they are available in the tank. They are distinguishable from the former as they usually have the body bent in the usual shrimp fashion.

Tench, *Tinca tinca*, either the green or golden type, are excellent scavengers. Either for the tank or the pond they are almost ideal. They are omnivorous in their feeding habits so they are able to clear up all types of uneaten food as well as decaying vegetation. Any large garden worms which might crawl into the pond would soon be eaten before they had a chance to die and pollute the water. All soft decaying vegetation is soon sucked up by these fish. A small tench in a tank is not only useful but very ornamental, in fact when very small they are particularly handsome, having a lovely bluish-green sheen on the gill plates and front of the body. There is also a black triangular patch at the caudal peduncle which adds to the attraction and often confuses aquarists who are unfamiliar with young green tench. One of the best features about the tench is that it does not eat young fish. Even very large tench will live among very small goldfish and make no attempt to eat or interfere with them in any way, something which cannot be said about the coldwater catfish. The tench can be safely used as a scavenger either in the pond or in the furnished tank when it is small enough to be housed there in comfort.

(To be concluded)

Breeding *Barbus arulius*

by A. HINDMARSH

THIS barb is of fairly recent introduction, and I first saw some rather small immature specimens last autumn. I wasn't particularly impressed but my wife persuaded me to purchase some. I took home a pair, and later I bought another couple. One died, and I waited in hopes of getting a breeding pair from the three left.

At first the youngsters were very drab, stripy in appearance, and quite slender. What little information I could glean about *Barbus arulius* told me that it is a large barb when fully grown—up to 6 in. was quoted. I found out also that the male had extensions to the rear edge of the dorsal fin. This turned out to be extensions to the rays of the dorsal fin, and is a sure sign for sexing the males in mature specimens.

After a few months I was quite positive I had two males and a female. They were very active, and the blue-grey tints and reddish patches on the tail forks of the males had changed my mind about them. I found myself firmly attached to them.

They were very active, but not at all aggressive, and the two males would circle round nose to tail for hours, showing off to the lone female. The dorsal rays extended themselves until they became very attractive, moving to and fro as the fish chased each other round the tank. I can honestly say that these barbs never bothered any of the other inmates of the community tank.

I fed all three lavishly on *Daphnia*, *Cyclops* and *Bemax*, and the female became very plump and rounded.

I cleaned out a standard 18 in. by 10 in. by 10 in. tank thoroughly, and layered the bottom with well-washed peat

and boiled pebbles. I topped up the tank with fresh tap water and set the temperature at 80-84° F. A large amount of clean coconut fibre was dropped into the tank, enough almost to fill it. This set-up was left for 2 days until the water was crystal clear.

I carefully netted out the female and I picked a male at random; both looked in good condition and just as colourful as ever. The pair settled down almost immediately, but by putting them together in strange surroundings during the evening, it gave them a chance to rest before morning.

During the first day I saw no sign of the pair, but on the second day chasing was observed. This was very vigorous and fast, in fact I've never seen chasing quite so furious. The male became so ardent at times that the female would hide amongst the peat blocks. The male would frantically search for her, find her and then prod her until he could drive her back into the fibre.

Eggs were not actually seen adhering to the fibre, but on the third day the female appeared exhausted and much thinner. On close observation one or two white eggs could be seen sticking to the fibres.

I immediately netted out the pair, and disturbed a few eggs, which were colourless and quite large. Then I kept a rigid watch on the tank, but saw no signs of life after 3 days. On the fourth day, one solitary fry could be seen adhering to the back glass. It was very large and intensely black. After 1 week about half-a-dozen fry were free-swimming, and from then onwards the batch appeared to get larger until 150 to 200 fry were swimming actively around the tank.

The fry were so large that I started feeding with micro worms straight away. Tube fry food was used liberally and after 3 weeks brine shrimp was taken readily. The young barbs grew very fast, and some had full finnage after 4 weeks. I was quite amazed at the rate of growth, and I put it down to their large size after hatching. I noticed how active the youngsters were, and their keenness to swim in and out of the aerator bubbles.

Since the spawning I've noticed another marked difference between the sexes: the males have small white pimples on their noses, and it isn't white spot!

Microscopy for the Aquarist—5 I by C. E. C. COLE

THIS month we continue with the list and descriptions of useful solutions for aquarists to use in preparation of specimens. Last month we discussed formalin and Bouin's fluid.

First, a general warning. If you intend to keep a small stock of any of the solutions I shall write about, please keep them all together in a lockable box or cupboard placed well out of reach of any little fingers, and have them plainly labelled. By no means all are poisonous in any degree, but better play safe in case of the odd accident. One more thing. It will preserve domestic harmony if all solutions, brushes, staining pots, etc., in use at any one time are kept together on, say, a metal tray or similar receptacle. Then if anything is upset, your furniture is safe. Not only this, but a tray of articles is easily and quickly moved to wherever you require it. If your cupboard is made big enough to take the tray, it will be there when you need it. And finally, don't leave the key in the drawer or cupboard lock—put it on your key ring.

A bottle of acetic acid will be most useful for many of our subjects. I have just examined some water beetles which have been in concentrated acetic acid for over 12 months. They do not appear to have deteriorated in any way: the elytra are movable, as are the limbs, and the body remains soft. Others kept in formalin are so hard that any attempt to move legs or wing covers results in them breaking away. These will be all right for sectioning, but not for treating as whole mounts.

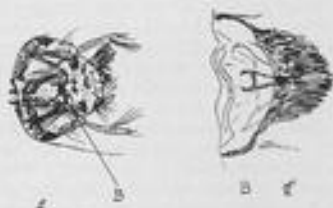
Further processing of the creatures which have been kept in acetic acid will not result in any appreciable hardening, even in alcohol—the usual dehydrating liquid.

Organisms which possess any sort of a calcareous skeleton should not be immersed for long periods in acetic acid, for the acid will destroy the bones; thus fishes are placed in formalin, beetles and crustacea in acetic acid.

Dehydration

Alcohol is extensively used, in various strengths, on its own and as an ingredient in very many solutions. Unfortunately, and for obvious reasons, it is difficult for the layman to obtain, and is very expensive in any case. The Manchester firm of Platters & Garnett market a Dehydrating Alcohol Mixture "to replace absolute alcohol in microtechnique," which I have used for some time and which appears satisfactory. It can be mixed with distilled water to make any percentage strength required. There are other dehydrating liquids with limited application. To start with, experiment with this Dehydrating Alcohol Mixture.

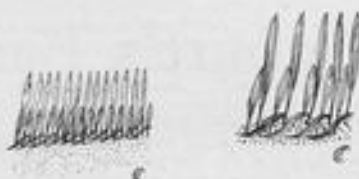
The shrinkage effect of alcohol is most marked if too



Head of gnat larva (left) as seen with a 2 in. objective and $\times 8$ eyepiece. Part B is shown at greater magnification ($\frac{1}{2}$ in. objective, $\times 8$ eyepiece) on the right.

quick a change of strength is used during the dehydration process. The following will demonstrate this conclusively. Take a specimen or two of *Daphnia* and drop them into a little dilute Bouin's fluid. Death ensues very quickly. They can be left in Bouin, and closely examined under the microscope. Note their shape and general appearance—legs and body enclosed in carapace, almost invisible, particularly when the carapace begins to stain yellow.

Now drop them into, say, 70 per cent. dehydrating fluid in water, and examine in a minute or two. The carapace is now contracted and pulled right open, and the body of the *Daphnia* is forced forward and out. The whole picture bears little if any, resemblance to that seen a few minutes before. The body is still attached to the carapace, and is still fairly soft, thanks to the Bouin. Prolonged immersion in formalin has a similar, though not so marked effect upon these little creatures.



The petal-like "hairs" that form a fringe to the wings of a gnat as seen with a $\frac{1}{2}$ in. objective (left) and $\frac{1}{4}$ in. objective (right) and $\times 8$ eyepiece.

A more gradual approach, through a number of less strong solutions of dehydrating agent, minimises, but does not completely eliminate, shrinkage—a drawback I have so far not been able to get over.

I suggest that a number of tightly stoppered bottles be procured and the following percentages of dehydrating solutions be made up: 10, 20, 30, 50, 70, 90 and 100. The alcohol content evaporates very quickly, so that, if left exposed to the air, the solutions will rapidly become less concentrated and finally completely useless.

Dehydration therefore should be carried out in small, flat-bottomed and tightly corked receptacles. Transfer from one solution to the next higher should not be delayed a moment longer than necessary once the corks have been removed. In this way the solutions can be used for a considerably longer period before being discarded.

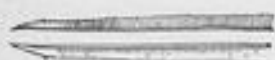
Specimens Illustrated

And now let us look at the diagrams published with this month's article. Once again, all are from unstained slides in my possession, and, this time, they are purchased ones. They show the additional detail revealed by increased magnification. I have had these slides some time, but each time I look at them I find something fresh to examine closely. It is true that most of us look without seeing. If you have any slides already, re-examine them carefully and you will soon discover what I mean.

The wings of the female gnat are particularly interesting. What appear to be just "hairs" with a 2 in. objective take definite shape with a $\frac{1}{2}$ in. objective and show three distinct sizes arranged in a definite pattern. Still greater magnification shows striated petal-shaped "hairs" or petal-shaped



Left: Sheath of gnat sting (top) and the sting itself (bottom) magnified with a $\frac{1}{4}$ in. objective and $\times 8$ eyepiece



Right: Head (top) and wing (bottom) of female gnat magnified with a 2 in. objective and $\times 8$ eyepiece



groups of "hairs" and the presence of thousands of minute thorn-like projections over the whole of the apparently "clear" wing surfaces.

Similar petal-shaped hairs are revealed on the sheath

which normally encloses the sting of the female gnat. The sting itself is of interest—the barbed ends are clearly seen, and the edge appears to be finely serrated. Details in this case might be better shown if stain had been used.

Schubert's Barb

THIS is a beginner's fish in every sense of the word. It is easy to feed; it is hardy—it will not contract disease or die if the temperature of the water falls slowly to 65° F., it does not need specially conditioned water and, for the ambitious beginner, it is not difficult to breed.

Schubert's barb is a colour variation of the well-known and long-established aquarium favourite popularly known as the half-striped barbel.

The half-striped barbel is native to China, and long before Kaiser "Bill" sent his legions of grey-clad, jack-booted automatons goose-stepping into "little Belgium," *Barbus semifasciatus*, to give the species its correct scientific name, was delighting tropical-aquarium keepers across the Channel. We have this on the authority of John Paul Arnold, who, in his *Alphabetisches Verzeichnis der bisher eingeführten fremdländischen Süßwasserfische*, states that it was introduced into Europe (as an aquarium fish) in 1900.

We must, I suppose, take it for granted that German aquarists kept it in their tanks before other Europeans, because the Germans were pioneers of the tropical fish-keeping hobby, which did not make much headway, or gain many adherents in other countries, until after the 1914-1918 war. It must never be forgotten that it was the German emigrants to America who did so much to stimulate interest in tropical fishes in that country, or perhaps it would be better to say, in that continent.

B. semifasciatus, then, enjoyed considerable popularity among tropical-aquarium enthusiasts in Europe and America until more richly coloured barbs moved into the limelight, such as the tiger barbs and the rosy barb.

About a decade or so ago, Mr. Thomas Schubert of Camden, New Jersey, U.S.A. developed a true-breeding strain of *B. semifasciatus* which appeared on the market as "*Barbus schubertii*." Apart from its identical size, shape and dark broken bars and blotches on the sides, it does not resemble *B. semifasciatus* in the slightest degree. It is a lovely honey-gold hue tending to lighten to silvery-gold on the underparts. The pectoral fins are clear, but the others are brick red. The eyes are black.

It is one of the most peaceful fish to keep in the mixed aquarium, and goes about its way without offering offence to any other species, even half-grown guppies. It is always active, always on the move, and swims sedately close to the

floor of the aquarium looking for edible matter—it is omnivorous in its feeding habits. It will, however, rise to the top of the water when food is introduced into the tank, or when sunlight or bright electric light warms the surface of the water.

The male is smaller than the female, and when the fish are in breeding condition, the fins of the male become increasingly bright, to a point when they appear as though painted with blood.

To breed the fish, all that is necessary is a tank well planted with feathery-foliaged plant life, a temperature of about 78° F., clear water and some live food to bring the fish into first-class physical condition. If the fish are in spawning condition, the male will wear his most vivid colours and the female will show fuller or plumper sides. There will be much chasing and diving into the plant life. The female is quite adventurous and will encourage the male to pursue her into the plants if his attentions seem to lack enthusiasm.

During these chases the female will eject her sticky eggs, and the male, in close pursuit, will fertilise them. After spawning is over, the aquarist should remove the parent fish to another aquarium. So long as the temperature is maintained in the high seventies or low eighties, the eggs will hatch out within 48 hours.

Two days later, after hanging in a vertical position at the surface of the water, or from the leaves and stems of the plants, or from the sides of the aquarium itself, the fry will assume a horizontal position, and go swimming in erratic, darting movements in all levels of the water: their quest is for food. If they do not obtain sufficient microscopic food during the first few days of their lives many will die, and those that live will grow up as stunted, maybe deformed fish. So it is up to the aquarist to provide the tiny fry with the smallest of live food, Infusoria, freshly prepared in jars stuffed with rotting lettuce leaves, slices of potato, or hay. A slight cloudiness of the water in the jars indicates that microscopic live food has become available.

After a week or two of Infusoria—half a cupful or above that amount every day—larger food may be given to the fry. Micro worms, powder-fine dried food or the "dust" of oatmeal may be sprinkled on to the surface of the water.

When the baby fish have reached a length of about half an inch, all is plain sailing, and the aquarist can sit back and admire his tank full of the tiny golden beauties.

Given good conditions, Schubert's barb will remain remarkably free from illness or disease, and will live to upward of 7 years.

Jack Hems

THE AQUARIST

AQUARIST'S Notebook



by

RAYMOND YATES

VERY few clubs in Britain issue a magazine nowadays. I have not full information, but no doubt one could count them on the fingers of one hand, although a few others issue news-letters, usually single sheets. There are many reasons for this but probably the main ones are expense, lack of "copy" and the difficulty of finding members sufficiently keen to take on the job of production. I was sorry to hear recently that the Portsmouth Club Magazine has been experiencing difficulties and may not appear in 1960. This club effort has been quite outstanding for some years and has been a credit to the editor and his helpers. I hope Portsmouth will manage to keep the flag flying. Nottingham also has for years produced a splendid magazine every month but they, too, are hard put to finding "copy" after 12 years of continuous publication.

The position in U.S.A. is very different; many clubs issue really excellent magazines, all differing in style and approach. Of course, these clubs probably have more cash available than their British counterparts but it would seem that their members take a more vital interest in their society than is possibly the case in many instances over here. Here are some notes on a number of these American club magazines.

Tropical Topics, monthly (Fort Worth Aquarium Society); 18 pages, duplicated, coloured front. *Tropical Breeze*, monthly (San Diego Tropical Fish Society); 16 large pages, numerous advertisements, good illustrations, duplicated. *Fish Tales* (Buffalo Aquarium Society); 8 pages, duplicated on one side only, advertisements on cover only. *The Boston Aquarium News*, monthly (Boston Society, 20 cents a copy); duplicated, 18 large pages, 11 advertisements from dealer-members. Aquatic Researchers of San Antonio issue *Aqua-Focus*, monthly, duplicated, 22 pages, of which six are advertising matter. *The Hobbyist*, monthly (Dallas Club); six pages, one-third advertising matter, duplicated one side only. *Angel Notes*, monthly (Alamo Aquarium Society); 15 pages, four are advertisements, duplicated on one side only. *Tropic Topics* (Orange Belt Aquarium Society of California); six pages, duplicated on one side only, no advertisements; this small issue is particularly bright.

It is hard to judge membership although one magazine mentioned that 17 members and 11 visitors attended its last meeting. Clubs mentioned, with the one exception noted, issue the magazine free. Annual membership fees seem to range from about 10s. 6d. to 25s. American societies seem to have many more officers than their opposite numbers here; for example: president, vice-president, recording secretary, corresponding secretary, treasurer, librarian and historian, directors, then chairmen of committees for membership, ways and means, programme, publicity, refreshment, audit, junior adviser, shows; and finally the magazine can have editor, assistant editor, business manager, sales manager, article promoter, columnists, photographer, typists, artists, policy committee, producers and assembly operators. In Britain it is a hard job getting anyone to volunteer for anything in this line, and instead of jobs for all it becomes a case of one man becoming a veritable "Pooh-Bah." These American magazines are well produced and show drive and are obviously not the work of one or two individuals. Can't we learn something from this?

If any British club at present issuing a magazine or news sheet is interested in an exchange system with American club magazines I will provide them with names and addresses if they let me know (stamped, self-addressed

envelope please). I shall also be pleased to hear from any U.S.A. club wanting to swap their publication with other similar clubs in Britain.

According to a newspaper report some unusual fish hatchings recently took place at the London Zoo. These were of a Russian fish called omal, claimed to be a good substitute for salmon. The eggs were sent from Russia by plane and some of them hatched on the way. Originating in Lake Baikal, Siberia, it is thought that this variety would probably do very well in Scottish waters.

Some time ago I was in Moreton, near Wallasey, and was delighted with the ornamental moat which has been constructed in front of Cadbury's factory there. The English are so fond of brick walls and railings that they have never discovered the charm of water barriers too wide to jump. Anyone who knows Holland well will appreciate just how effective these barriers are. The idea is common in international zoos to restrain the animals (and public), but there is still a lot of opposition to overcome from the public, who write endless letters to the press agitating for this or that pond to be filled in, this or that canal to be closed and emptied. How the Venetians manage to survive is beyond me!

A cartoon recently showed a party being taken round a public aquarium stopped at a huge tank containing many fish and a man in frogman outfit and scraper. "This," says the keeper, "is Homo sapiens—his job is to keep the tank clean."

The Merseyside Aquarists' Society is very go-ahead and its latest venture is in keeping with its reputation. Some months ago a display was featured in a large multiple store in the city centre. This was so successful that the Society was approached to provide nine furnished aquaria for the background effect in the Water Babes Grotto. This event will last for roughly 7 weeks, so club members will have plenty of opportunity to observe the effects of a prolonged show and note the permanency of the furnished aquaria which, in 2 or 3 day shows, look so artificial. The tanks are to be judged near the end of the showing period, when the results of overplanting with fast growers like *Gabomba*, *Hygrophila*, Indian fern etc., will be evident.

A lobster weighing over 11 lb. has been landed on a hand-line by a Southampton man. The largest English specimen is recorded as about 15 lb. Corsica has excellent specimens round the coast and near Calvi but the locals are so indolent that they mostly prefer to import lobsters from Nice than go to the trouble of catching them.

A new device, a hydrophonic fish detector, has been developed by an American firm which enables listeners (presumably anglers) to pick up the sound of fish "voices."

The device, powered by a torch battery, weighs only 6 lb. I am not sure it is a good thing; the way things are going with trips round the moon etc., it looks as if we shall soon be hearing what our fishes think of us, their owners. Listeners so seldom hear any good about themselves.

The most peculiar things happen in shows, even nowadays. Some time ago I heard of a whole batch of tanks at a show which

were missed by the judges, and the error was discovered only near the end of the show. How can such things happen?

Writing in *Aquatic Life* (U.S.A.) Walter Podkomorski gives details of an interesting experiment made to show the relationship of the decrease in light proportionate to depth. For the experiment two forms of lighting were in use, incandescent and fluorescent, the former being 25 watts and the latter 15 watts. The incandescent light was in a polished aluminium reflector, 4½ inches across and 1½ inches from the water surface. The 15 inch fluorescent light was positioned similarly. The tank water used was clear with no aeration, no floating plants were present and the tank had a fairly light-coloured bottom. A light meter in a glass jar was used and camera settings gave an initial reading. Further settings were related to the initial reading in mathematical proportion. The lower readings were used to convert the camera settings in to lower wattages. The results obtained were as shown in the Table.

Depth (inches)	Incandescent lighting (watts)	Fluorescent lighting (watts)
Surface	25	15
2	12	10.7
4	9	9.8
6	4.5	9.2
8	3.7	7.9
10	3.1	3.4
12	2.3	1.9

Skin divers have discovered how quickly the light fades under the sea. However, this is relative in many ways. It depends on various circumstances such as the angle of the sun, the clarity of the water, the amount of light-absorbing plankton, etc. Penetration of daylight is considerably less in northern waters where plankton is much thicker. William Beebe in his bathysphere descent off Bermuda reported that at 1,900 feet he could still see faint remnants of blue daylight, although absolute darkness reigned at 2,000 feet. However, even at 3,000 feet there is still sufficient light to affect photographic plates. The light fades according to the spectrum, that is, the red waves fade first, later followed by the greens and yellows. The last glimmers are a twilight world of blue-violet. With aquaria it must be remembered that the great majority get side light, and this side light is usually daylight.

The Federation of Scottish Aquarist Societies is always looking over the border and delighted to welcome non-Scots to their meetings. They have arranged a big "get-together" in March, 1960, when Dr. F. N. Ghadially will be the guest speaker. Hobbyists in or near Scotland should get in touch with Mr. A. B. Jeffrey of 17, Montgomery Street, Kirkcaldy for details of this and other fishy events in North Britain.

The Northern Goldfish and Pondkeepers Society, which is still in its first year, has attracted many enthusiasts for the coldwater side of the hobby; they meet in Manchester once a month, on a Sunday. Details can be obtained from the secretary, Mr. J. Stott, 22, Churton Road, Manchester, 18.

A rather unusual incident was reported from Derby, where a swan, flying over the River Derwent, collided with an overhead electricity cable. There was a flash and the snapped cable fell into the water. It appears that many stunned fishes floated to the surface, mostly trout, grayling

and minnows, and the ever-present gulls quickly got to work. The fate of the swan is unrecorded.

Walking down the street in a strange town last month, I was surprised to see two large tanks of the all-glass storage-jar type, filled with water, standing on the edge of the pavement. They were surrounded with onlookers. Investigation showed no fish, no plants, nothing really aquatic: the tanks formed a sort of wishing well, a common-in-the-fountain idea in aid of the Cancer Research Fund. British crowds will gather round anything, I know, but for a moment I thought I had come across some sort of outdoor show. Years ago I did see just this in Doncaster—aquaria on barrows. I have never seen the like since.

A number of perch sharing quarters with a trout caught my eye recently. What strange bedfellows! Knowing the cichlid-like pugnacious behaviour of larger perch I thought the trout might be in for an anxious time. Not a bit of it. True the perch did make those half-hearted attacks which never really come to anything, but when they did the trout turned on them and chased them round the tank. Granted that the trout was 2 inches larger than their 7 or 8 inches, it was, nevertheless, quite surprising. One tends to forget that trout are predators.

A Sunday newspaper describes an unusual event in North Carolina. Two people who had a goldfish pond in the garden observed a cardinal bird with a beak full of grubs fly over the pond. The seven goldfish instantly stuck their heads out of the water and the bird dropped a grub in for each then flew off for more. This trick was repeated time after time. A newspaper photographer was called in and he photographed this unusual event. One suggested explanation is that the bird had lost its young, but that being a male, the instinct to feed remained strong. It is possible the bird went to the pond for a drink and dropped a grub which was instantly snapped up by a goldfish. The goldfish, with mouth agape, could pass in colour and size for a fledgling cardinal.

A town for fishes has been constructed on the sea bed inside the territorial waters of Monaco. Three miles wide, it is intended as a reserve where scientists can study the habits and growth of fishes. Commandant Cousteau, the famous aqualung explorer, has had a ship sunk there, for he believes that fish always "sniff out a wreck."

We have become accustomed to fish on pottery, wallpaper, towels, curtains and the like, but last Christmas I came across a new idea in decorations. These consisted of large representations of fishes (goldfish, angels, veiltails, sea horses, tetras etc.) in paper, up to 24 inches long, suspended on varying lengths of cotton from the ceiling. The body portions were quite substantial-looking, being made of the circular "bell" type of decoration, the heads, tails and finnage being attached. Moving freely with passing air currents the effect was really delightful. These fishy novelties were quite arresting and the nearest approach to the Japanese kite or wind stocking I've seen in Britain.

Piston pumps need oiling fairly frequently if used considerably, and any light, thin oil will do. I have always tended to overdo the oiling as I have never found any ill-effects from "fumes". A new silicone grease has been developed by the Dow Corporation of U.S.A. which is claimed to be a superior lubricant to oil at the piston washer. It lasts longer and eliminates any chance of oil seeping into the air line whilst preventing excessive wear. Vibrator type pumps never need oiling, in fact oil could damage the diaphragm.

Breeding the Black-Line Tetra

by E. WALLWORK

AN old favourite, this fish is usually in fairly good supply and, in common with a good many characins, is best seen in a well-planted tank. Then it can be seen that there is a faint golden edging to the familiar black line which runs from the head, along the upper border of the lateral line and into the tail, where it expands into a rough diamond shape. In the right setting it can be seen that a small golden spot is present in front of this diamond, but it is variable in intensity, being at its best when the male is in breeding condition. Both sexes show a white leading edge to all fins except the tail and adipose fins.

Shape as a Guide to Sex

Sex is only really determined by the fuller body shape of the females, which occurs reasonably early, at about 1 inch body length; but they will need to be about 1½ inch long before breeding can be undertaken and then it is best to separate the sexes for 10 to 14 days, feeding them on the best animal food available. They can be brought to sexual maturity in a community tank but they are so active and such fast swimmers that the female will often lose all her eggs before they can be netted for breeding purposes. The pair which is being discussed were 1½ inch long, although this fish does grow to more than 2 inches long.

Foods given included *Daphnia*, *Tubifex*, white worms, dried food, tinned salmon, mussel and occasionally earthworm, but it was noted that they were not very keen to go near the bottom of the tank to feed, preferring to feed in mid-water.

The breeding tank prepared for them was 24 in. by 6 in. by 6 in., and no gravel was used but one end was planted with weighted bunches of *Myriophyllum* and a mass of boiled willow roots, all of which occupied one-third of the tank. Water was from an empty stock tank in which the willow root was normally kept, which may account for the fact that it was faintly brown and its pH was 6.8. This is not really important because I have bred these fish in alkaline water with stock plants and lost them only because they spawned on the roots of water hyacinth, which is ideal except that my plant had a large number of *Hydra* on its roots. Willow roots can be boiled and this eliminates all harmful parasites as well as snail spawn, although in view of the short incubation period of these eggs, snail spawn is unimportant.

Temperature was raised to 80° F. in the breeding tank, and the breeding pair introduced at night, when they swam rapidly from end to end of the unfamiliar tank and soon appeared "out of breath."

Adhesive Eggs

The following morning they were swimming together into the masses of willow root and, adopting a side-by-side position, were trembling with excitement. After a few minutes they swam to the opposite end of the tank and repeated this procedure over a period of 3 hours, though no eggs were seen by me at first. However, with a medium-power magnifier I saw a large number of eggs in the plant masses, in clumps of about 20. At a rough estimate I should say there was 200 of them.

These eggs were difficult to see at first, being only about ½ mm. in diameter, faintly amber, transparent and were sticking to the plants. Six hours later a very slight opacity had developed in the eggs towards one side and,



Male black-line tetra

even at this stage, the infertile ones were very easy to see as they had already begun to turn white.

Half a day later the tails of the young fry could be seen hanging down from the circular yolk sac. Some movement could be seen within the fry, which were still very transparent indeed, but some of them were wriggling quite freely and had lost their attachment, falling on to the plant frond below. They remained for a further 2 days, taking occasional trips from plant to plant with rapid vibratory movements. After that time they all seemed to disappear and then came the doubts that attend all aquarists. Where had they all disappeared to? Observation was hindered by the mass of willow root in the tank. Nevertheless, *Infusoria* was drip-fed into the tank, there being less naturally occurring *Infusoria* present than in a fully planted tank. The following evening *Infusoria* were attracted by a portable top light at one corner of the tank, and were closely followed by a most attractive shoal of semi-transparent fry, more than a hundred of them. This procedure is one which is quite useful for finding a lost batch of fry in a tank and on this occasion I was surprised at the result. The fry were very tiny, about 3 mm. long, with very little body depth. *Infusorial* feeding was continued for a further 5 days, and the bodies of the youngsters lost much of their transparency by this time. Micro worms followed, and minced earthworm, and rate of growth was very satisfactory indeed.

The black-line tetra did not seem to be present at first, but the diamond-shaped black area on the caudal peduncle appeared relatively early in life and the general body shape of the fish seemed to be more streamlined than was anticipated, but as they were progressively fed, the black line appeared when they were about ½ inch long. They were raised to full size without difficulty.

Causes of Failures

Generally speaking I am not in agreement with those who state that a fish is easy to spawn, but would agree that if a pair of these fish is separated for a time and then brought together under conditions such as described above, a degree of success is usual. Failures in the main, speaking from personal experience, lie in failure to recognise that the fish have in fact spawned after such a brief introduction. The result is that, not knowing what to look for, the aquarist leaves the spawning pair in the breeding tank for too long and the eggs are eaten by the parent fish. On another occasion I thought the whole batch of eggs had disappeared soon after removal of the parents, whereas in netting out the parent fish, the lightly adhesive eggs had been freed from their attachment and fallen to the bottom of the tank. Since that time no gravel or bottom layering has been used, which makes observation easier.



These two specimens of red-ear or painted terrapin (*Pseudemys scripta*) are each about 1 year old. The upper one was fed mainly on raw beef and the lower one was given the diet described by the author

It was Konrad Lorenz, I think, who wrote that chelonians don't live in captivity, they just take a long time to die. This thrust, aimed at the majority of terrapin owners, was very close to the mark. But, to be fair, he should have added that the statement need not hold true if the reptiles are intelligently treated. Most of these terrapins, in fact, are picked up from store counters on impulse, by people who never expect them to last longer than any other cheap toy. The material evidence of this attitude is the dishes which are displayed for sale as terrapin containers. Not even large enough to provide reasonable accommodation for the hatchling, they calmly ignore the fact that the poor beast will have to grow if it is to live at all.

The aquarist or vivarium owner who takes some interest in his pets is, of course, certain to do better than that. But at the best the beginner with terrapins is liable to make some mistakes. The question of temperature is a vexing one. I do not pretend to know anything about European terrapins, but the purchaser, even in Britain, who picks up a terrapin at random, is liable to find that he is getting American terrapins. There is a genus (*Chrysemys*, the painted terrapins) which occupies the northern part of U.S.A., and extends even into Canada, but for some reason these are hardly ever handled by dealers. Very likely the terrapin you buy will have a red stripe along each side of its head; it is therefore a "red-ear," *Pseudemys scripta elegans*. Nearly all the chelonians which turn up in North-American pet shops are this sub-species, and certainly a great many are reaching Britain. There are other forms of *P. scripta*, which do not have the red stripe, and also three other species of the genus. The safest solution is to assume that, if you have an American terrapin, you have a sub-tropical species.

The essentials for success with sub-tropical terrapins are ample light, high temperature for at least the greater part of the year, enough water to give the animals freedom in swimming, and abundant natural foods. Since the "turtle dish" and terrapin food offered by the dealer are equally useless the new owner must use his ingenuity in supplying both these needs. An ordinary aquarium is frequently used. Some sort of an island is needed, or a bank of stones at one end, reaching above the water level. This means that the aquarium can be only partly filled with water. A cover is needed only to conserve heat; the turtles will not climb out.

I have never adopted this plan, for several good reasons.

Success with Sub-

by RICHARD

(Photograph)

From the start I planned to see my terrapins reach full size, and with the wasted space in a partly filled, rock-encumbered aquarium, I estimate that one of 30 gallons capacity would be required for two 6-inch terrapins. I have five, the largest nearly 5 inches now. I like to have my terrapins outside in the summer, and out-doors is no place for an expensive glass tank. Lastly, these animals, unlike fishes, can be viewed from above as advantageously as from the side.

When my terrapins were smaller I kept them in dish pans, which I placed outside, with a sheet of glass over them, on sunny days. Most of the year the sun's heat, through glass, will get the water up to 70°F or better. Later I employed an enamelled cast-iron sink of about 8 gallons capacity (these things can be found on rubbish heaps around here—I have not learned why people throw them out). This receptacle was, of course, too heavy to move around. I started using it during the winter, and kept it in a shed that is quite open, with only wire netting over one side. The turtles remained in the sink, using rock islands as basking stations. Late in the spring I moved them out-doors.

The device I then rigged is shown in the photograph. I built a rough box that would take the sink with a surround of 6 to 8 inches width. I stuffed this box, tightly around the sink, with peaty soil. This serves the double purpose of conserving heat and giving the turtles a promenade, making islands in the tank unnecessary. But it transpired that the turtles were unable to climb out of the sink, even when it was quite full of water. So I still had to build a ramp in the water, and this had to be constructed of large, heavy stones, otherwise the active little reptiles soon pulled the whole thing down. An improvement on the present set-up, which I plan to try later, would be to fill the whole



A painted terrapin dealing with a caddis larva under water. The insect has been seized by its head and the terrapin is seen to have moved its claws forward ready to tear the case from the caddis larva

Tropical Terrapins

GUPPY

(by the author)

box with concrete, and dish the middle part out. The edges could be made shelving and rough to give the terrapins' claws a grip. The box could easily have been made deep enough to prevent the animals from climbing out, but a wire-netting cover is necessary anyway, to protect them from birds and from our cats, which persist in regarding them as intriguing playthings.

The cool nights in my part of the world (British Columbia) make heat necessary at all seasons. In the summer one 50-watts heater suffices. I set the thermostat at 75°F, and at night cover the box with a single transparent plastic sheet. This is removed if the water temperature rises to 85°F; if it persists in rising further, some shade must be supplied. The thermostat would have gone the way of the ramp stones, had I not placed it in a bottle, which in turn is wedged in position by stones, and tied down with string. The water level in the bottle must be kept to just the correct level on the thermostat.

It proved feasible to move the box, dirt and all, into the shed which served the terrapins as their winter quarters. With the addition of another 50-watts heater, the water remained at 75°F through a cold spell, during which the air temperature dropped as low as 15°F. However, I intend to let the terrapins hibernate during the 3 worst months; I am confident that this is safe enough. When they were hatchlings only a month from the pet shop, I let them hibernate for 3 weeks, and the following winter for 2 months.

It is my guess that many of the baby terrapins never learn to eat. Frequently they are offered only dry packaged food, which they are very liable to refuse even after they have become adjusted to vivarium life. How much less likely will they be to eat this stuff, in strange surroundings, after all the trials and abuses of being collected and



Feeding time out of water. The claws are ready to deal with any resistance put up by the "prey"! Once the food is obtained the terrapin retires beneath the water to eat it.



The author's out-door vivarium for terrapins. Its wire cover has been removed for Mrs. Guppy to feed the reptiles. The wooden box contains peaty soil in the centre of which is buried an old sink

confined to overcrowded and inadequate quarters on the dealer's shelves! In my experience all need tempting to get them to start eating. With the first two I hit by accident on a plan which worked well, at the time. I put live caddis larvae in their pan. Not only are these insects high on the terrapin's list of favourite tit-bits, but their clumsy blundering around the pan incites the reptile to seize them. I must either have kept the water a bit cooler at that time, or I had a different species of caddis. At any rate in later attempts I always found the corpses of the insects floating at the surface after a short time. Finicky feeders are more likely to co-operate if the food is dropped in front of them when they are on the bottom of the tank. But one should never assume that the turtle is eating, until it is actually seen to swallow the food. The small offering easily gets out of sight, and there is a temptation to suppose that it has been eaten. The food may be picked up and then rejected, but once that stage is reached, it is almost certain that smaller morsels will do the trick.

Once the terrapins are eating well I always hold the food in forceps, and offer it to each one in turn. This method is preferable, not so much to avoid left-over scraps (the untidy habits of terrapins make water changing a frequent necessity in any case), but so as to make sure that every animal is getting its fair share. There are always some vigorous eaters that would grab the lion's share if given half a chance, whereas others stay in the background and would get nothing to eat at all if not coaxed. Some, in fact, may go right off their feed, and refuse all nourishment for weeks on end. However, in my experience these hunger-strikers can always be coaxed into eating again in due course, by the use of such tit-bits as fish entrails or raw liver. I have tested the theory that overcrowding is the trouble, and that the smaller individuals are being affected by an appetite-retarding agent released by the others. This theory is set out by Professor Meryl Rose in *The Aquarium* (U.S.A.) for October, 1959. The results of my test have seemed to show that isolation of the reluctant feeders does not help at all.

The staple diet of my terrapins has always been earthworms and woodlice (oniscoids), with a great deal of raw fish in the summer, when it is easily obtainable. I use any kind of small fish, chop them up entire and feed all but the head. I read somewhere that sticklebacks are not good for terrapins, but nevertheless, when other fishes were not available, I have used them, after carefully removing the spines, to tempt slow feeders, and could not see that any

harm resulted. While plenty of fish was available my terrapins went off worms entirely, but would always put away a feed of woodlice, if nothing else was forthcoming. In the autumn, when the fish supply dwindled, they gradually came back to eating earthworms. They never lose their fondness for woodlice, a useful trait; many vivarium inmates do not care for these plentiful and easily obtained terrestrial crustaceans. Raw beef is easily come by and many will succumb to the temptation to make frequent use of it. I have noticed that terrapins fed largely on this diet grow about half as fast as mine.

Terrapins will eat a small amount of vegetable food, and quite probably this is necessary for their health. They eat more greenstuff in the spring than later in the season. Since their whims in this matter can never be predicted, the only way to feed vegetables is to keep them supplied at all times. It is useless to plant the tank; in a few days they will uproot and tear to pieces every green thing. It is this habit, in fact, that accounts for much of the water changing that proves necessary with these pets. But aquatic plants do last longer in warm water than lettuce and such, and so are much preferred for terrapin feeding. Duckweed (*Lemna*) is acceptable and is very useful, since the terrapins cannot make a mess with it. *Potamogeton* and almost any other tender plant will be eaten; there is no need to sacrifice your pet aquarium plants!

Since terrapins spend a good deal of time out of water, it is evident that water temperature cannot affect their lives

to the same extent as it does with fishes. In fact I think that so long as they are able to sun themselves, or some substitute for sun heat is provided, there is no special advantage in keeping the water at more than 75 F, which is warm enough to prevent them from becoming sluggish while submerged. They will sit for hours beneath a pane of glass in direct sunshine; I imagine that under such conditions their shells, at least, can hardly be cooler than 110 F. Such a toasting will sharpen the appetites of newcomers and slow feeders. Electric lights should be hung so that the turtles can nearly touch them with their backs. They will sit cheerfully within an inch of a light, the glass of which will burn a person's fingers if touched.

As I have already stated, these terrapins will hibernate without harm for 2 months at least. It is not possible to trace their exact place of origin, but despite the summer heat, the only parts of the U.S.A. which lie south of the isotherm of 50 F in January are the Florida Peninsula and a strip of the Gulf Coast. Since American terrapins are sluggish at 65 F, and will cease all normal activity at 55 F, we can be fairly sure that they do not feed all the year in their native habitat. For safety's sake, I have never let their water temperature fall below 40 F. As soon as they become chilled, they show great anxiety to hide. Broken bowls or soup plates, upside down on the bottom of the tank, are much appreciated when this urge overtakes them. They should never be allowed to remain ashore in low temperatures.

Treatment of Sick Fishes

by A. BOARDER

MANY novices have no idea of what to do with a sick fish other than to dose it with plenty of salt. Although salt is one of the finest cures for some fishy complaints this does not mean that it can be used as a universal remedy. First of all it is important to try to find out what is the matter with a fish and what has caused the trouble, if possible. There are three main causes: pests, parasites and diseases. Pests include such creatures as leeches which cling to a fish occasionally and suck its body fluids. Parasites may be fish lice or flukes and diseases are caused by bacteria too small to see with the naked eye.

Obviously the same cure would not be effective in all cases. The salt bath, a tablespoonful of common salt to a gallon of water, will often put a fish that is out of sorts into a better shape, and as a cure for fungus disease and fin rot salt is excellent. However, some of the parasites which attack coldwater fishes in particular cannot be killed with the salt bath. It will be found that a bath in diluted Dettol will rid the fishes of the parasites named above. The solution for treatment can be a quarter of a teaspoonful of Dettol to a gallon of water, and leave the fish in this for 15 minutes; a stronger solution can be used, say the same amount in a quart of water, and leave the fish in for only a few minutes.

One or two points in the treatment of sick fishes should be emphasised. The most delicate part of the fish and that which can be most easily injured during treatment is the gills. These are protected externally by the hard gill plates, but the gills themselves are very soft parts which have the task of exchanging gases between the water and the blood. As the fish breathes it sucks in water, which is forced out through the gills when the fish shuts its

mouth. Any chemical placed in the water will have a strong effect on these gills and as they are so delicate they could be irretrievably damaged if the fish was allowed to remain in the liquid for long. No other part of the fish would be tender enough to suffer from a short exposure in a chemical solution but the mucous covering could be destroyed or badly damaged if too strong a solution was used. Even too much salt can remove much of this mucus, to the detriment of the health of the fish. Before using any chemical then it will be well to consider what its effects are likely to be on the soft gills of a fish.

Another point which should be borne in mind when treating a sick fish is that the water in its container need not be very deep. As long as the water is deep enough just to cover the extended dorsal fin then this will do. Water any deeper will not become re-oxygenated nearly as quickly as the more shallow water. It is most important to see that the water in the cure tank is well oxygenated and shallow water is the easiest way to ensure this. If you double the depth of water in a tank you immediately lessen the amount of the water likely to benefit from the atmosphere considerably.

Do not worry about feeding a fish when it is in the cure tank. Fishes do not die over-night of hunger if they are not fed every few hours. They can go for many days without food and whilst under treatment will be better without it. What often happens is that food is given which is not eaten, and this soon pollutes the water. This only causes the fish more distress and delays a cure. Once the trouble has been cured the fish can be fed, first on live foods only. White worms are an ideal food for the fish which is recuperating, but do not return a fish to an aquarium containing other healthy ones until you are satisfied that it is quite free from trouble.

Plants from Acid and Calcareous Waters

by C. D. SCULTHORPE

(Photographs by the author)

AQUARIUM plants with plumes of finely dissected foliage are much admired; indigenous species of *Myriophyllum*, *Apium*, *Ceratophyllum* and *Ranunculus* were mentioned as examples of these suitable for coldwater aquaria and garden pools in my previous article (*The Aquarist*, January). *Hottonia palustris* L., the water violet, is equally notable; the only other species in the genus is the North American *H. inflata*.

A rare plant, except in eastern England, *H. palustris* has erect, rooted or floating stems with profuse white adventitious roots. The whorled leaves, each up to 4 inches long, are divided into flattened, fern-like segments of a delightful pale green; the general appearance gives the plant its other popular name, featherfoil. Under bright light, an aerial inflorescence appears in May and June, the stout stem being kept erect by the uppermost whorl of leaves, from whose midst it arises. This draws attention to the mechanical requirements of an insect-pollinated aquatic plant. When the large, attractive inflorescence is raised into the air it must withstand not only water movement below, but also severe bending strains due to wind.

Successful plants of rapid-flowing water have long, erect flower stalks with, in heterophyllous species, associated floating leaves which adjust their position and maintain the equilibrium of the inflorescence. Aquatic plants which are pollinated by insects show attractively coloured petals similar to those of their terrestrial relatives, except that blue is a very rare colour, and white and yellow are very frequent. The inflorescence of *Hottonia palustris* is composed of whorls of pretty, salver-shaped flowers, white, pink or lilac in colour with yellow throats. The species does not produce turions; it perennates and is dispersed by the breaking apart of the whorl of branches below the inflorescence and the growth of each of the branches into complete plants in the spring.

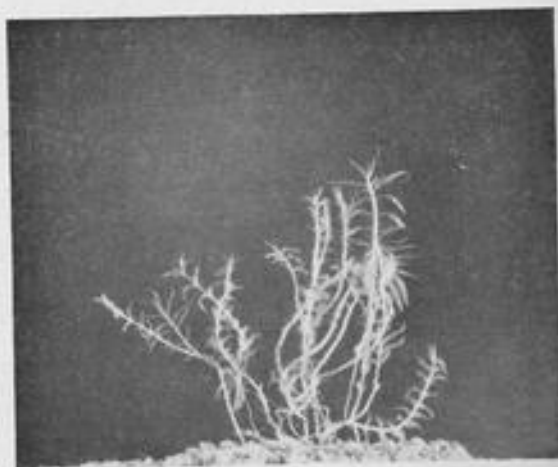
The water lobelia, *Lobelia dortmanna* L., is, together with the next species, a plant inhabiting the shores of lakes with soft, acid water. Its dark-green entire leaves bend horizontally at the tip and have two longitudinal air canals, which are easily seen in a transverse cut of the leaf. These cause its remarkable buoyancy and the difficulty encountered in planting it, despite the profuse, unbranched white roots. In July and August several bell-shaped pale-lilac flowers may be produced on a scaly, aerial stem.

Isoetes lacustris L., the quillwort, is of equally unusual appearance. A dense tuft of spiky dark-green leaves with white transverse markings and four longitudinal air canals arises from the stout rootstock. An ally of the ferns, this plant reproduces by megaspores and microspores proliferated in cavities within the white leaf bases. As in *Pilularia globulifera* L., *Fontinalis antipyretica* L. and *Riccia fluitans* L., which form no reproductive bodies in deep or rapidly moving water, these spores are replaced by tiny plantlets in deep-water specimens of *I. lacustris*. Both the quillwort and the water lobelia provide handsome foreground plants in the aquarium, flourishing in coarse sand or in gravel.

Species of *Callitriche* are widely known as water starworts; differentiation based solely on leaf shape is unsatisfactory as they all show the variation of leaf form according to external conditions which we have already noted amongst heterophyllous species. The genus is



Brittle and rare—the annual *Najas flexilis* (the uncommon tropical species *Najas kingii*, previously known as *N. microdon*, has spiny margins to its leaves)



Potamogeton densus: the oppositely arranged leaves are triangular

usually divided into two sections: *Eucallitriche* and *Pseudocallitriche*. *Eucallitriche* contains amphibious species pollinated by insects and by wind. The floating leaves, which form conspicuous rosettes, are usually broader than the narrow submerged leaves, as in *Callitriche verna* L. em. Lonnr. *Pseudocallitriche* comprises rarer species of more northerly distribution, such as *C. autumnalis* L., whose linear leaves are fully submerged. They are pollinated and fruit under water, the pollen grains drifting to the stigmas, buoyed up by oil globules. Planted in bunches in the garden pool, some of these starworts are pleasing to the eye as they grow to the surface. In aquaria, viewed from the side, they are less attractive and their fragility and inclination to produce long, straggling stems inevitably reduce their value as decorative aquatics.

The Najadaeae is a small family related to the Potamogetonaceae; all three species occurring in Britain are very rare. *Najas flexilis* Rostk. & Schmidt is one of the very few annuals grown in aquaria, and it is found in a small lake in north Lancashire, in Perthshire and in the Outer Hebrides. It is brittle, translucent green and rootless, as are the two other species. *Najas graminea* Del. is stouter and has more dense leaves; it occurs in the vicinity of a mill outflow in a Manchester canal, and is said to have been introduced with Egyptian cotton. *Najas marina* L. is a native stiff spiny species living in brackish water in several of the East Anglian Broads.

The Potamogetonaceae is difficult to classify, for many of the native species have different foliage forms under different conditions and there are also abundant hybrids to complicate matters still further. The few distinctive interspecific characters are mainly floral, and therefore useless for most of the year. Several reasonably distinct species which live entirely submerged thrive in sand or gravel in the aquarium. Sometimes the shape of their leaves changes slightly when they are transferred from running to still water; this tendency may be counteracted by the use of several diffuser stones to circulate the water.

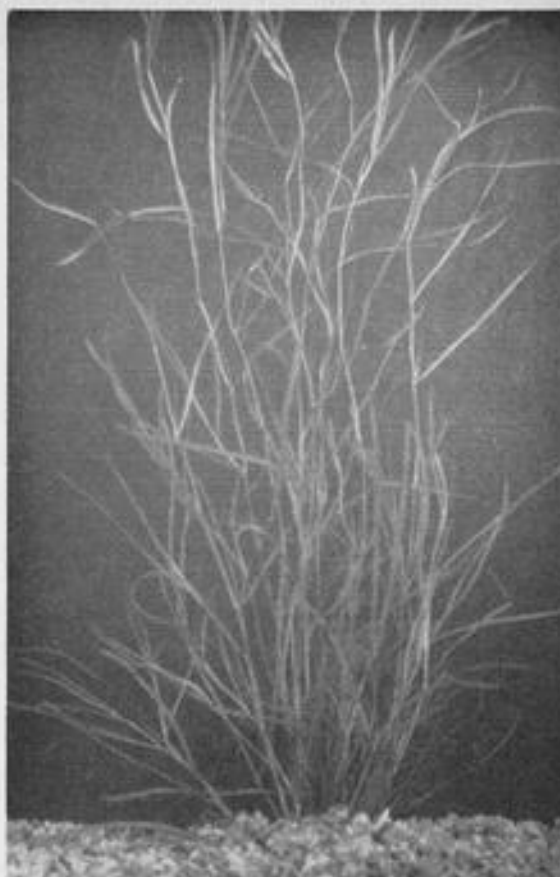
The shining pondweed, *Potamogeton lucens* L., is common in ponds, canals and slow-flowing streams on calcareous substrata. Its large oblong to lanceolate short-petioled leaves with toothed edges are translucent and shining, and they reach a length of about 8 inches and a width of up to 2½ inches. The plant perennates by turions which appear in the autumn on the creeping rhizome.

P. pusillus L. also frequents calcareous waters, where its slender green branches may be more than a yard long. The pale sessile leaves are only about 1 millimetre in width but nevertheless have three conspicuous longitudinal veins. This species has no rhizome and perennates by spindle-shaped turions, about half an inch long, borne near the base of the branches.

The curled pondweed, *P. crispus* L., is a well-known species from running water. Its branching stems are quadrangular, the sessile leaves attain a length of 4 inches and have toothed margins. When mature the leaves undulate and assume a reddish-green hue; these two characters often disappear in plants grown in small aquaria. The 1 inch-long turions of this species have thick spiny leaves and in spring give rise to a new rhizome.

A plant resembling *P. pusillus* in general habit and frequently growing in calcareous waters is *P. pectinatus* L., the fennel-leaved pondweed. It differs from that species in having reddish brown stems with narrower dark-green or brownish green leaves and a submerged water-pollinated flower spike.

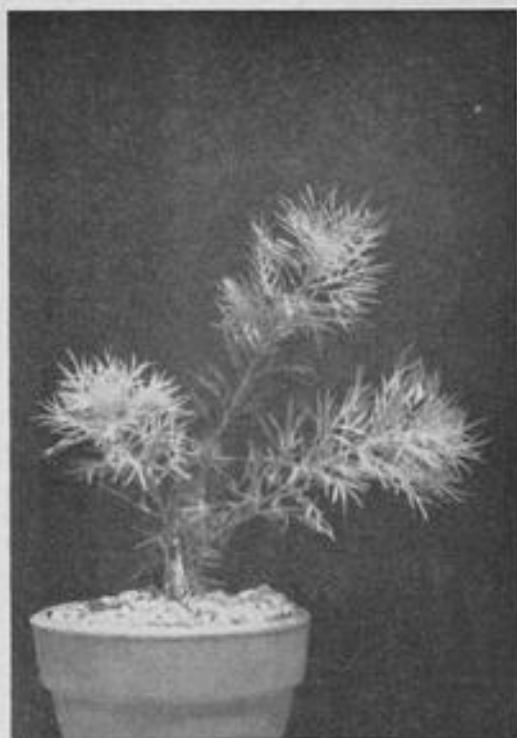
The only native species with opposite leaves is *P. densus* L. The cylindrical branching stems may reach a length of only 4 to 6 inches, and their close green translucent leaves are triangular in shape and slightly toothed. The



Slender, branching stems of *Potamogeton pusillus*



This recently introduced tropical species of *Potamogeton* has not been identified but in many respects is similar to *P. pusillus*



Potted cuttings of the water violet (*Hottonia palustris*), showing the whorled, dissected leaves



Water lobelia (*Lobelia dortmanna*) forms a large number of long roots. Note the bending of the leaf tips

species is not common and prefers crystal-clear swift rivers.

The most beautiful native *Potamogeton* is also one of the most rare. It is *P. nodosus* Poir., the Loddon pondweed, whose rhizome produces stout smooth stems bearing long-petioled leaves. The elliptical to lanceolate blade reaches a size of 8 inches long by 2 inches wide and its translucency is enhanced by delicate, reticulate veins. The species perennates by turions arising on narrow stolons, and it is found only on the gravel beds of the Loddon, the Dorset Stour, the Thames in Berkshire and Oxfordshire and the Avon in Somerset, Wiltshire and Gloucestershire.

None of the species discussed in this article or the previous one is demanding in its culture requirements. *Baldellia*, *Luronium*, *Littorella*, *Lobelia* and *Isoetes* should all be planted singly, whereas *Ranunculus*, *Apium*, *Ceratophyllum*, *Myriophyllum*, *Lysimachia*, *Hydrocotyle*, *Hottonia*, *Najas*, *Callitriche* and *Potamogeton* species look better as bunched cuttings. *Ceratophyllum* and *Najas* are, of course, rootless and may be weighted into the sand or left to float. Some species such as *Baldellia ranunculoides*, *Potamogeton lucens*, *P. crispus*, *P. densus* and *P. nodosus* are more suitable for large aquaria in which there is considerable water movement, otherwise they will probably not produce their mature leaves. Reference to the water in which the species live is advisable; those inhabiting calcareous water, such as *Potamogeton lucens*, prefer aquarium water of pH greater than 6.8, whereas those occurring in soft clear water will prefer the acid water obtained by careful straining through peat moss. Of course, all the species will grow in any aquarium water, but should not be expected to flourish and flower and fruit in water of characteristics opposite to those of their natural habitat. Sunlight is necessary for the development of mature colorations, and flowers seldom appear in artificial light. All the species tolerate a wide range of temperature, but only *Hydrocotyle vulgaris*, *Lobelia dortmanna*, *Lysimachia nummularia* and *Najas flexilis* can be successfully acclimatised to tropical aquaria.

Cacti in the Fish House

IF you wish to try to raise some cactus plants from seed now is the time to procure your seed and get a propagating box ready. Seeds soon germinate if they are sown on top of some John Innes seed compost and are kept damp and warm. A temperature of 70° F. is ideal, and the seed will soon start to germinate as long as warmth, air and moisture are supplied. The direct sun must not be allowed to shine on the seedlings, as this will check the growth. Pans of seed placed on top of a tropical tank soon germinate. Do not place too many pans towards the centre of the cover glass as the weight may break the glass.

MOST plants will be resting during this month and care must be taken to ensure that the plants are kept as dry as possible. The genus of succulents known as *Stapelia* comes from Africa and the stems are liable to be attacked by a black fungus. A dusting with flowers of sulphur will keep this in check. A fungicide known as Tulisan can be used in warmer weather but as it is sprayed on wet it should not be used in the winter. The *Stapelia* are better broken up when they get too bushy as the younger off-shoots usually flower much better than the old. The flowers resemble a toad's skin and have a repulsive smell, like rotten meat. They grow naturally in desert-like country where only blowflies are likely to be around for pollination. The flies are attracted by the smell and lay their eggs inside the flower. This closes and traps the eggs. When the larvae hatch they crawl around searching for food and so carry the pollen.

"Winter Sickness"

by R. E. MACDONALD

IT is possible for the aquarist to be presented with all the symptoms of an epidemic in his tank without the fishes showing any apparent signs of being afflicted by parasites or disease. Plants begin to rot; fishes lose their colour and deaths occur.

This sickness, which is most likely to present itself during the winter months, is due entirely to the biological equilibrium in the tank being unbalanced.

In a well-balanced aquarium, the organic matter which lies at the bottom of the tank is changed through oxidation by aerobic bacteria in the water. The bacteria convert the sulphur content of the organic waste into sulphates and the phosphorus into phosphates. These substances, along with the nitrogen-containing compounds which are changed into ammonium salts and eventually into nitrates, are absorbed by the plants. This process of conversion uses a large amount of oxygen which has to be taken from the water.

In winter months, when the amount of light that the plants need to produce oxygen decreases, there is a considerable drop in the oxygen content of the water. Without natural aeration (which is considerably more efficient than artificial aeration), a relative absence of oxygen below the surface of the water may occur. When this happens the aerobic bacteria are replaced by anaerobic bacteria, which unlike the aerobic kinds, thrive without oxygen.

As the anaerobic conditions begin to form the sulphur conversion will be affected. Hydrogen sulphide which is changed into non-toxic sulphates normally and is most poisonous to fishes, may accumulate together with nitrites that are produced by the appearance of species of anaerobic bacteria that change nitrates into nitrites. Nitrites are toxic, and the fishes will be affected.

These poisonous accumulations, which are produced through lack of oxygen, are really dangerous when a high concentration of one or more of the substances is reached. Ways to avoid anaerobic decay are:

(1) Prevent overplanting with vegetation. It should be remembered that a 24 in. by 12 in. by 12 in. tank needs around 30 plants for good biological equilibrium. If the plants are packed too close together each plant will not receive its full share of light. Consequently, the lower portions of the vegetation will begin to rot through lack of light. Allow space and give thought when planting.

(2) Ensure a good supply of artificial lighting. Plants need light for the process of photosynthesis, in which oxygen is produced. A good guide is to allow 2½ watts of incandescent lighting for each gallon of water. Plants need about 12 hours of light a day, so it can be seen that there will be a considerable increase of artificial light required during the winter months.

(3) Avoid any excessive accumulation of organic waste at the bottom of the tank by regular siphoning and filtering.

(4) Prevent overcrowding of fishes. A good rule to adopt is "an inch of fish to 24 square inches of water surface," and it is always worth while to supplement the oxygen supply by means of artificial aeration.

Lastly, with anaerobic decay it will be realised that even if the concentration of the poisonous substances is not high enough to affect the fishes seriously, the lack of oxygen alone will weaken them and cause them to be more susceptible to attack by parasites and bacterial infection. This should always be considered as a possible influence when tracing the cause of a disease.

FRIENDS & FOES

No. 79

Ramshorn Snails



Planorbis corneus and egg capsule
(slightly larger than life size)

GENUS: *Planorbis*, from Latin *planus*—flat, and Latin *orbis*—ring or circle.

SPECIES: *Planorbis corneus*, from *Planorbis* (see above) and Latin *cornuus*—horned or horny.

THIS is probably the best-known and most sought-after species of *Planorbis* snail, as far as aquarists are concerned. It is also one of the largest, growing to over an inch in diameter and almost half an inch in thickness (height) of shell.

The shell is extremely hard when at maximum size, but the young snails have much softer shells, and are avidly eaten by many of our fishes. Spawn is produced at frequent intervals, eggs being enclosed in an almost circular gelatinous capsule up to half an inch in diameter. The capsule is firmly attached—by its largest surface—to plants, stones, glass or almost anything firm, and may contain up to 60 eggs. The young snails develop within the capsule and with a hand lens can be seen moving slowly around until they can break out and scatter. Hundreds fall victims to fishes, snail-eating leeches or parasitic worms, but always a few survive to carry on the species.

These snails like plenty of room and are best accommodated in large areas of water that is hard. The average aquarium is by no means the best habitat, and aquarists who endeavour to keep adult specimens in them are indeed lucky if they succeed.

C. E. C. Cole

Spanish Aquarists

A GROUP of aquarists interested in keeping tropical fishes has been formed in Barcelona, known as the *Asociacion Acuariafila Barcelona*. The secretary, Senor J. V. Gili de Heredia (Seneca, 8 Atico, Barcelona 6), would like to receive Bulletins from other aquarium societies as the *Asociacion* is planning to issue one of its own in due course.

THE AQUARIST

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

My angel fish often show greyish or dark patches on the body. These patches are not permanent, but I have noticed what appears to be small holes where the patches have been. Do you think my fish have contracted some disease?

Angel fish often show greyish to dark patches on the body, but these patches are not always indicative of disease. Temperature changes, excitement when given food or varying moods will cause such changes in the colour pattern. On the other hand, definite holes or sores may indicate ulceration. But do not worry too much unless your fish show genuine signs of being unwell. As a precaution, add a few drops of a 5 per cent. solution of methylene blue to the water (enough to give the water a distinct bluish tinge) and feed the fish on live food and pieces of raw or lean meat—no dried food for a time. If the holes grow any larger, net the fish and swab the spots with neat T.C.P.

Please will you give me some information about *Pelmatochromis kribensis*?

Pelmatochromis kribensis is native to West Africa. For a cichlid, it is fairly docile and in its smaller sizes may be included in the community collection of fishes. Another point in its favour: it is not a hater of plant life, though it will take a nibble at certain soft-leaved plants. It will eat coarse-grained dried food but keeps in better colour and condition when it is fed on live food or finely minced meat. A fairly high temperature is needed to keep the fish in good health; that is to say, a temperature of 75-78°F. The fish spawn in caves formed by placing two rocks with a flat rock on top. A flower pot turned on its side is another favoured place. The fish does not spawn freely, but when it does spawn it has large broods. Both parents guard the eggs and fry. *P. kribensis* needs a tank measuring about 24 in. by 12 in. by 12 in. if you wish to try and breed them.

I have introduced some tiger barbs into my community aquarium, but they seem to spend a lot of time in corners instead of swimming all the time with the other fishes. When they are in a corner, they take up a slightly head-down position. Do you think these fish are ill or deformed in any way?

It is a characteristic of tiger barbs to rest for short periods in corners or among plant life. They often take up a head-down position and stay that way for minutes on end until they feel the urge to play and chase about the aquarium with the other fishes.

I wish to clear my aquarium of snails, and I have been told that certain species of fish will do this for me. Is this true?

Yes, lots of fishes nibble at snails and worry them to death, and as the eggs of snails hatch out the fishes will pick the baby snails from the plants and glass and eat them. The majority of cichlids, paradise fish and Siamese fighting fish will soon make short work of snails, but these fishes often cause havoc among other fishes in the aquarium. The puffer fishes eat snails, but some of the puffer fishes are bullies and fin-nippers. The little guppy is harmless enough, but it will nibble at snails and generally make their lives uncomfortable; so will the pearl or leeri gourami. If your tank is well planted, one male fighting fish will do little if any damage to the eyes, gills or fins of other small or timid species and would be your best acquisition in your war against snails.

I am new to tropical fishkeeping and I have been keeping guppies for some time. I am puzzled because the fry dropped by my female do not resemble the parent fish in colour or finnage. Can you give any reason for this difference?

It is not unusual for male and some female guppies to differ in colour and finnage from their parents. Perhaps that is the charm of breeding guppies. Breeders of quality guppies take great pains to keep their strains intact by careful mating and the disposal of inferior fish before they get a chance to mate with the better-quality fish. Fish which show better-shaped fins and richer colours than

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.

their parents are kept apart and mated with other well-formed and coloured fish. The breeding of quality guppies has become a fine art, like breeding fancy goldfish, and it can become an absorbing pastime.

I would be grateful for some information about the habits and care of the snakehead (*Channa asiatica*).

The snakehead is a pugnacious fish, and the larger it grows the more dangerous it becomes; that is, to other fishes and smaller members of its own species. It is, however, an interesting and attractively marked fish and will live for a number of years in a 24 in. by 12 in. by 12 in. aquarium maintained at a temperature of about 75°F. It needs plenty of chopped or whole earthworms, gentles, *Tubifex* and the like to keep it well nourished.

Is it all right to feed greenfly collected from garden plants to my fishes?

Greenfly from the garden make a useful live food for those fishes that will take food floating at the top of the water. But make sure that the greenfly is taken from rose bushes and plants that have not been sprayed or dusted with an insecticide. Most insecticides used to keep garden pests in check are highly dangerous to fishes.

My box of white worms has become infested with small midges or flies. These rise in a cloud and fly about the moment I remove the cover from the box. How can I get rid of the flies?

One way to deal with your problem is to remove the top layer of soil from the box and replace the soil with fresh. Wipe round the sides of the box with a rag dipped in paraffin oil. Just a light wipe round is needed. Too much food introduced at a time will encourage the breeding of tiny flies or midges, especially if the food is very wet.

I have a sun lamp (ultraviolet) and wonder whether my aquarium plants and fishes would derive any benefit if I flooded the aquarium with light from it for a few moments several times a week?

We advise you not to try this dangerous experiment. We have a sun lamp, and the light from it has had a detrimental effect on certain house plants not removed from its vicinity. You must remember that the light emitted from a sun lamp is very intense. It would probably do the fishes a great deal of harm. Normal daylight, or bright electric light from a standard electric lamp, will give the best results.

I have read somewhere that the rich brown sediment that forms on the bottom of the aquarium is best left where it is as it is a good fertiliser for the plants and helps to keep the fishes in better condition. Conversely, I have read that an aquarium keeps better when the sediment is siphoned from the bottom. Please will you tell me what I am to believe?

There is a difference between the rich brown sediment which has been rendered innocuous by bacterial activity and the sediment of too much fish excreta and uneaten food. A certain amount of brown sediment or mulm is beneficial to plant life. A floor littered with uneaten food and decaying plant leaves and stems will soon spell disaster. The knowledgeable aquarist makes sure that the fishes are not fed too heavily at one time, and that the excreta of large fishes such as cichlids is siphoned away before it fouls the water. This does not mean that one has to spend minutes every night working with a dip-tube or siphon, but a weekly tidy up with dip-tube or siphon will help to keep the aquarium in perfect condition.

I keep a coldwater marine aquarium, and as marine mid-water swimming fishes are virtually unobtainable, I am wondering if there are any fresh-water varieties that can be "acclimatised" to salt conditions. Could I use the peacock-eyed bass?

I do not think that you would be successful in "acclimatising" a peacock-eyed sunfish to sea water. This fish is found naturally in lowland streams from Virginia south to Florida and Louisiana, and north through the Mississippi Valley into southern Illinois. The diamond sunfish is known to enter brackish waters near the mouths of streams about Chesapeake Bay, but just because a fish may pass voluntarily from fresh to brackish waters at times does not mean to say that the same fish could exist for long in a marine tank.

I have recently moved into a house which has a concrete garden pond in the garden. I emptied it and scrubbed it out after removing a large quantity of mud and mud. I refilled with tap water, placed two water lilies in tin containers and two other submerged plants in flower pots, and added two large goldfish. The water is now as cloudy as when I began and I cannot see the fish. I have been told that it is not possible to keep the water clear, but I think that it should be better than it is now. What can I do?

In the first place you must not expect to set up a garden pond in the summer without getting some cloudiness to form in the water. It is quite possible to keep the water in a pond clear, but just as it is impossible to make wine in a few minutes so it is impossible to expect the water in a freshly set up pond to remain clear. There is always a certain time taken for a proper balance to be formed. Provided that there are enough water plants in a pond the water should stay clear, but the plants must be given time to become established. If your pond contains few, if any, growing water plants the water is sure to turn green if it is exposed to the light; this is a natural process. It is only when there are plenty of other growing water plants present in the pond that the algae, which cause the green colour, will die out.

I have a goldfish about 3½ inches long which I have had for about 6 years. Until recently it has been in an accumulator jar, but owing to its increased size I have now got it in a tank 10 in. by 15 in. by 10 in., planted in the same way as the old tank. Now I cannot keep the water clear; it is always muddy and a thick sediment lies on the bottom, whereas in the old tank the water was always crystal-clear. The fish is perfectly happy but what can I do about the cloudy water?

The best thing to do is to let well alone and the water should soon clear. The water plants in the old tank were growing well and keeping the water clear. When transplanted into the fresh tank they had a set-back and so were not able to function properly. You might help a little by placing some coarse sand such as river-washed grit on the bottom. Do not feed with any dried foods until the water clears, and then go easy with it through the winter.

Our pond is in a sunken garden and is about 12 feet in diameter and 2 feet deep. It contains approximately 50 large goldfish and many small ones, including golden orfs. It is proposed to fill in the sunken garden, the sides of the pond needing to be raised about 2 feet. This involves concreting, during which time the fishes must be re-housed. I propose moving them into six new galvanised iron tanks whilst the pond is being altered. My problems are: do the new tanks require treatment before putting the fish in? Shall I have to feed the fishes more frequently whilst they are in the tanks? What is the best way to treat the pond before returning the fishes? As the scavengers appear to have died out should I get some more to put in the tanks?

The new tanks can be dangerous to fish and so I suggest that you paint the insides with a bitumastic paint, giving the top lip of the tank a coating. Wash them out when the paint is dry and they will be all right for the fishes. Do not feed them at all whilst they are in the tanks. They will not suffer harm for a month or two. You will not need any scavengers for the tanks as long as you withhold all artificial foods. Once the concrete in the pond has set it can be well scrubbed round with a stiff broom and well



Photo: W. J. Howes
In a few weeks' time thousands of goldfish will be delivered in this country from Italy, the beginning of the annual summer importation. Most are destined to be kept in unsuitable conditions and for early death, since ignorance about the needs of "pet" fish is still widespread.

washed out. Do this twice, at intervals of a week; during the intervals the pond should be filled with water.

In a garden pond, 18 feet by 5 feet, I keep a 15 inch carp with my goldfish. Will you kindly tell me what to feed it on, together with quantity?

The carp will eat exactly the same food as your goldfish as it is of the same family and habits. It will eat any live foods such as garden worms, gentles, etc., and any form of dried foods such as ordinary packet goldfish foods. The pond is of a good size and as long as there is not a large number of fish in it there need be very little extra food needed. There will always be a certain amount of food available in the pond and you must not over-feed. To test if the fish are hungry just throw a small piece of dry brown bread in the water. If the fish are hungry they will soon come up to the bread. If they do not do so within a few minutes then they must not be given any more food.

I have two 100 gallon tanks standing out of doors and fed from buildings. Could these be used profitably to keep fish in? Would trout or goldfish be suitable and what quantity can I keep?

The tanks would be suitable for keeping fishes as long as the water which runs into them does not come from a roof which receives a lot of soot. This could foul the water and make it unsafe for fishes. If you could let the water run clear of the tanks until the roofs were washed clean the rain water would then be safe. You would not be able to keep trout as they require a well-oxygenated water. Goldfish would be all right and the quantity you keep will be according to the surface area of the water. Allow not more than one inch of fish, not counting the tail, to each 24 square inches of surface area. Some oxygenating plants such as *Elodea canadensis* can be used in the tanks, or some hornwort, which would grow without any base compost.

(Please turn to page 181)

FISHES IN THE BEDROOM

by J. N. BANKS

I DID not dream, 2 years ago when I "went tropical" with a 24 in. by 12 in. by 12 in. tank, that I should end with tanks in the bedroom. But more of that later.

The tank I set up was a community tank. That, to me, then, was one with one each of as many different kinds of fish as I could afford. I did, however, have a pair of red and green swordtails and, of course, some guppies. The livebearers in due course presented me with a batch of young which lasted all of 2 days before being eaten. I decided that I needed a breeding tank. I scouted round the relations and much to my surprise acquired two 18 in. by 10 in. by 10 in. tanks, one of which needed re-glazing.

"Swarms" of Guppies

The good one was set up and was soon occupied by swarms of young guppies. The other tank I set about re-glazing. After much recourse to the public library I decided I was sufficiently "genned up" to tackle a small 18 in. tank! All went well until the bottom was put in, last of course, as by the book that was propped upon the chair nearby. Then, calamity! One of the corners gave a crack and my piece of glass was ruined. Not possessing any more glass of suitable size I decided to patch it. This I did by putting a layer of aquarium cement in the shape of a square larger than the crack and pressing my glass "patch" on top. I covered this with gravel and filled up with water. Not quite by the book, perhaps, but the tank is still leakproof.

The local club bought all the equipment of an aquarist giving up the hobby and I acquired three 24 in. by 12 in. by 10 in. tanks with equipment. Next problem was where to put them? I decided to utilise the useless alcoves each side of the chimney breast (described as useless when explaining my idea to the wife). I made stands from 2 in. by 1 in. timber and faced it with hardboard. On this I stuck rock-strata wallpaper. Jagged holes were then cut out to take the squareness of the tanks within and everything was connected up. The result was very pleasing both to me and my wife (so she says).

Cichlid Fancy

By now I had taken a fancy to cichlids and one tank provided a home for these. The others housed platys and swordtails. At this time I also had a young three-spot blue gourami that was amazing me in its rate of growth. It soon became apparent that it was full of spawn and a search was made for a mature male.

By this time I had run out of plants and patience with the cichlids and thankfully exchanged two for a male gourami.

I scouted round the club members and obtained a tank from one who was cutting down his stock. The only place to put it was on the opposite side of the room in another alcove that had fortunately been left when French windows were fitted. The radiogram was resited and the tank installed. At this time another club member decided to give up fish-keeping and I became the proud owner of a

trio of adult angels complete with tank. The position was now serious; there were no more alcoves left! I tentatively suggested the boxroom, which up till then had always been the third bedroom, and was able to overcome any objections. The angels were installed in the living room and the gouramis relegated to the bedroom, where incidentally, they produced 86 fine offspring.

Murmurings were now being heard about cost of electricity and bulbs and so on, *ad infinitum*, so a trip was made to a local pet shop with surplus fishes and the proceeds were donated to the electricity board.

An outing had been arranged by the club to visit a large aquarist's firm and against all my resolutions I spent the return journey sitting on a 36 in. by 15 in. by 12 in. tank which just fitted on a shelf built into the wall of the bedroom. This was soon full of young swordtails, which took a lot of catching when the time came for the electricity man's visit!

Staging in the Bedroom

Another club member was moved by his firm out of town and, lo and behold, I had another 24 in. by 12 in. by 12 in. tank, complete with fishes. That also found its way into the bedroom and the inmates went into my community tank, which by now was worthy of that designation.

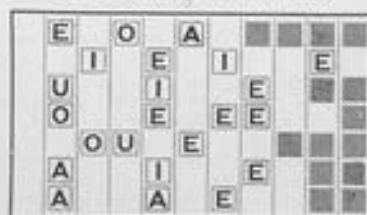
The angels and the blue gouramis spawned simultaneously and suddenly I found I was short of tank space, as I also had a pair of dwarf gouramis and Siamese fighters in breeding condition. At the next club meeting it was announced that a member had bought a van load of tanks and was selling them at cost price. Not being able to forego a bargain, I obtained two more tanks to join the others in the bedroom. My next job was to make some wooden staging to arrange them better.

Each species could now be kept separate from birth. No longer were platys mixed with swordtails.

I have just started breeding some golden swordtails that caught my eye and naturally they have to be kept separate from the others. What I shall do if my angels spawn I don't know.

I have just heard the whereabouts of another 36 in. tank for sale . . .

DO YOU KNOW THE NAMES?



In the squares above the vowels have been filled in. Fill in the consonants from the jumbled list to make the common names of seven fish families. If this is done correctly, one of the vertical columns will give the common name of a freshwater fish family that includes a large number of well-known aquarium fishes.

C C F F F G G H H H H I L M N N N P R R
R R S S S S S S S S S S T T T T W W

(Solution on page 182)

G. F. H.

Our Readers Write

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

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

Decrease in Numbers?

AS an aquarist of some years' standing, I am becoming increasingly disturbed at the (apparent) decrease in the number of fellow-enthusiasts.

Now, after the boom in fishkeeping of some 8 to 10 years ago, when we "had never had it so good," I am wondering what percentage of fishkeepers are left, as compared with those very active years?

As past secretary of what was once the flourishing Isle of Ely Aquarium Society I now find it increasingly difficult to come across people even slightly interested in fish-keeping.

What really has happened to all those one-time enthusiasts and dealers? What are the views of other *Aquarist* readers on this subject?

A. CAWDRON,
March, Cambridge.

Borrowed Plumes

ALTHOUGH I am a newcomer to keeping British native fishes I have tried some experiments. Just over 3 months ago I discreetly "borrowed" a few cuttings of some pot plants that my mother has around the house and I planted these in an odd corner of one of my four 24 in. by 12 in. tanks.

The cuttings are still flourishing and, to my mother's amazement, look much better than her pot plants! They are the green and the green-and-white-striped varieties of *Tradescantia*. They are not fast growers and in my small poorly heated shed have been living in the temperature range 53° to 62° F. They have not harmed the fishes and do not get eaten; I have three perch and one goldfish in with the plants and they do not uproot them.

The plants look very nice in the aquarium and can be obtained from most florists, although many aquarists will probably have them already as pot plants growing in the house.

J. R. HOOTON,
Harlesden, London, N.W.10.

Production of Gases by Water Plants

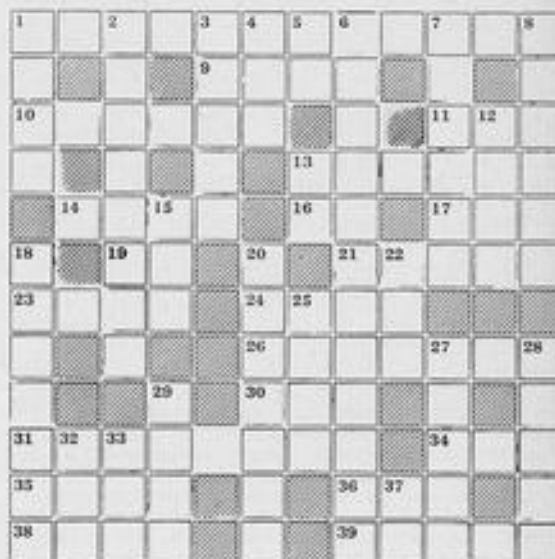
AS Mr. Perkins so rightly points out in the December issue, the majority of aquarists have observed streams of small bubbles rising from aquatic plants exposed to strong light. This seems, however, to occur more often in newly planted tanks or after the plants have been trimmed, when bubbles can be seen rising from the broken or cut surfaces of the plants. Is it not possible that these streams of bubbles occur only at sites of injury. If not, why are they seen to come from certain places only and not from the whole surface?

Surely all aquarists are interested to know whether gases produced in plants are passed out into the water or not, besides that from damaged plants. If Messrs. Perkins and Sculthorpe would supply references to the experiments on which they base their convictions, your readers would then be in a better position to draw their own conclusions.

MRS. V. C. FYFE,
Cambridge.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



Clues Across

- Aquarist or year-round swimmer? (4-5, 3)
- False god or fancy goldfish (4)
- Fish lacking pigmentation (6)
- Come back, pal, or the waves may get you (3)
- Kill caught fish with whiskey? (6)
- This river gives some the blues (4)
- Abstainer with 17 becomes tetra (1, 1)
- Age (3)
- Award for non-regular officers (1, 1)
- Scarcer (5)
- Wavy decoration (4)
- Gourami feature in 29 is twiddled 'twixt cup and lip? (4)
- That may be touched or felt (7)
- Employ (3)
- To water (8)
- At this word (Latin abbrev.) (1, 1, 1)
- Archaic way to stop taps (4)
- Chronicle (3)
- A head of these swine could form an aquarium (4)
- Scrub (5)

Clues Down

- Scorch fish? (4)
- Guppy in common parlance (8)
- Sing about for birds' limbs (5)
- Rumpus (3)
- This to do produces 4 Across (2)
- These are shocking fishes (8, 4)
- Device for cleaning aquaria (6)
- Yellow water lily (6)
- Mother-o'-pearl loses its head in this measure (4)
- Little angel? (2)
- Orfe (3)
- This is too big for home aquaria, no kidding (3-4)
- Mouth of river (7)
- Appropriate here to turn the tap (3)
- Slip of fish skin used as lure (4)
- Perfect state of insect (5)
- Baby eel (5)
- Prominent features of thick-lipped gourami (4)
- Rail Transport Officer (1, 1, 1)
- Marine worm much used as bait (3)
- Company commander, for instance (1, 1)

(Solution on page 182)

Coldwater Fish-Keeping Queries

(continued from page 178)

I have a coldwater tank with goldfish. The tank has been filled for about 3 months and now a black film is forming over the bottom and is creeping up the plants. Can you please tell me the reason for this? Two of the fish have died and I have taken the others out.

The black film is caused by overfeeding. There has been a quantity of uneaten food decomposing on the bottom and the black film is the result. Siphon out all you can reach and place some fresh washed sand on the bottom. Do not give any dried food for at least a week and the blackness should clear up.

I have a tank 4 ft. by 3 ft. by 1 1/2 ft. with the back, sides and base of metal and a glass front. As I intend using the tank for coldwater fish in the garden can you please advise me what kind of paint I should use for the interior?

You can use a good bitumastic paint for the metal work. Make sure that the tank is absolutely dry before starting to paint. Once dry it can be washed out and should be all right for the fish. Don't forget to watch for frosts as the water can freeze and cause the glass to crack.

I have some *Azolla* which is thriving in a small pool in a shady position. Can you please tell me what happens to it in the winter? Does it die, or will it reappear in the spring? Is there anything I can do to protect it during the winter?

The plant is probably *Azolla caroliniana* and will die down in the winter. It will grow again in the spring as long as it has not been damaged by excessively cold conditions. It is a native of the southern United States and California, and is also found in tropical America. It can become a nuisance in a small pool and so should be used with caution. To ensure that you have some for next year you can remove some to a small tank or jar and keep it indoors for the winter.

I have a large natural pond in a part-wooded area at the bottom of my garden. It is well stocked with goldfish and planted with lilies. It has remained clear for a number of years but last season it has become covered with duckweed. This completely covers the water and although I have netted off hundred-weights of it the pond is too large for this to make much difference. Will you please tell me if there is any way of destroying the weed without harming the fish and will it come again next summer if it dies down for the winter?

The duckweed (*Lemna*) will certainly die down for the winter but it will reappear in the spring from seeds left behind. I know of no way of killing the weed without harming the fish. It can be dragged out with a rake once most of it has been flushed to one side with a strong jet from a hose. If there is no other food given to the fish they can eat this weed, although from your description there is far too much for them to be able to clear up. A couple of ducks would help considerably, if they were pinnioned to prevent them flying away, especially if you continue to rake out as much as possible. When it appears again in the spring begin at once to remove it so that it does not get too thick again.

I had a tank, 18 in. by 18 in. by 8 in., with two bleak, one Bristo shubunkin, one black moor and one golden orfe. I had it for 6 months and then sold it. The new owner added two goldfish and after a few days the fish died one by one and then the plants died. Would the different types of water in our districts have killed the fishes?

I can only make a guess at the cause of the death of the fishes. In the first place the tank is capable of supporting only 6 inches of fish. I do not know the sizes of your fishes but imagine that the tank was already filled to capacity when you sold it. The addition of the extra fish was the last straw and the fishes died through lack of oxygen and polluted water. It may have been that the water used by the new owner came through copper pipes, which are very dangerous to fish life. Again he may have over-fed the fishes and so polluted the water. The two last-named causes would also account for the plants dying.

News from AQUARISTS' SOCIETIES

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

THE Annual Dinner of the Mansfield & District Aquarists' Society was held recently. Guests of the Society were Mr. E. Harrison (vice-president) and Mrs. Harrison, also Mr. Mark Welch (P.N.A.S. Judge) and Mrs. Welch. Mr. Harrison presented the Society's "Challenge Shield" to Mr. A. Lindsay, as the year's most successful competitor in the Table Shows, and the "Home Aquaria" shield to Mrs. M. Purser, for the most attractive home aquarium.

In his address Mr. Harrison stressed that the Mansfield Society had that most essential ingredient for maintaining a successful Society, a warm and friendly atmosphere. Future programmes include a lecture by Mr. Harrison, a "continuation lecture" by Mr. Mark Welch, also a contribution from Mr. H. Esterbrook, F.F.G.B.S. Local aquarists are assured of a sincere welcome at the meetings. The secretary is Mr. C. Hughes, Parkleigh, Park Hill Road, Mansfield Woodhouse, Notts.

AT the Annual General Meeting of the Erith and District Aquatic Society an interesting and varied programme was arranged for the

next twelve months including club shows, talks by club and outside lecturers, and films. The district embraces the whole of North Kent, the headquarters at the Congregational Hall, Bechtelheath, being central to that area. Meetings are held the first Wednesday of each month at 8 p.m. and visitors are welcome. The address of the secretary is Mr. D. R. Cronin, 84, Park Crescent, Erith.

A CHANGE of name is reported from Slough, Windsor & District A.S. The new title is the Slough Aquarium Society and future meetings will be held at Slough Community Centre. The names and addresses of the chief officers are: Chairman: E. G. Kitching; Secretary: Mrs. E. G. Kitching, both of Arklow, Church Lane, Stoke Poges, Bucks; Treasurer: Mrs. E. C. B. Knight; Show Secretary: H. C. B. Knight, both of Jasmine House, Hatch Bridge, Windsor, Berks.

AT the first meeting this year of members, The Gooles & District Aquarist Society discussed problems and there was a "round the

table" quiz. Owing to an increase in members the meetings are now held at Kitwoods Cafe on alternate Mondays.

A show tank was set up at a recent Cage Bird Society show and proved to be very attractive. Members were unanimous in deciding to seek further opportunities for displaying the club tank.

New members are welcomed, young and old, expert or novice.

AT the last meeting of the Dundee Aquarium Society there were ten entries for the Scott Trophy Table Show—Barbs, and the results were as follows: 1, G. B. Kirkland; 2, A. R. Bell; 3, A. Cross; 4, A. Cross. Current placings in the Scott Trophy competition are: A. R. Bell, 8 points; E. J. Seymour, 5 points; G. B. Kirkland, 4 points; A. Cross, 4 points; P. N. Greening, 3 points.

A NEW Society has been formed in Birmingham and is known as the North Warwickshire Aquatic Society. The officers of the Society are as follows: Geo. Griffiths, president; F. Siers, chairman; L. W. Male, secretary and Mrs. M. Orton, treasurer. General meetings are held on the last Wednesday of each month at Greenhorne Rd. School, Kingstanding, Birmingham, to which aquarists in the area are invited to attend.

AT a meeting of the Yorkshire Section of the F.G.B.S. the following officers were elected: Chairman, Mr. P. Higson; vice-chairman, Mr. K. Briggs; secretary, Mrs. F. Cherry; treasurer, Mrs. E. Mooney.

Mr. F. Cherry's and Mrs. E. Mooney's names were put forward as Class B judges, and Mr. B. Warwick of Streton as a trainee judge. It was decided that meetings should be held on the third Sunday of each month at 2.30 p.m.

TROPHIES for last year's competitions were

awarded at the Annual Dinner of the **Sheffield & District Aquarist's Society** which took place recently. The Dinner, which was attended by over sixty members and wives. The Guest of Honour for the evening was Mr. Edgar Chapman, the well-known F.N.A.S. judge, who was made the first honorary vice-president and life member of the Society in recognition of his services to Sheffield Aquarists over the past twenty years.

RECENT events in the programme of the **Oxford Aquaria Society** included a table show for any variety. Thirty-three entries were benched and the judging was by Mr. Reg. Minns, who is very well known in the area as an expert and authority on the hobby. The result was as follows: (1) Mr. Ron Buxton, with a superb female black mollie which gained 88 points. (2) Mr. F. Poole who benched a magnificent blue male fighter which was awarded 87 points. (3) Mr. A. Henderson with a male dwarf gosiemi with 84 points, and Medals were awarded for these three winners.

During the coming year a series of bottle shows will be run to determine the winner of the chairman's cup for a table show points competition which will be held on a yearly basis. All subsequent table shows will be for specified classes, this first one being a sort of "dummy run."

WILL show secretaries please note that the **Cardford Aquaria Society** are holding their second Annual Show on 10th-11th June. Plans are now being made to make it an even bigger show than the first where a thousand fish were on show. More trophies have been added to the already large number which are put up for annual competition, and a full list of these trophies will be announced at a later date. Show schedules are not yet available, but further information regarding these will be published later.

THE Annual General Meeting of the **Bristol Tropical Fish Club** took place recently and the following officers were elected for 1959/60: Chairman, Mr. L. Nightingale; vice-chairman, Miss O. M. Iles; hon. sec., Mr. L. Littleton; hon. treasurer, Mr. V. A. Webster; librarian, Mr. S. Rummens; reporting sec., Mr. W. Holland. Auditors, Messrs. F. Mould and P. Cope. Applications for membership are welcome and should be addressed to the Secretary, 9, Little Stoke Rd., Stoke Bishop, Bristol. 9. Meetings are held at the Old Duke Hotel, King St., Bristol, 1, on the third Thursday of each month, commencing at 7.45 p.m.

At the December meeting Mr. V. Jones of the Clifton Zoological Society spoke to the Members on various aspects of Tropical Fish-keeping, and at the January meeting Mr. W. Ham of the Bristol Aquarist Society gave a talk on "Electricity and the Aquarium."

THE following officers were appointed at the recent A.G.M. of the **Friends Aquarist Society**. Chairman, J. Home; secretary, Mrs. R. Huntley, 74, Lillian Road., S.W.16; treasurer, P. Cooper; show secretary, P. Jakes.

At recent Table Shows the winners of the respective classes were as follows: *Barbs*, P. Beavan. *Blood Show*, B. Huntley. The club championship was won by D. Robinson, who also won the highest pointed fish of the year shield.

The Society meets every Thursday at the Lansée Hotel, Lansée Road, S.W.9, and application for membership should be sent to Mrs. R. Huntley, 74, Lillian Road, London, S.W.16.

THE following have been appointed as officers of the **Leeds & District A.S.** for 1960: President, Mr. P. Reynolds; vice-president, Mr. J. Skinner; hon. secretary, Mr. L. Grimshaw; hon. treasurer, Mr. E. Dobson; hon. show secretary, Mr. L. Grimshaw; hon. social sec., Mrs. J. Skinner; F.N.A.S. delegates, Mr. and Mrs. J. Skinner; A.Y.A.S. delegates, Mr. H. Lees, Mr. S. Skinner.

CURATOR of the aquarium at Bristol Zoo, Mr. Vic Jones, talked to members of the **Bristol Tropical Fish Club** on his "stream aquarium," at their annual meeting in The Old Duke, Kings Street.

It was decided that the club should meet every third Thursday in the month at the Old Duke.

Officers elected: Chairman, Mr. L. Nightingale, vice-chairman, Miss Iles; treasurer, Mr. V. Webster; secretary, Mr. L. Littleton; press secretary, Mr. W. Holland.

AT the annual general meeting of the **Stirling A.S.**, the following office-bearers were elected: President, Mrs. Clarke; vice-president, Mr. Johnston; secretary, Mr. J. Ritchie, 63, Johnston Avenue; treasurer, Mr. P. Jenkins.

Mrs. Milne, B.Sc., then gave a talk on the development of a fish's egg and said it was probable that bacterial infection of the egg preceded fungal invasion.

Mr. Kebo had on show two very good specimens of Tuxedo moonfish which were later sold for the benefit of the society funds. Also making quite a display was a large red puffer.

The speaker at the last meeting, was Dr. Young of the Zoology Department of Glasgow University, who spoke on the structure and breeding of fishes which build nests of bubbles.

HALIFAX Aquarists' Study Group has been disbanded due to lack of support. Formed only two years ago by the 11 enthusiasts who were left of the one-time 150 strong **Halifax and District A.S.**, the group met monthly to concentrate on the scientific and experimental side of fish-keeping rather than to discuss it as a hobby or fancy. Mr. A. J. Rawson, who was secretary of the Study Group, stated that membership further dwindled after the winding-up of the old Aquarist Society in December, 1957 and eventually there were fewer than five people attending meetings. So the decision to close the group was taken.

The Halifax society was started in 1946 during the post-war boom in tropical fish-keeping and held regular and popular aquarist shows for a number of years.

MR. PRATT won first place with a very fine tiger barb in the table show for tropical fish in the barbs class held at the last meeting of the **Hounslow and District A.S.** Second was Mr. Boul's cummingi barb and third, Mr. Willis's tiger barb. Judges were Messrs. Rowland and Woodward. The rest of the evening was taken up with a general discussion on fish-keeping.

THE annual general meeting of the **Guildford and District A.S.** will be held on the 10th February at Guildford House. At recent meetings there was included a talk on plants, by Mr. A. S. Jones, and also Mr. Maddler's experiences as an aquarist—he has 30 tanks—together with a description of his fish house.

THE new meeting address of the **Ilford and District Aquarists' and Pondkeepers' Society** is St. Laurence's Church Hall, Hamil-

ton Avenue, off Horns Road, Ilford. Recent programmes have included a talk on fish diseases and a table show. The secretary is Mr. V. Price, 1a, Horace Road, Barkingside, Ilford.

COLOURED slides have been the feature at recent meetings of the **Bristol A.S.**, and these have been supplied by Mr. V. Capaldi of the Bristol Club and Mr. Roy Skipper of the Hendon Club. A discussion on the open show formed the basis of the December meeting.

THE **Brockley and District Breeders' Circle** programme for February is as follows: 16th February, Glazing demonstration; 22nd February, One-man table show.

The secretary seeks information on likely spots in Scotland where specimens of the freshwater crustacean *Niphargus fontanus* Bate 1895 might be found.

THE **Friends Aquarist Society** would be very grateful to hear from any person who would be good enough to loan them any 2 in. by 2 in. black and white or colour slides or 35 mm. roll of film on fishy subjects for showing at one of the club evenings. Please contact Mrs. E. Huntley, hon. secretary, 74, Lillian Road, London, S.W.16.

SECRETARY CHANGE

A CHANGE of secretary has been reported from Erith and District Aquatic Society: Mr. D. R. Cronin, 84, Park Crescent, Erith, Kent.

OBITUARY

WE regret to announce the death of Mr. Charles Whitehead of Englewood, Anmore Road, Denmead, Near Portsmouth, Hants., on 26th December, 1959. He was a veteran breeder and raised many varieties of fancy goldfish and it is doubtful whether anyone in the western world has produced over so many years so many top-class goldfish. He was vice president of the Goldfish Society of Great Britain and a member of other aquarist societies. He will be sadly missed at the larger shows in London and Bristol.

Crossword Solution

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

DO YOU KNOW THE NAMES? (Solution) Reading across, the names of the fish families are: Remoras, Whitefishes, Sunfishes, Conger-eels, Groupers, Jawfishes and Catfishes. Thus the third vertical column reads Minnows.

"MOLLIFUD" The Aristocrat of Fishfood

MOLLIFUD is the result of 30 years' experience as a fish fancier and breeder. It is not an overnight brainwave, and contains only the highest quality ingredients, which are not cooked, as cooking destroys valuable food elements essential to the health of your fish.

You can see that this food is in a moisture-proof carton to

prevent loss of nutrients, what you can't see is the quality you buy, a complete and balanced diet, including the green matter known to be beneficial. Mollifud contains no biscuit meal to make bulk and does not cloud the water. Can you say this about any other fish food you have used? Price 2/- post 6d. Breeders Pack 4/- post free, Fry Food 1/4 post 6d. Generous terms to trade.

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