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THE AQUARIAN
FOR the south of England, at any rate, the heavy freeze-up at the end of December was as unexpected as it was unwelcome. Aquarists do not bargain to have to deal with frozen ponds or to worry about their coldwater aquaria outside or in unheated buildings so early in the winter, and many difficulties were encountered. It is possible, of course, that an even more severe spell of weather may materialise in this or the next month, the more usual periods for trouble with ice.

Fortunately, ponds very rarely freeze solid, unless they are so shallow as to be unworthy of being used for keeping fishes. This is because ice formation begins at the surface and a long time elapses before the lower water cools to the freezing point. And even if coldwater fishes are in near-freezing conditions this does not mean that they will come to harm. Such is the advantage of being “cold-blooded,” of being able to continue to exist when body temperature is little different from that of the surroundings, over a range of 80 degrees or so. All the body processes of a fish are slowed at low temperatures: feeding cease and movements are few; even the heart beats more slowly. Body food stores are more than adequate for such conditions and the requirement for oxygen is greatly decreased. However, a fish actually trapped in solid ice for a long time may die from the stoppage of its gill movements, and in very cold weather the ice may reach a temperature low enough to freeze the body fluids of the fish, which certainly brings about death. These fluids do not have the same freezing point as water, so that something lower than 32°F must be reached for this to occur.

Ice forming on ponds should gently be broken to avoid the enclosure of the water by a continuous layer for long periods. Such a layer can bring trouble because gases from decomposing bottom matter may accumulate in the water under it during these conditions to such an extent as to poison the fishes.
THE HOME AQUARIUM FOR MARINE TROPICALS

Black Angel Fish

by JOHN BOURSOT

The Chaetodontidae, comprising the 150-odd species of butterfly fishes and angel fishes, is one of the families of marine fishes best known to the public. These active, graceful and gorgeously coloured fishes of the shallow tropical and subtropical seas are a striking and thrilling feature of the reefs and sea gardens which hold visitors entranced as they look down upon the busy scenes beneath their glass-bottomed boats.

It is in the smooth palm-fringed lagoons and among the numberless reefs of the Indo-Pacific where the butterfly fishes attain their most luxurious development and wear their finest colours. To these exquisite creatures the gazer turns his eyes again and again to enjoy the classic form and graceful lines, and to marvel at the rare abstract beauty of spots and bars and patches so skilfully arranged.

The angel fishes are similar to the butterfly fishes, though discretion forbids a comparison of species inhabiting different oceans. For unlike the Pacific butterflies, whose beauty surely exceeds that of Atlantic butterflies, Pacific angels and their Atlantic cousins, though differently marked, must share the palm. Such Pacific forms as the young half-circled angel, like a fish carved in streaky marble, the breath-taking young imperial angel with its pattern of tight narrow rings like a slice of polished agate, and that fabulous fish the emerald angel (calculated to leave any freshwater aquarist transfixed and agape), will, of course, seem incomparably more handsome to owners of Atlantic angels. But the reverse is also true. None can dispute the strange fascination of a black angel cruising the reefs of the Caribbean. With the yellow underside of the pectorals hidden when the fins are closed, the attractive monochrome of silvery grey with black mosaic on the body gives the fish a charm and elegance which colours would deny. Lovelier yet is the French angel. Although darker than the black angel its scales are edged in gold like the scales of a porcelain fish. The magnificent rock beauty, with startling baby-blue eyes (among the most beautiful in Nature), is a radiant fish in flashing orange and with a huge black saddle on each side. The queen angel must be seen to be believed. More brilliant than the blue angel, the deep resplendent orange, the vivid yellow, the intense blue, the blazing rainbow-hued dorsal and anal fins, the blue gill markings and deep blue ocellus on the head make it the show piece of the Caribbean.

Seeing these fishes for the first time, the novice stands wide-eyed and open-mouthed. Bystanders fade away as his attention is riveted to the gorgeous colours, and he stares incredulously at Nature's matchless impressionism: so different from the ghastly mess of smears and daubs of human impressionists.

Let us now consider the black angel, Pomacanthus arcuatus, in particular. Immature individuals of this species so closely resemble immature French angels (Pomacanthus paru) as to be all but indistinguishable from them. Thus it will be of small importance to the aquarist which of the two he has.

Compressed and deep-bodied, the juvenile black angel is a strikingly handsome fish in deep black with a smooth satiny lustre. A yellow stripe runs down the middle of the head, dividing on either side of the mouth. The fish is partitioned by four bold yellow stripes. The first of these crosses the operculum, the second and third, starting from the top of the dorsal, cross the body, and the fourth crosses the base of the caudal fin. With the exception of the clear pectorals, all the fins are black, though an unexpected dash of electric blue on the back of the tapering anal and caudal fins always draws a protracted "Oh-b-b-b" from the newcomer.

The habitat of the black angel stretches from the Bahamas south to Brazil through the sapphire and emerald waters of the Caribbean, where, unlike its cousin the French angel, it seems to favour the shallower waters on the inner reefs, juveniles even occurring inshore at depths of 4 ft. or less. They may be seen among the shipping in the murky water of ports and artificial canals, where they nibble at rocks and bridge pilings, and are quite unoffended by the roar of heavy motor traffic scarcely 2 yards above the water.
The black angelfish travels well and is an admirable candidate for the tropical marine aquarium, where it should be maintained at a temperature of about 78° to 80°F. It is hardly remarkable intelligent for a fish, quick-growing and distinctly friendly. I always feel a special bond of friendship for this charming little fellow, whose pleasing habit of rolling his big expressive eyes in search of food from my hand is most endearing.

A 15 to 20 gallons tank will suffice for a 2 or 3 in. black angelfish (or any other angelfish), though the relatively small space will limit the excellent opportunities for the aquarist to show his skill in arranging the tank to simulate the sides of a coral pool. The flat side of a rock, or the flat base of a large rosette of coral standing on edge, should be turned towards the side of the tank and 2 or 3 in. away from the glass so as to afford the angelfish a retreat. This shelter should be in the large side to allow for the fish's rapid growth. Owing to the transparency of the glass the retreat will appear to the fish to be wide open at the back unless the outside of the tank bears a patch of dull black paper over the particular area. If, in addition, an assortment of dried sea-fans and sponges is placed behind the tank, or the outside and so arranged as to be visible above and between the coral on the inside, and held in place by black or dark green construction paper (sold at art shops) the whole scene will be unbelievably improved.

Very small angelfish of an inch or less will accept brine shrimp, dried food and raw shrimps, and must be fed often. However, I find them a trifle finicky and prefer specimens of 3-4 in. At this size they look their best and feeding is easier. Raw meat, liver, earthworm, shrimp and dried food are eagerly consumed as the fish rise prancing or in dashes to seize the pieces. When feeding with dried food I prefer to use one bite-sized piece at a time to avoid the bottom of the tank becoming strewn with unused food. Brine shrimp, unless very big, is best avoided for larger angelfish, as it is too small for them to bother about but large enough to annoy. Lettuce is greatly appreciated by all angelfish in general since they are vegetarians to a greater or lesser degree. If a lettuce leaf is tightly rolled into a small "stick" like a roly-poly pudding it may be sliced with a sharp razor blade. The "slices" will unroll into strips which may be shortened to the required length. If these are thrown upon the surface of the water the angelfish will soon learn to pull them down. Small pieces of avocado or alligator pear are also appreciated. Bananas is rejected.
The object of feeding greenstuff is to maintain the supply of carotenoid pigments (which occur in all forms of life from bacteria and Protozoa to flowers and men) to enhance the yellow bands of the fish. Wild fish delight in cropping algae from stones and whale piles, for which their deep bodies and large fins afford them perfect stability. Nevertheless, it is my experience that black angels do very well without greenstuff.

The black angel is encouragingly white spot-resistant. I have never seen it affected. More likely to occur is white patch. This obscure ailment, taking the form of light grey patches on the body, sometimes manifests itself for no apparent reason, although I rather suspect a drop in temperature as being a contributory cause. In a severe attack the fish appears almost white. However, the ailment is trivial rather than serious, not catching and easily remedied by a rise in temperature or, in stubborn cases, by adding one teaspoon of sulphathiazole sodium to 5 gallons of aquarium water. In mild attacks, at least, the fish's appetite seems unimpaired. The black angel is quick to show signs of distress if the water becomes toxic from contact with ordinary aquarium cement or other undesirable materials. In this respect the plastic tank is a boon as such vexing problems never arise.

Whereas some angel fish such as the blue, the queen and the Townsend are distressingly belligerent, attacking not only their own kind, but other fishes as well, the black and the French confine their quarrelling to themselves. Thus one black angel to a community tank is the rule. However, if the tank is very large and well provided with several retreats in the rockwork and coral it is not impossible to keep four or five black angels together, especially if all are introduced at once. An inevitable "peck order" will be established at feeding time, but the several escape holes and the fishes' divided attention should insure reasonable harmony. Protecting backwards from such outspokenness is a straight stout needle-sharp spine, with which an irate angel will deal stabbing blows at its neighbour by slaming backwards and sideways in sudden jerks. Fortunately this practice is not over-indulged in, and almost never where other species of fish are concerned.

It is an evaporating circumstance of present-day classification that many species of animals and plants have acquired several scientific names each. The angel fishes are, alas, no exception, though in their case taxonomists may perhaps be spared the criticism they deserve because of the enormous and misleading differences in colour and design between the young and adult stages of most species of angel fishes. Newcomers should be alert to the conclusion which has arisen.

In the wild state the black angel reaches a length of 2 ft. (the French angel, 1 ft.), and does not spawn until quite large. This decided advantage would probably result in fry large enough to take brine shrimp from the start, thus eliminating the problem of microscopic food. The unconfirmed report that the black angel has already spawned in captivity hints at golden opportunities for breeders seeking new and rare laurels.

In the West Indies, where all wild life is disregarded or despised, except by cooks, any black angel unfortunate enough to fall foul of the fisherman's net is treated to the gross indignity of the frying-pan.

Successful Treatment of Tail Rot
by D. A. CONROY

One of the fish diseases with which most aquarists will be familiar is that known as 'tail rot'. This particular condition may lead to disappearance or even death of large numbers of fishes if it is allowed to spread unchecked in the tank or pond, and for this reason constitutes a perpetual menace to fish fanciers and breeders.

Within recent years much evidence has accumulated to suggest that bacteria may be responsible for outbreaks of 'tail rot' in fishes.

The author has been actively engaged upon a study of this and similar conditions over the course of the past year, and was able to isolate the causative agent of a large outbreak of 'tail rot' among goldfish (Carassius auratus L.) in Buenos Aires. It transpired that the disease was caused by a motile Gram-negative bacterium resembling Aeromonas (Pseudomonas) puncta, one of the organisms responsible for abdominal dropy in fishes, and the injection of cultures of the isolated organism into fish provoked a typical 'rotting' of the caudal fin.

A description of this work is in preparation, and will subsequently be published in the scientific literature. As the treatment applied was successful in every case, the present note has been written with the object of communicating briefly the results to aquarists, in the hope that they may prove to be of interest.

As received in the first instance the fish showed numerous small red spots on the fins, the white 'rotted' border typical of 'tail rot' likewise being present. The causative bacterium was isolated in large numbers on culture, along with individual colonies of Sarcina lutea and Rhodotorula echinata. By means of simple bacteriological procedures, the organism was shown to be highly sensitive to kanamycin sulphate. Each of the diseased fish was therefore given a single intraperitoneal injection of an aqueous solution of kanamycin sulphate at a concentration of 20 micrograms per gram of body weight.

Within 24 hours, all of the red spots on the tail had completely disappeared, and the condition progressed further, so that those parts of the tail which had been diseased could be cut away with no difficulty. The cure achieved was permanent, as in the fish recovering completely, and followed directly upon one solitary injection of the antibiotic.

Kanamycin sulphate truly merits the serious consideration of aquarists. Apart from being readily soluble in water, it is active over a wide pH range, stable in aqueous solution for long periods at ordinary room temperature, and is reported to lose less than 10 per cent. of its total activity after being sterilized at 121°C. for an hour. It must be emphasised, however, that as an antibiotic, its purchase may be subject to certain restrictions in England.

Also, it is necessary to bear in mind that when administering an antibiotic solution to fishes, it is of prime importance to ensure that both the solution itself and all of the instruments have been properly sterilised before use. Any reader who may wish for further details of the work described is invited to communicate directly with the author (Cátedra de Microbiología, Immunología y Serología, Facultad de Farmacia y Biología, Universidad de Buenos Aires, Buenos Aires, República Argentina).

It is with great pleasure that the writer acknowledges the constant interest and encouragement shown in this work by Professor Dr. Luis C. Verna, Head of this Department.

Kanamycin sulphate is marketed in this country by Bayer Products and is obtainable only on medical or veterinary prescription.—EDITOR.

THE AQUARIST
Opaline Gourami and Pigmy Corydoras

by J. STOTT

We have had the opaline gourami with us since early 1957, and I think it can be said to have joined the ranks of our most attractive aquarium fishes. It is certainly, in my opinion, an improvement on the blue or three-spot gourami (Trichopodus trichopterus), to which the opaline is closely related. The basic blue coloration is much brighter and richer, forming a perfect background for the velvety, purple-black markings on the side of the fish.

The breeding behaviour follows much the same pattern as that of the blue gourami and similar conditions are required, such as soft water, slightly acid (about pH 6.8), at a temperature of 80°F. The sexes are recognizable in the same way as in the blue: males have longer and more pointed dorsal fins. It is suggested that the intended breeding pair should be conditioned separately for the best results and for this live food is essential to produce tip-top condition. The male builds a nest similar to that of the blue gourami, somewhat scattered and covering a considerable amount of surface area. Fry of the opaline are smaller than those of the blue when hatched, and are, in fact, about the size of dwarf gourami fry; therefore, when feeding is started green water is suggested as a first food. They should be kept on this for about 4 or 5 days and then infusoria can be introduced.

The male, when in full breeding colour, is most attractive with the basic blue deepening and the black marks spreading, and the underparts take on a silvery blue. There is little or no colour change with the female.

A Midwater Catfish

Most of the Corydoras fishes have the reputation for spending much of their time on the bottom. There is one species of Corydoras, however, which differs in this respect and is most active in midwater. This particular catfish is Corydoras hastatus, which is the smallest species of the genus; hence the popular name of pigmy catfish. When fully grown it rarely exceeds an inch and a quarter and is, therefore, both in size and habits an ideal catfish for the community tank of small tropical fishes. Though not colourful it has an attractive appearance mainly because of shape and the distinctive marking at the caudal fin base.

The basic colour is a light greenish brown, darker along the back and shading out to a silvery cream on the under parts. A dark line extends from the eye along the centre of the body to the caudal base, where the line forms a spearhead-shaped mark with an ivory-white surround. The dark line is edged with a gold shading.

Like other members of the Corydoras genus it has the down-turned mouth of the bottom feeders, and is therefore unable to feed at the surface; it does descend to the bottom for feeding but, in the main, apart from this it spends most of the time when active moving around and about the plant life in midwater.

When in the community tank it often assumes the role of the mucus and follows the other fishes, making the same movements and attempting to copy their actions. When it is in this mood its antics become quite amusing to watch, making it a worthy inmate for the community tank.

January, 1962
The Guppy Gets a New Look

by PETER DENDY

If you are still breeding the year before last year’s guppies then they may be out of date now and be feeling very self-conscious about it. That may well be why they have been a bit off colour lately, with a pinched and woe-begone look. After all, guppies are very sensitive little fish and they feel things deeply, and your corydoras may not be the only fish in the tank making remarks about them and being “catty.” You will be able to change all that if you buy a copy of the new Guppy Breeder’s Standard Handbook.

The new Guppy Breeder’s Standard Handbook or the “Standards”, as it is more usually known to guppyists, is a very interesting publication and gives the official Federation of Guppy Breeder Societies’ sizes, shapes and descriptions of guppies that may be shown under their rules. It also gives details of pointings and colourings and the new “Standards” have created three entirely new guppy outlines for the breeder to work to. Two of them are for males, the fantail and the triangletail, and one is for females, the wedgetail, and all of them are very interesting indeed.

The guppy has come a very long way since it was first introduced into the domestic aquarium and really now bears no resemblance to its rather drab forebears. There is no other fish which has responded so well to selective breeding or which comes in so many different shapes, colours and colour combinations, and I do not exclude the fighters and platys either.

Development work on the guppy has been going on intensively since the late twenties in America, Germany and Great Britain, although along slightly different lines. The Americans have aimed at colour and finnage size without too much regard to shape or regularity, so that a flamboyant fish has been produced which is extremely eye-catching and of commercial value. In fact you might well be forgiven if you thought that the commercial aspect had dominated to the exclusion of other considerations.

In some American fish it would seem that the finnage has been overdeveloped to such a degree that the fish has become unbalanced. In Great Britain the emphasis has always been on shape and balance and the production of a neat and tidy fish. The Germans have followed a line which probably lies somewhere between the American and British schools of thought.

Credit for the most careful and detailed work put into the production of the modern British guppy must be given to the Federation of Guppy Breeder Societies, which has done and is doing a really first-class job in this country. The F.G.B.S. was formed some 23 years ago by a handful of enthusiastic and expert guppy breeders who got together and laid down the first standard outlines to which breeders could work. Since then the standard outlines have gradually been evolved and added to, and the Standard Handbook has progressed through eight editions.

The new standards show some minor changes in the finnage shape of the well-known varieties, with an increase in the length of the sword in the three swordtail outlines and an increase in the length of the dorsal fin in the platys and scarftails as examples. The changes once again are aimed at the production of a better balanced and neater fish. The introduction of the three completely new outlines by the Standards Committee of the F.G.B.S. has been due partly to the natural process of evolution of new shapes and partly to a demand by breeders in this country for a fish which carries a heavier finnage.

Illustrations of the new shapes accompany this article and it will be seen that the triangletail breaks entirely new ground and will demand a great deal of patient work from breeders to produce good examples. The fantail might be described as being somewhere between the volitail and the scarftail and probably will not present quite so many
difficulties, as there is already stock about that bears a fairly close resemblance to the standard outline.

The new female shape, known as the wedgetail, is going to be a problem and I think that it will be a long time before many are seen on the show bench. This will largely be due to the fact that very few breeders indeed spend much time on breeding females, other than the gold and gold-laced varieties, but prefer to concentrate on the prettier boys.

With the introduction of the new standards I feel that the F.G.B.S. is entering a new and most interesting phase which will present further challenges to the serious guppy breeder. There is at the present time a quantity of American stock amongst F.G.B.S. members, which mostly sprang from the Hahné strain of reds and is most colourful. This strain, with appropriate successions, may well form the basis of a good triangular tail and is the basic material on which I am working at the moment. However, I am under no illusions about the magnitude of the task, particularly the problems connected with producing the right shape of dorsal.

There is no doubt about it, breeding guppies for the show bench is probably the most continuously absorbing and challenging thing that an aquarist can attempt to do and unless you have tried it you cannot possibly realise just exactly what is involved. To those aquarists who still turn up their noses at the mention of guppies I would simply say “try it and see for yourself, chum, you will be amazed at just how difficult it really is”.

The Guppy Breeders’ Standard Handbook is obtainable for 3s. 6d., plus postage, from Mr. B. Ashman, 19, Knighton Road, Romford, Essex.

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

I am a beginner in tropical fish-keeping, and in my 24 in. by 12 in. by 12 in. tank I have several dwarf characins including black widow fish. I have been told that black widow fish are quarantine. Is this true?

Generally speaking, black widow fish do not fight other fishes, but large ones sometimes develop the naughtiest habits of chasing after sluggish species and snapping at their fins.

Are Jordanella floridana easy to keep and breed?

*Jordanella floridana*, popularly known as the American flag fish, flourishes best in a well-planted, brightly lighted tank maintained at about 70°F. It will eat dried food, live food and tiny pieces of raw or cooked red meat. But besides meaty and dried food, it must have green food in its diet. It prefers mussy algae, but if your tank doesn’t grow sufficient of this lower form of plant life, then provide the fish with a substrate such as cooked spinach. It breeds at about 78°F and does not always use the same breeding technique; that is to say, it may deposit its eggs in a depression snared in the sand, or it may place them among the crowns of plants, or even on odd occasions in a tangle of plant life some inches off the floor of the aquarium. The male guards the eggs and fry, which are easy to grow on if you provide them with *Infusoria* and green water for the first week or so, and then larger food such as newly hatched *Daphnia* or brine shrimps. *J. floridana* can be a bully, and it is not an ideal fish for the community tank.

My male fighting fish has damaged one of its eyes. The eye looks milky and slightly bulging. Please tell me if there is anything I can use to get it better.

Try bathing the affected eye with a solution of one-eighth of a ounce of boric acid crystals in a quarter-pint of tepid water. Or you might drop two drops of 1 per cent. protargol direct on the eye. Wrap the fish in a soft cloth and place it in tepid water while treatment is being carried out, and return the fish to the aquarium as quickly as possible.

My 24 in. by 12 in. by 12 in. aquarium gets no daylight, but is

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*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.*

*Kept bright by a 75 watt lamp left on for 8 hours every day, it grows lovely Cryptocoryne, but Vallisneria turns yellow and dies down almost immediately. Do I need a special compost to grow the underwater grass?*

Your trouble is lack of strong light. *Cryptocoryne* will flourish in partial shade, or weak light, but the *Vallisneria* in your tank must be planted immediately under the electric light, which must be fixed not more than 6 inches above the surface of the water. But even in this position, it may not improve. The best thing you can do is to increase the all-over lighting of the aquarium by fitting two bulbs of 60 or 75 watts each.

*I have a pair of large oval fish in my aquarium. They have developed darker bars on the sides, keep swimming their bodies and fins and have time protruberances like when showing from their vents. Can you tell me what is wrong with them?*

Your fish appear to be in breeding condition. If you provide them with a piece of frosted glass, slate or stout bamboo cane stood on end, it is not unlikely that you will soon find the fish engaged in raising a family.

We hear a lot about the danger of using metal in the aquarium. Yet lots of aquarists anchor their plants to the bottom of the water with lead strips. Why is it that the fishes do not succumb to lead poisoning?

It is always best to keep metals out of the aquarium, but lead does not easily form dissolved salts in water and the small amount of lead used to keep plants in position does not do any harm. Galvanised iron, brass, zinc, copper and bronze are the really dangerous metals.

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*January, 1962*
My dwarf recommended dwarf gouramis to add colour to my community aquarium. But since introducing them into the tank they have looked pale and far from attractive. Do you think I have been sold poor-quality stock?

Dwarf gouramis will not show their lovely red, green and blue colours unless they have the right conditions. They like a thickly planted and brightly lighted tank maintained at a temperature around 75°F. When they are in spawning condition, their colours are superb. But the species is rather timid, and if it is placed among boisterous companions it is quite likely to stay pale and hide away most of the time in the plant life.

I have owned an aquarium for about a fortnight and should appreciate some advice on how to remove the slightly milky appearance of the water. I think I made the mistake of feeding too much dried food for the first few days, but I now know better. However, the fish are not growing, and I do not want to empty the aquarium and start all over again if I can possibly avoid it. I have 430 gallons of water and six Vallisneria plants in the tank, which holds 5 gallons of water.

Dip-tube or siphon the floor of the aquarium to remove wastes and other debris. Then siphon the water from the aquarium into a crocked flower-pot containing scalded peat topped with about 2 inches of washed sand. As the water drains from the hole in the bottom of the flower pot, return it to the aquarium. A filter operated by a small air pump would save you all this trouble, and do the job for you in a few hours. But there is not sufficient plant life in the aquarium to make for success. Plant a double row of Vallisneria, 1 inch apart, along the back and ends of the tank. And place a clump or two of Indian fern or Hygropha in the centre.

What sort of conditions and food suit Corydoras catfish best?

Corydoras catfish prefer rather shallow and preferably alkaline water maintained at a temperature of 68-72°F. They like to shuffle over a soft floor (fine sand or coarse gravel covering coarse sand) and are not particular about the sort of food they are given to eat. But like the majority of fishes, they prefer live food to dried food.

I have just obtained a pair of Nandakrishana guentheri and have given them a tank to themselves. Please will you tell me where this lovely little fish is found, and what sort of food and conditions suit it best?

N. guentheri is native to East Africa and Zanzibar. As the species occurs in brackish water, as well as in fresh water, it is a good idea to add some evaporated sea salt (or a small amount of pure sea water) to its aquarium. A teaspoonful of salt for every gallon of water in the aquarium is about right. N. guentheri seems happiest in a fairly subdued light and a temperature in the middle seventies. It is carnivorous by nature, and needs a diet of live food or suitable substitutes such as scraped lean beef or finely chopped offal.

Please can you give me the name of a fish that will clear a tropical aquarium of ramshorn snails?

A couple of paradise fish (Macropodus opercularis), kept on a lean diet, will soon large ramshorn snails to death and eat all the small ones they can find.

I should appreciate some information about the breeding habits of Paludinaebius trivialis.

P. trivialis is rather erratic in its breeding habits. Although the species usually favours the inside of an overturned flower pot as a spawning ground, it is not uncommon for a pair to lay their eggs on a smooth piece of stone, or even on the bottom of the aquarium after the sand has been cleared away. Further, while one couple may turn out to be excellent parents and dote on the eggs and fry, another couple may completely disregard all the rules of correct parental behaviour and make a meal of the eggs as soon as mating is over. The obvious way out of this difficulty is to remove the cannibalistic parents from the aquarium before they get a chance to finish their bouquet. A gentle stream of air bubbles from a diffuser stone placed near the remaining eggs will keep them well oxygenated and free from sediment. At 70°F the fry hatch out and become free-swimming within about 5 days. Normally they feed right away on micro worms, brine shrimp or similar alternatives.

I have just started to keep tropicals, and of the fishes I have seen that really appeal to me, the pompadour takes first place. Would two pompadours live happily among my guppies, platys, mollies and tiger barbs in a 20 in. by 12 in. by 12 in. tank?

We do not advise you to spend your money on Symphysodon discus until you have gained more experience in tropical fishkeeping. This species is nowhere near as easy to look after as the fishes you have at the present time. Among its chief requirements are soft, clear water maintained at a temperature above 70°F, plenty of swimming space, companions that will not scare or bully it, and, in most cases, a regular supply of live food, preferably Tubifex worms.

Aside from the red plecostomus, are there any other snails which can be used to add bright colour to an aquarium?

Yes, there are several species of prettily coloured snails which can be used to decorate the tropical aquarium. For instance, there’s the red-bodied Australian snail (Bulimus), the vivid-yellow-bodied Puladinae species snail and the Columbian striped ramshorn snail (Marisa).

I am on the point of setting up a large aquarium in my lounge, and would like to know the names of fishes I should avoid because of their plant-eating propensities.

Among the most avid plant-eaters are the so-called silver dollar fish (Moenkhausia), Malayan angel fish (Mollienesia), Monkbushia ogistriz and B. arubia. Mollies and scats are enthusiastic greenstuff eaters, but normally they confine their attentions to algal growths and the lower forms of plant life rather than chooser aquatics.
COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

January, 1962

pond, but if they are not it would be safer to bring them under cover for the winter.

Is there a book available on aeration and what are your views on this?

I know of no book which deals with aeration solely. Most books on fishkeeping would include some information on the subject. I do not use aeration myself as I consider that this is only necessary in a tank which is unbalanced or overcrowded with fishes. Having run tanks of fish for very many years without any form of artificial aeration I know that this can be done without, provided that the tank is well planted, not overstocked and the fishes are not overfed. Aeration can be useful to the breeder when he has many eggs or fry in a tank but the experienced aquarist knows that the use of an aerator often signifies that the owner is either inexperienced or is trying to keep more fishes in the tank than is normal.

While searching for Daphnia in ponds I found what appeared to be Tubifex in the mud at the edges. If I wished to collect some what is the best method to separate the worms?

Use a wire tea-strainer about 5 in. across and scoop up a quantity of the mud and worms. Then swish it about in the water, moving the strainer in a circular movement. This will wash away the mud and cause the worms to form in a ball which can be transferred to the carrying can. Before you feed any to your fishes see that they have been left for a few hours under running water so that the foul
matter which is in them can be washed away to a great extent. Freshly collected 
Tubifex can be a source of danger to fishes if the worms came from sewage-waste 
water.

Please tell me how I can succeed in breeding coldwater catfish 
in an indoor tank.

Before you start on this project try to realise how big 
adult catfish are likely to be when large enough to breed, 
and then your problem will be to find a tank large enough 
to accommodate them! They can grow to a huge size and 
can eat any fish small enough to get in their mouths. I 
advise you to try to breed something smaller and easier.

I have a large garden pond containing 24 adult goldfish and 
four gudgeon. I have now a mass of small fish which are dark 
in colour and mottled. They look like gudgeon but a dealer 
tells me that he has never heard of gudgeon breeding in a 
glass. Is this so?

It is quite possible to breed gudgeon in a suitable pond. 
If you catch a few of the young fish and place them in a 
glass container you can see if the fish have barbels under the 
mouth or not. If they have barbels they are gudgeon and 
if not they are just young uncourled goldfish. Young 
goldfish are bronze in colour for some time when young.

My goldfish being themselves against the sides of the tank and 
grounded. What is wrong with them?

Many goldfish like to rub themselves against plants and 
rocks occasionally and it is not necessarily a sign that there is 
anything wrong. Provided that no other signs are 
present there is no need to worry. A salt bath sometimes 
has a good effect as there may be some form of external 
parasite worrying the fish. Although fish attacked by 
flukes will act in this manner it does not signify that flukes 
are present every time a fish rubs itself against the sides of 
the tank. A change of a large quantity of water often 
 improves the health of the fish but do not start treating for 
flukes unless you see signs that they are present. These 
signs include folded fins, lack of appetite, mouthing at the 
surface and, later, blood streaks on the body.

I am interested in constructing a windmill for operating a 
water pump in the pond and wonder if there are many 
examples in construction?

The main point to remember is that the windmill has an 
eccentric which works on a piston, in the opposite manner 
to a steam engine. The piston works the pump but the 
mower lifts the all raising water to its height is its weight. 
A number of intermediate valves are usually inserted so 
that it may take some of this weight, similar to the valves in 
the veins of the human body which prevent them from 
swelling out with the weight of the blood.

I am a coldwater aquarist, mainly interested in outdoor ponds. 
Can you tell me where coldwater ends and tropical begins? 
Goldfish, orfe, eel, shubeneekins, reds, catfish, sunfish and 
familiars are all coldwater fishes and able to withstand a winter out of 
doors (at least in Jersey where I live), but cyprinids, lebeoone, 
fringelip, and teleosts have to have heaters and cannot be 
kept out of doors. Where is the dividing line?

The distinction has generally been made that coldwater 
fishes are those which can be kept without artificial heat. 
Most of the fancy goldfish can be kept in cold water if they 
are bred right but so many to-day are imported from warm 
climes and so need some artificial heat. It is usual to 
give most fry some extra warmth but this is natural, as most 
outdoor ponds warm up considerably during the time when 
the fishes are breeding. My own outdoor pond sometimes 
reaches a temperature of 80°F in the summer. When 
some artificial heat is used for marly fancy goldfish this 
is gradually reduced as the fish grow, as it is possible to 
get the water temperature down to the normal for the time 
of the year once the youngsters are about 6 weeks old. 
On the other hand there are several so-called tropicals 
which can withstand cool conditions. I have had paradise 
fish at 40°F and have found plays in my outdoor pond at 
the end of October and in the pink of condition with a 
water temperature of just below 50°F. It is also well 
known that white cloud mountain minnows can stand cold 
waters.

I do not seem to be able to get my plants in tanks to grow well. 
I have tried various kinds of lamps and for differing periods 
but the plants do not thrive. What warts lamps are best.

It is not only the wattage of lamps that is the important 
factor in growing water plants. It is almost impossible to 
state which lamps are suitable for a tank under the actual 
position of it is known and also the amount of natural light 
available. A certain degree of experimentation must take 
place to see which will provide the best results. Too much 
light can cause an excess of algae to form. Too little light 
and your choice plant waters will not thrive. One point 
about growing plants is so often neglected that it cannot be 
emphasised too greatly, and that is the fact that so many 
aquarists expect the plants to grow in sand, which contains 
no nourishment at all, or else they push a plant into a mass 
of roots of plants already well established. After all, a 
gardener of sense would not dream of planting a choice 
subject in the garden in the centre of a mass of Michaelmas 
daisy, and yet aquarists fail to recognise the fact that water 
plants are as much in need of nourishment and space as the 
ordinary plant. Before introducing a fresh plant to a tank it 
is well first to get it growing in a small pot in a large jar, 
and then the whole rooted system can be transferred to a 
vacant space in the tank with the knowledge that it will at 
least have a fair chance of survival.

We have a school pond which has a lot of blanket weed in it, 
and this makes it difficult for cleaning. Is there a type of fish 
which would eat this weed?

I do not think that fish would eat the coarse blanket weed but 
when it first grows it is more tender and much of it is 
eaten by many species of fishes. Many a roach has been 
caught on a hook baited with soft blanket weed. Goldfish 
will eat this weed when it first grows but, of course, if this 
is expected of them there will be no need to feed them 
artificially. Hungry goldfish are almost continually 
swallowing over the plant leaves and sides of the pond and 
provided that they are not fed will assist in clearing up much of 
the weed. If a broken green stick is thrust into the weed and 
twisted around it will be found that more weed will be 
drawn to the stick so that a thick bunch can be wound on it. 
If this is pulled off and the action repeated the pond can 
soon be cleared.

I have had some trouble with a brown slug-like type of matter 
which floats to the surface of my pond. When touched it 
dissolves and sink. What is it?

This is a form of dead algae which has gone through a 
process of decomposition at the bottom of the pond. Gases 
have formed among it which cause the matter to rise 
to the top. This usually takes place in warm weather and 
most anglers will have seen this happening many times, 
especially in canals during hot weather. It would be a 
good plan to clean out the pond before next summer.

Is it possible to breed earthworms?

Yes, but it is a slow job and you will find it better to 
courage the worms in your garden to a certain spot where 
they can be collected. It is no easy matter to keep 
earthworms alive during the summer months, let alone to 
get them to breed. If you have an unused spot in the garden 
it need not be large, you can place all your tea leaves and 
vegetable rubbish there. Cover this with an old sack and 
keep it moist. Worms will be attracted by the moisture 
and vegetable food. Turn it over now and then and collect 
the worms.
The Madagascar Lace Plant

(Aponogeton fenestralis)

by Dr. R. O. B. LIST

The name of the lace plant is derived from its lace-like leaves, which grow from a rhizome. A lot of difficulties with it were experienced in the beginning, many years ago, when the plant was first found. In addition to the high cost of the plant, there was the question of expense. Early owners found that the plant had no lasting qualities and that specimens which started off on the right foot soon stopped growth and the rhizomes rotted.

How does the lace effect come about? What is the purpose of the openings in the leaves? Text-books on the subject, written in a variety of tongues, give various reasons but nowhere do I find these based on scientific fact. We must therefore regard them as pure conjecture. I leave the reader to make his own choice of the following possibilities: (a) to enable the plant to get the most possible and necessary light; (b) although the leaf structure is not what we might consider frail, the apertures allow a flow of water to pass through without undue damage; (c) to give the largest possible area for breathing and assimilation of nourishment.

Madagascar

The full popular name of the *Aponogeton fenestralis* is Madagascar lace plant, and this name implies that its main source was Madagascar. However, reports received do not allow Madagascar to take all the credit for this wonderful and beautiful plant. Some of the credit must go to the surrounding islands, i.e. Nosy-Bé and Saint Marie. It is also believed that the *Aponogeton* are found in the Komoro group of Islands, but this latter point cannot be accepted with full certainty. A number of German plant collectors are, however, all agreed on one point, which to the author appears curious, that no *Aponogeton* are found in either the north or south of Madagascar; a few occur in the west but the greatest finds were made in the east and centre of the Island.

Apparently not a year goes by in which an expedition does not make the journey into the interior of the Island, but such efforts do not always meet with success. A variety of conditions make such expeditions intolerable, as not only has the collector to take in his stride adverse conditions for health but the nearly total absence of roads and even paths, and impossible (for Europeans) temperature variations. With heavy rainfall, giving long periods of floods, the terrain becomes a complete sea of mud infested by crocodiles.

To Nature's own difficulties, we must add two further hurdles: the human failure (if it is one) to covet moony and goods, and the other is bureaucracy. Natives are usually well aware of what the collectors seek, and even create a variation of the supply-and-demand game, of which we are so well aware. They obviously feel that the supply of plants should become a means for barter or hard cash.

drowning or crocodiles, and it has been stated that no matter what an Aponogenes fenestratus may cost you, it nevertheless is too cheap. Be that as it may.

I have to thank two good friends for much of this information. They have now successfully completed two explorations of the Island. They are Dr. Hans-Henrich Fugger and Manfred Steinschneider.

Name and Habit

The records show that the Aponogenes rhinolutes were known to the natives as "Uvrarandara," which in the Madagascan dialect gives us the name of "tough bult," which is not unusual. Literature gives, I think, the date of earliest recorded report as 1806, by the French botanist M. De Petit Thouars. This is apparently the earliest reference to be found at present, yet we find that Linnaeus gave us Aponogenes in 1758, some 23 years earlier, and this, of course, after the established order of things takes priority over the Uvrarandara which Petit Thouars adopted.

It is also stated that the natives used the rhinolutes as food, but I can find no reference to how these were eaten. It is quite clear that the natives were not prepared to allow wholesale plunderings of these plants.

The majority of reports indicate that the plant is not at all particular about the type of material it grows in. It appears to be found usually in a very slimy type of mud, and hardly ever in what we call earth, but sand is also often found as its base medium.

In its natural habitat there do not appear to be any fixed conditions of temperature, water hardness or pH. All of these vary a very great deal owing to climatic conditions on the Island. It appears that at various times severe tropical storms are experienced, with rainfall for much longer periods than we are used to, and these of necessity alter the various normal readings. It appears that these storms do not follow a regular time pattern, on which one could base a scale of registration for temperature, water hardness or pH.

It has been found that the plants do like a rest period, which coincides with the normal dry periods which have been established. So as not to confuse the reader, a little explanation may here be necessary. Dry periods are long spells alternating with the wet periods. This does not imply that the periods consist of nothing but rainstorms without any form of let-up. You could have a dry spell in a wet period, but this is purely coincidental.

In these dry periods, when the plants rest, growth appears to stand still. Some of the Aponogenes varieties throw off their oldest leaves, some throw off the whole of their leaves, and some throw off no leaves whatsoever. A. fenestratus usually keeps most of its leaves but only when the watery area in which it grows does not completely dry out. Should the area dry out completely, then all the leaves drop off; but A. fenestratus is usually found in deep water, and the plant does not suffer. It will not live well in still water. It requires supplies of new water, from rivers or rain. The periodic flooding causes masses of earth material to be displaced and dispersed to some areas, where a build-up occurs, and this is where the main supplies of A. fenestratus are to be found.

If you derive any pleasure at all from having a walk in a sharp shower of rain, just reflect a moment on Madagascar. In the interior of the island, rainfalls of such intensity are known that they measure 177 inches annually.

In the next article I will try to bring to your notice some of the varieties of this splendid plant, with details of their culture and care.

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TOXICITY OF AN EPOXY CEMENT TO FISHES

by DONALD F. MAIRS

Bureau of Sport Fisheries and Wildlife, Fish Control Laboratory, La Crosse, Wisconsin

In tests of components of the water system at this laboratory, epoxy material used to cement fibre-glass screen holders to experimental troughs proved toxic to common carp fingerlings. The cement consisted of an epoxy resin, an amide hardener, and methyl ethyl ketone as a thinner.

Tests were made to find a safe procedure for its use. Five-gallon jars were filled with 15 litres of reconstituted demineralised water (pH 7.1; alkalinity, 35) and put in a circulating-water bath at 13°C. The cement was painted on two fibre-glass rods (0.5 in. by 0.5 in. by 13 in.), which were then suspended in the test jars. Two controls were used, one each test; one jar had two untreated rods; the other, none. Each test was repeated at least once.

In the first test the cement dried on the rods in 4 days to a firm but slightly "racky" state. Of three test jars, one received 12 rainbow trout fry (average standard length, 25 millimetres); one, six rainbow fingerlings (31 millimetres); and one, 12 goldfish (59 millimetres). The rainbow fry were dead in 3 hours, the rainbow fingerlings died in 8, and the goldfish in 18 hours. No deaths were recorded in the controls.

Two more tests used cement that had dried 4 days and fish from the same lots mentioned. In one test, treated rods were flushed in running well-water for 2 weeks before being put in the jars. This apparently removed the toxicant, as no fish died. In the other test, the fish were put in a fibre-glass trough with 15 litres of well-water changing at the rate of 4 litres a minute. The treated rods were put on the bottom of the trough. The change of water apparently prevented a lethal build-up of a toxic substance, as no fish died.

Last, a test was run on cement that had dried for 1 month on the rods to complete hardness. The 12 rainbow fingerlings (28 millimetres) used to test this cement survived a 50-hour exposure but died rapidly thereafter. No control fish was affected.

Epoxy cements probably differ in toxicity, but all are dangerous in a closed system unless it is well flushed before use. Even in a constantly changing water system, cement should be thoroughly hardened before it is used. (From "The Progressive Fish-Culturist", U.S.A.)

THE AQUARIIST
Gourami with a Thick Lip (Colisa labiosa)

by ——— AQUARIUS

The thick-lipped gourami, from northern India, Assam and Burma, is a very handsome fish that is a favourite with many aquarists. It has the typical gourami shape and rarely exceeds 4 inches in length. The colour of the body is a greenish brown with eight or nine vertical bars of red. There is a stripe running along the body from the head to the beginning of the caudal fin, where it ends with a blue spot. The fins are yellow to blue-green with red margins. The female is not so highly coloured as the male, and it is the male that shows the thickening of the upper lip. During spawning the male also shows dark violet colourings under the belly and throat, and is at such times very handsome indeed.

Colisa labiosa is not very timid in a tank but does not like too much interference, especially at breeding times. There is little difficulty in breeding this fish as it is a bubble-nest builder (see photograph on the next page) and the male will take care of the eggs and also the fry during the early stages. Most types of food, both animal and vegetable, are freely taken.

The breeding tank should not be small as there must be room for the female to get away from the male during the excitement of spawning, when the male becomes very aggressive. The male builds the bubble nest, which is not as tidy as that made by some other types of gourami. The female takes no part in the nest building. Spawning can take place when the water temperature is about 75° to 80°F, but these fish will do quite well at lower temperatures when not breeding. The eggs float to the surface when laid, and the male tends them and keeps them together as much as possible in the bubble nest. Once spawning has finished the female should be removed.

The eggs hatch in 2 days at a tank temperature of 80°F. The male can be removed 3 days after the eggs hatch; if this is not done he may start eating the fry. The fry are very small and must have the smallest possible Infusoria for a start. Green water from the pond or an established tank will make a good first food, and as the fry grow so larger types of food can be given. Make sure that the fry get plenty of the right kind of food, especially in the early days as a good start is important to promote the right rate of growth and ultimate strength of the youngsters. The top of the water must be kept quite clear by drawing a sheet of paper along it each day, and it is essential that no draughts should reach the water as the fry are very easily upset by sudden changes in temperature.

When setting up the tank for breeding purposes some floating aquatics can be included, as the fish like to incorporate some fine forms of vegetation with the bubbles of the nest. Soft forms of algae are appreciated by these fish and so for the fry plenty of green algae, free-floating, will give a good start and then the soft forms found on decaying leaves will give the fish something to browse over.

January, 1962

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An attractive characin from the Amazon area is the glass tetra. This fish breeds readily in aquaria if specimens 2½ to 3 inches in length are used. Little difference between the sexes is discernible, the "ripe" female being rounder in outline than the male. Many eggs are laid on water plants whilst the pair lie side by side amongst the leaves. In about 3 days at 75°F the eggs hatch and Infusoria or the finest grade of fry food is needed for early feeding of the young.
A New Species of *Bedotia*?

![Image of a fish](image)

*Bedotia* species (approx. natural size)

Some notes on a new fish with its home in Madagascar that is probably a species of *Bedotia*.

The photograph reproduced above illustrates a fish that has recently been purchased by a number of members of Hondon Aquatic Society. Specimens were seen in a number of London pet shops and were marketed under the name of *Jawambe gohio*, and were described as African fish. However, later information revealed that they were Dutch-bred and were possibly silverides and really belonged to the genus *Bedotia*. This seemed to make far more sense.

In the February, 1954 issue of *The Aquarist*, in an article by Mr. G. W. Allen, quite a useful comparison of *Bedotia gohio* (Pellegrini) and *Bedotia tricolor* (Pellegrini) is given. However, the description does not fully satisfy our type; e.g. Mr. Allen mentions a golden white semi-circle in the caudal fin of *gohio*, whereas our fish has, in fact, a dark spot on the lower half of the caudal peduncle. The second dorsal has approximately 10 rays, certainly not 17 or 19 as described for the two species mentioned above.

The sleeper-bodied fish, assumed to be females, have three rows of darker pigmentation in the rear dorsal with just a trace in the first dorsal. This could, however, be one of the several varieties or cross-breeds. The fish are young and are only 2 in. long. They have settled easily to aquarium life.

H. G. WHITE

Outline diagram of female fish of the species described, slightly greater than natural size. Numerals refer to the number of rays in the fins adjacent to them.

January, 1962
Raising Big Guppies (PART 2)

by PETER DENDY

LAST November I described the feeding of fry in the early stages of growth, and their introduction to dry food, which you can prepare yourself. I mentioned the use of liver, which is a valuable food source. Liver cannot unfortunately be used raw as it contains the water in a very short time, and it must be given dry. Obtain a few ounces of liver from the butcher, cut it in thin slices and place this on a tin plate in a medium oven to dry out completely, so that it is quite brittle, but not, however, burnt. The dried liver will keep indefinitely and any not immediately wanted can be sorted for future use.

Dried liver is brought down to the required size of particles by rubbing it on a file or fine rasp, and provides a brown powder in which you may notice specks of white. (If you do see specks of white, don't bother too much, as these will only be bits of your finger-nails, which always seem to get in the way!) The result of your labours should be sifted through butter muslin to remove the larger particles, which are obviously too big for the fry. I always add about 10 per cent of Sanatogen to the liver powder and then reckon that I have as good a fry food as could be found anywhere. The liver particles which have been left over after the sifting can be turned into a good food for older guppies by mixing with an equal quantity of powdered Bemax. Bemax can be quite easily powdered with a pestle and mortar, which is a very handy thing to have, particularly if you prepare your own fish food regularly.

Separate Rearing of Sexes

Before the fry are 3 weeks old they will be big enough to sex and will be ready to be transferred to larger tanks. Where possible I like to bring up the males and females separately, as I consider that after the age of 3 to 4 months the two sexes should be fed differently. Overcrowding must be avoided and as a general guide the maximum number of fish per tank should not exceed one male per half gallon or one female per three-quarters of a gallon, which gives you about 22 males or 16 females to a tank 21 in. by 12 in. by 12 in.

The feeding of micro or Grindal worm and selected dried foods daily to both sexes should be carried on for about 3 months, after which, if Grindal worms are used the amount fed to the males should be decreased to two or even one very light feed per week as the body approaches its final size. From feeding experiments that I have carried out I have found that a Grindal-worm diet increases the size attained at an age of 10 weeks by as much as 10 to 15 per cent. more than that in fish that had not received any live food whatsoever.

I am further of the opinion that the continued feeding of Grindal worms to adult male guppies makes them sluggish and reduces their life span as well as making them moon-chested. A fully matured male seems to do far better on an extremely light diet. Females, on the other hand, seem to thrive on heavier meals, and I continue a daily feeding of Grindal worms throughout their life. I have particularly mentioned these worms as I consider that the ordinary white worm is far too big for guppies and can give rise to intestinal trouble in the form of indigestion and constipation. Other forms of live food can, of course, be used, but I prefer home-grown food because you can at least guarantee its purity and freedom from unwanted parasites etc.

Variety in Diet

If you are feeding two or three times a day with proprietary dry food then it is a good thing to use food prepared by more than one manufacturer, to try to ensure that you are providing a balanced diet and, incidentally, giving the guppies some variety to look forward to. You would yourself hardly take kindly to the same meal, however good, if you had it for breakfast, dinner and supper every day of your life. I always give my guppies a homemade prepared food at least once a day, which seems to be appreciated. There are so many things which can be given and I will list a few and leave it to you to make them up to your own formula.

I have already mentioned live foods and liver and to these body-building foods can be added raw-meat scrapings, tinted pet foods containing meat, raw herring roes and maggots. The maggots are squashed in the aquarium water, to the huge delight of the inmates, and provide a feed of mixed particle size to please big and small alike. Unfortunately, all these food have the disadvantage of not keeping and of clouding the water very quickly. One pet food, Lowes All Meat Bar, is, however, ideal, as it does not "go off." The bar is cut and mixed with an equal proportion of powdered Bemax; the larger lumps and pieces of bone, of course, require to be removed before feeding.

Dehydrated vegetable foods can be incorporated and proprietary dried foods can be fortified by the addition of a drop or two of halibut-liver oil, which should be well mixed in. This has the advantage of helping to keep the dry food floating longer, but do not overdo the oil or you will end up with a film on the surface of the water. Milk is a valuable food and can be fed to the fish by feeding your Grindal and mixing with a little water and milk. This is best done by mixing it with a farinaceous food to form a paste, and additional benefit can be achieved if a small quantity of lime (calcium salt) is also added to the mixture.

I said in the earlier article that feeding can give you size within the general limits of the fish, and the object of these articles on feeding has been to help you to make the most of what you already have. If your strain is coming very small then feeding, while helping, will not be the answer, and it may be time to improve the vigor of the strain by importing new "blood" or trying an entirely new strain.

THE AQUARIST
GLASS and the Aquarist

HAVE you ever given any thought to just how important a pure glass tank is in the fish-keeping hobby, and that without it all we fishy fanatics would be properly sunk? I started jotting down a few uses for glass just for fun and within a couple of months had a list 18 items long. The uses range from the obvious to the obscure and one or two may not have occurred to you.

If a tank cracks it may be possible to get away without re-glazing by cutting a piece of glass to the internal size of the back, side or bottom, whichever is cracked, and running Bostick sealing compound all round and then pressing the new piece of glass into position. I have a tank with a cracked back which I treated in this manner and it has since been in service for years. This method of mending a crack was forced on me by necessity, as the early arrival of a brood required the provision of a new tank urgently. It was when I was trying to dry the back, which I had painted green, in front of a fire that the crack resulted.

Glass can be used as a separator in a tank to keep two fish apart to prevent fighting or to encourage their amours before mating. It also makes a good breeding trap if inclined at an angle across one end of the tank with a small space to allow newly hatched livebearer fry to slip through into safety. In both these cases the glass is to be positioned if rubber channeling is slid over the edges that will come into contact with the aquarium sides.

Thin strips of glass about 1 inch wide along the front of the tank to hold the gravel back and provide a clear area for feeding are worthwhile, or use them to form a rectangle about 6 in. by 3 in. with pieces of aluminium as clips at the corners if a smaller clear area is required. I always use one of these systems in conjunction with a feeding ring in all tanks and consider it essential for true hygiene. If glass is to be put in a tank, then please take the sharpness off the edges by rubbing on a carborundum stone or you may regret it when your hand gets damaged. Leave for just long enough for the bottom to get good and warm and then stand it to one side for about 20 minutes. The white worms will, if you have not overcooked them, be found in a solid fairly clean clump at the top of the medium. These can then be put into a jam jar and washed under the tap, pouring off the water as soon as the worms have settled to the bottom and repeating the washing until the worms are quite clean.

I make a practice of washing enough white worms to last a few days, and those that are not immediately wanted may be put into a glass dish of damp gravel, where they keep clean and remain alive. To recover the worms, merely add water, swish round and pour off into the jam jar again. Remember to drain off the water from the gravel, however, or you will drown the white worms that are left.

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Belonging to the same series as Living Invertebrates of the World and Living Fishes of the World, both reviewed before in these columns, this book is also lavishly illustrated. The reviewer, however, feels that he must in some instances criticise the selection of the prints used. For example, there is a great number of tree frog photographs; no less than 25 photographs are devoted to the genus Hyla, in which many species are of rather similar appearance. The cover photograph in particular would appear to be badly chosen. It depicts a New South Wales tree frog (Hyla geocola), which appears like an exceptionally large Common European tree frog (Hyla arborea), for which it could easily be mistaken. This same photograph is again reproduced as a full page in colour in the body of the book and does not seem, from a scientific, aesthetic or even photographic point of view to have any real merit. Beside the crystal-clear photographs of Budgett's frog provided by the Zoological Society of London, two of the same frog's display behaviour by Gerald Durrell are distinctly inferior.

However, there are many excellent photographs often showing seldom-photographed species, 220 in all, of which 77 are in colour. The following are of special merit: a caecilian (a worm-like burrowing amphibian) of a rich dark blue colour with sky-blue bands, caught in the act of devouring an earthworm. This is of interest scientifically because the feeding habits of these animals are but little known. Many gorgeously coloured salamanders, largely of U.S. origin, add greatly to the attraction of this book. Possibly the most striking of the toads illustrated is the oriental fire-bellied toad (Bombina orientalis). It is black, marbled with bright green above and vivid pillar-box red beneath, so like our European fire toads in appearance except for colour. The bright orange-red and black two-toned arrow-poison frog (Phyllobates bicolor) is shown with a brood of tadpoles adhering to its back. Many such interesting photographs showing unusual parental care in the group are shown, including the Smith frog (Hyla faber) mating in its pond with mud walls which the frogs themselves have built. A little Goddard's frog (Eleutherodactylus goddardi) seems to carry a burden of eggs almost as large as itself on its back and Rohde's leaf frog (Phyllomedusa rhodosto) is shown mating. A colour print like that of the spotted bydamedes (Hylamachus maculosus), a tree frog of Mozambique and Zanzibar, wrapped round a smooth stem, is but one example of many, of photography at its very best.

Dr. Cochran is Curator of Reptiles and Amphibians at the U.S. National Museum, Smithsonian Institution, and her interest in the amphibians has led her to travel widely, particularly in the Americas. The texts lives up to the standard set by its predecessors in this series, and in my opinion even excels those I have read. The concentration of interesting facts, whenever possible, is interlaced by accounts of her travels, and we are just allowed to glimpse the lengths to which Dr. Cochran has gone in search of her

To the end of the book is an encouraging section entitled "How to keep amphibians as pets" (also, it is a mere two and a half pages), which stresses the possibilities of original observation and recommends the keeping of a notebook. In this connection I would mention that a Kentish farmer was possibly the first person (at least in this country) to observe a male Querobolus marquitari (South American pouched tree frog) push the eggs into the pouch of the female. The careful notes he kept tell the story in full detail and solve a problem of how the eggs enter the narrow mouth of the pouch.

This book will prove a classic panoramic view of the class Amphibia, which are a small group of, some 3,000 species, compared with the unknown number, conservatively estimated as 25,000, of species of fishes. It should be owned by everyone interested in frogs and toads or the related amphibians, the news, salamanders and caecilians.

H.R.B.


This Dictionary is an American translation of the original work in German by Hans Frey, Das Aquarium von A bis Z. The publisher states in a Note to the Reader that the text is a literal translation with minimum rephrasing, and indeed the same Note (warning?) mentions that abbreviations are frequently used "and to the novice aquarist some of these might be misleading." The Note gives a few examples and identifies what these abbreviations "usually" (i.e. in the text) stand for. It seems extraordinary to the reviewer that a publisher should know that one of his books is going to present readers with difficulties and yet do nothing about these. In fact the only criticism to be made about this Dictionary is that it has been left too much alone. It stands badly in need of an editor. Words that have no place in the English language have been allowed and invented, the main offender being "aquaristics," meaning the techniques of aquarium-keeping but used also as an adjective and in other peculiar ways. The word occurs in this book as if it were a term long used, known and accepted by English-speaking aquarists. This is not so and it is misleading for beginners who may consult the book.

Many examples of the lack of editing could be given. Some of the entries are strange ones for a Dictionary. Who will look up these entries, for example: "bottomstanding," "emerged," "omissions of sound," "generational change," "new water," "protection of nature," "emulsion," "merged," "tissue"? Connective tissue has been translated as 'conjunctive tissue' and allowed to remain because of the lack of editing, and so have mistakes in chemical names and formulse in the recipes for sea water (page 654).

And what can be made of sentences and phrases such as these: "According to present experiences, the species degenerates easily, the decadency (sic) getting always smaller and finally losing its ability to reproduce" (page 117). "In comparison to the generally overfed nutrition in aquaristics, it has to be stated that, as a rule, the feeding as done with wild fishes diverges considerably from this norm" (page 548); "... fishes... have developed some additional sensory organs, which find no comparison in our world of ideas" (page 855). The text is turgid with such examples of obscurities, targon and prolixity, making it irritating and difficult to use to discover the useful information that is probably buried there. In general the illustrations are good, but the book cannot be recommended on this count alone. In my opinion it should not have been published in its present state.

ANTHONY EVANS

THE AQUARIIST
My Sunfish

by N. ZENOVICH

Sunfish have long been my favourites. For many years I have kept different species of them and would like to say some words about the last three I had and one of them I still have. Ten years ago I bought in a pet shop three tiny peacock sunfish, each the size of a half-crown.

Although all books state that this species will live in aquaria for 3 years, or 4 in running water, mine lived happily until 6 years and then one peacefully died on the bottom of the tank. Of the remaining two the larger one became very bullying and quarrelsome and made the life of his mate a hell, depriving him of food and living room. I had not a spare tank to separate them so I put the bully into a bucket of water and dropped him into the nearby river. His further fate is unknown.

The last one in this way came to occupy the whole 12 gallon tank, which is well planted with Sagittaria and Elodea.

The Survivor

Now I have come to the point that induced me to write these lines. This third fish is still alive, being now 11 years of age. It is 5 inches from snout to the base of tail, green-grey in colour with slightly yellowish fins. Its food is mostly earthworms and occasionally freshwater shrimps, which he drives and catches quite vigorously. There are no signs of senility except that he does not swim very much, but spends more time resting in his favourite corner. He is quite tame, coming to the surface when hungry and snatching a worm greedily from my fingers. Although I refer to the fish as if it were a male, I do not really know its true sex.

Once when I was adjusting the plants, he panicked and jumped out of the water onto the table, and from the table onto the floor. After he was returned to his home he hid for a couple of hours in the thickest clump of plants, and then all fight was over, with no bad consequence whatsoever.

This shows how much you can prolong the life span of an aquarium fish given the most favourable conditions and care.

Hunting Arctic Whales with Hypodermic Needle?

A MARYLAND scientist hunted Arctic whales with a hypodermic needle in the summer of 1961, according to the Director of the Natural Resources Institute of the University of Maryland. The senior biologist for inland research of the Institute spent 3 or 4 weeks at the mouth of the Mackenzie River in Canada’s Arctic Northwest Territories. During his stay he killed and retrieved white whales by using an ordinary hunting bow and arrows tipped with a special hypodermic cartridge.

Though not the largest of whales, the white whale attains 14-16 feet in length and weighs over 800 pounds as an adult. Their appearance in the relatively shallow water at the mouth of the Mackenzie is part of an annual nesting migration.

The specially designed needle for whale use measures nearly 5 inches long and is equipped with three sharp barbs to hold it in the whale. When the needle-tipped arrow hits the target, a small explosive charge forces a special drug into the body of the whale to kill it. A small balloon on a line is attached to the arrow to follow the whale. It was expected that only 0.1 gram of the drug, succinylcholine chloride, would be needed to kill a one-ton whale, assuming that they are as sensitive to it as are white-tailed deer.

If this test and subsequent trials on larger species of whales show that they can be killed and retrieved in this manner, it will have a decided effect on the world’s whaling industry. The standard means of taking commercial whales is by use of an explosive harpoon. In over 90 per cent of the cases this method renders whale meat unfit for human consumption as food, and tons of meat are wasted each year for human consumption. The pelagic whaling industry, now facing near extinction, could use any economic gains from meat taken in good condition. The drug to be used in the new hypo-arrow would not be dangerous to humans or animals later consuming the meat, and little damage will be done by the needle.

Commercial Fisheries Review, U.S.A.

Faulty Connection

Readers’ attention is drawn to an error in the illustration labelled Fig. 2 with the article entitled “An Aquarium Control Panel” (“The Aquarist, December”). This drawing shows terminal 12 of the connecting block connected to the wrong side of switch 83. The correct connection is shown in Fig. 1 with the article, and proper operation of the lights will not be obtained unless this circuit is followed.

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THE GOLDFISH AND ITS VARIETIES

No. 1 — Common Goldfish
by A. BOARDER

The common goldfish (Carassius auratus) is by far the most popular fish kept to-day, both in tanks and ponds. It is imported in thousands from abroad, especially from Italy, and is available at most pet shops. Of the thousands which are imported few survive for long unless they fall into the hands of aquarists with some knowledge of fishkeeping. That so many live under varying conditions speaks well for the hardiness of the fish and must be a strong recommendation for them, particularly where beginners are concerned.

The goldfish of to-day is a descendant of the fish bred some hundreds of years ago in China and from the original type many varieties have been evolved. When considering the advisability of mixing varieties of goldfish in ponds it must be borne in mind that they can all interbreed, and, of course, the resultant progeny can be very mixed and worthless.

In this series of articles the intention is to describe each variety of goldfish in such a manner that only the beginner be able to recognize them but the serious fancier will be better able to see which fish are nearest to the desired shape etc.

The Federation of British Aquatic Societies have made standards for exhibiting these fish and they are a very good guide for all aquarists who wish to keep and breed a good strain. We all know that it is just as cheap to feed a good fish as a poor one and the initial outlay need not be high when this fish is purchased.

The distinguishing features of the common goldfish are the normal or oval-shaped fins, that is with no long tail or clipping. In body shape the fish resembles that of the common carp with a fairly stout body showing a clear curve from the snout over the back to the caudal fin. Any sign of a break in this curve is undesirable, and such fish should not be used for breeding purposes. The under part of the body should be in a reverse curve but equally clean and not show a cut-away near the anal fin. The dorsal fin should be of medium size and be held erect, showing no sign of folding over. The pectoral and pelvic fins should be of medium length, rounded and fairly stiff. The anal fin must be single and well developed, but not too long. The caudal fin or tail must be well shaped but not too long. Any tendency to a flowing tail would immediately disqualify a fish of this sort.

The common goldfish varies considerably. It can be all red, all silver or a mixture of both. In addition there can be black markings on the fish, but often these tend to disappear, as all young goldfish have the black markings just before changing from the original bronze to their red or silver colour. Some fish keep the black for years, but a good strain will not carry any black markings once the colour change is completed.

There is no doubt that the all-red fish is the one most favored by the majority of judges, and rightly so. Few fish can be found to compare with this fine deep red self-coloured fish. Although multi-coloured goldfish may look very pretty in tank or pond there is something fine about the fish that shows no silver at all, not even at the tips of its tail. It is not easy to get such a fish although it has been known that a fish bought for a copper or two has won as the best fish in the show more than once. This is just chance in thousands, as for every goldfish good enough to win in good company there are thousands which would not get a second glance from a judge. The multi-coloured fish is recognized by the Federation but would rarely stand a chance against a good self-coloured fish.

The feeding of the common goldfish presents few problems. I have heard it said that a goldfish will eat anything a pig will eat and it would be hard to find many foods eaten by humans which would be rejected by the goldfish. They are omnivorous, eating vegetable and animal matter. The sensible diet is one which has a good variety. Any of the cereal products are good and in addition some dried shrimp and dehydrated means are offered for cats and dogs can be used. For live foods there is a good choice. The goshen worm is excellent, when the following can be given when procurable: white worms, Tubifex, maggots, water lilies (Daphnia), mosquito larvae, or dead flies etc.

When considering whether a fish is worth keeping showing the following faults should be looked for; and if found should mean the rejection of such a fish. Any tendency to a hump back is bad as this gives the fish a "mourny" look. A hump on the back is also a bad feature. The red fish should have a warm, rich red colour all over and show no signs of silver or black. A varied coloured fish should have the colours well spread with plenty of red, green and silver. The eyes should be normal and show no signs of protruding. The fish must be in a condition which means they should show all the body well covered with hard bony scales. If one or two scales are missing the fish could lose a few points but it would not be disqualified. Needless to say the fish must be in good condition, so that it displays itself well in the show tank. Condition also helps the colour to show up and so is very important.

When choosing goldfish for breeding purposes try to choose those which are as near to the standard as possible, and then as the strain is developed discard all those fish which do not change colour within 2 years. It is the retention of fish that do not change colour for some years which eventually ruins a strain in a pond if such fish are allowed to remain there. Always breed from the strongest fish and never use a fish which has been treated for illness or disease that may be inherited.
Hatching Brine Shrimp

by R. E. Macdonald

For some years now, brine shrimps (Artemia salina) have been used most successfully as a live food for aquarium fishes and I for one cannot recommend a finer or more nourishing diet for small carnivorous fishes or as a first food for newborn fry. Adult shrimps may also be purchased in the frozen form and fed to the larger fishes.

Unfortunately, it is extremely difficult to keep brine shrimps for a period longer than 2 or 3 days but the eggs will last for a period of anything up to 10 years if kept in glass containers and stored in a cool, dry place. The eggs are brown in colour and are concave on one side when dried; they become completely spherical after being immersed in water, although they do not actually swell. They are about 0.2 millimetre in size and possess a very hard shell.

The mature shrimp are pale pink and darken according to the amount of salt in their environment. The more salt there is, the darker their colour becomes, and incidentally the size of the creature increases with a greater salt concentration. Natural habitat of the brine shrimp is the big inland salt lakes.

Salt them, is essential to the successful hatching of the eggs, and a solution consisting of 1 oz. of salt to 1 pint of water (or if you like, 1 lb. of salt to 1 gallon of water) should be prepared and the salt thoroughly dissolved. The solution should always be made up and used in containers of glass, plastic or earthenware; the chemical reaction between the salt and metal excludes the use of anything metallic. Next, a quantity of brine-shrimp eggs are sprinkled on the surface of the water and artificial aeration is applied. The amount of eggs used should correspond with that required for one feeding only, and, for a constant supply of brine shrimps, further hatching containers should be set up.

The speed of hatching will depend entirely upon the temperature of the water, and it is found that at 80°F the eggs will hatch after 24 hours. Lower temperatures slow down the hatching time considerably.

With the constant turbulence caused by the artificial aeration it will be found that quite a number of the eggs are driven to the sides of the container, where they are forced partially from the water. Eggs that are subjected to this treatment will not hatch, so it is advisable to retain them within a large feeding ring or some other similar object.

The newly hatched shrimps are known as nauplii and are strongly attracted to light. This phenomenon makes collection easy, for all you have to do is to fix a torch or bright light in one corner of the hatching container and the nauplii will immediately congregate there. The nauplii can then be siphoned off through a fine sieve and dipped quickly into freshwater to remove the salt water from their bodies. It must be realised that unless the brine shrimps are sieved and washed in this manner before being added to a freshwater tank, the salinity of such a tank will increase until a concentration is eventually reached that will prove fatal to the fishes. Similarly, brine-shrimp nauplii will not live for very long in a freshwater environment, and although these creatures are too small to cause any serious harm in the way of biological disturbance if they should die unattractively, extreme over-feeding will certainly make things unpleasant for the occupants.

There is one point about feeding fry with brine-shrimp nauplii that is often overlooked, and in my opinion it is the most important. Many freshwater live foods may be infested with deadly organisms and parasites that can wipe out a whole brood in one foul attack if special care is not taken. As brine shrimp are essentially marine life they do not carry any such deadly creatures and can be fed with absolute safety to the smallest and weakest fry.
**Aphanus sophiae**

It is not very often that we find this delightful toothcarp amongst our aquarium fishes, although of late, I believe, not only are they becoming more popular, but aquarists are finding them comparatively easy to breed.

The average enthusiast has perhaps not had the opportunity to study this species and so I feel sure his interest will be aroused by these observations. The male is undoubtedly the more colourful, as it is often found with tropical fishes. The whole of the body and finnage is covered with tiny white spots, which appear to be beneath the surface and appear even more vivid during mating; at this time his colour becomes a deep blackish grey and the finnage a beautiful blue. Both dorsal and caudal fins are larger and more rounded than the female’s and more heavily tinged with colour; they always appear to stand more erect. The female is certainly more drab in colour and perhaps slightly smaller, but again, when mating, both coloration and spotted markings are more pronounced.

I found these fish rather shy in a community tank and not over keen to feed with the other fishes; the female became very difficult to condition, although I had already seen these species spawn in a tank whilst being with various other fishes. One does not want fish to be continually hidden from view and so I moved them to a 24 in. by 12 in. tank, rather heavily planted with Anubias, with a small amount of floating bladderwort. The immediate difference was very noticeable. Both male and female became very lively and perky and with a plentiful supply of Daphnia and white worm, they came into breeding condition extremely quickly and within days they had spawned.

The eggs, although quite large, were not easily seen as they had been placed well within the bladderwort. After about 9-10 days the fry were seen swimming amongst this very fine-leaved plant. These fish had been kept in tap water, pH 7.6 and hardness 18°, at a temperature of 70°F and with salt added. They have now been removed to another similarly treated tank where I have no doubt they will repeat their spawning.

The habitat of these fish in Persia, and according to literature on this species they attain a length of 1½ in. They appear to be very hardy fish, for my young fry had already suffered a drop in temperature of 30°F through a heater failure without loss.

R. A. Thomas

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**Earthworms as Food for Aquarium Fishes**

Earthworms are creatures beloved by gardeners because they aerate the earth and cause a continual interchange of humus between the soil layers. They are ferociously stamped upon by irrational housewives and to add horror upon horror they are forced to bear the ghastly scientific nomenclature of Lumbricus terrestris, of the order Oligochaetae. Moles eat them, birds both big and small eat them, extremely small children with a great amount of relish eat them, but most important of all, fishes eat them!

Earthworms are an extremely nourishing food for fishes, although slightly laxative, and can be fed chopped to the larger fishes (e.g. the cichlids) and minced or mashed to the smaller ones (e.g. the tetras). Like all foods, earthworms must be properly prepared before they are given to the fishes. This is where a great many aquarists go astray, for they merely wash the worms before shredding them regardless of what lies within the intestine of the creatures.

**Cleaning Earthworms**

The correct procedure is this; as soon as the worms have been extracted from the earth they should be placed in glass jars for an hour or so (without soil or a filling of any kind), where they will lose their mucous covering and evacuate their intestine. Only after these operations have been performed should the worms be washed in clean water and fed to the fishes.

Earthworms may be bred in containers of earthenware or wood, which should be placed in a dark and warm position and contain leaf mould or any loose soil rich in organic matter. They may be fed on decaying leaves and finely grated vegetables and fruits.

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**Fish Parasites—2**

**Fish Louse**

_Fish lice (Argulus) are about the same size as water fleas (Daphnia) and can be brown, green or a yellowish green in colour. They feed upon the blood of the fish and greatly irritate the skin. The affected fish will therefore lose much of its colour and attempt to dislodge the parasites by rubbing its body against objects in the aquarium. Fish lice can be identified on the body of the fish by the use of a magnifying glass. The lice can be removed from the host with a pair of forceps or by rubbing the skin of the fish, this being done in a head-to-tail direction only. Any persistent lice firmly attached to the skin can be removed with forceps after using a brush to moisten the body of the fish with a very strong solution of common salt. Care should be taken to prevent the salt solution from making contact with the skin of the affected fish._

R. E. Macdonald

THE AQUARIST
our readers

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

Treatment for Fin Rot

In answer to Mr. Fuller’s letter, in the November issue of *The Aquarist,* about alternative cures for fin rot, I have only had one case of this disease, and this was cured by the following method.

The diseased fish, a young keyhole cichlid (Aequidens maronii) was isolated. A strong solution of hydrogen peroxide was prepared and the fish was held in a damp cloth and its tail fin was dipped in the solution for about 10-15 seconds. The tail was then rinsed in fresh water. This treatment was repeated three times over several days; it was then discontinued as the fin showed signs of regenerating. The one disadvantage with this treatment is that it is impossible to use it on small fishes, for fear of injuring them.

D. HAUER,

I have, I am sorry to say, no miracle cure for fin rot but I would ask Mr. P. M. Fuller (The Aquarist, November) why he thinks surgery is illegal in Great Britain. Thank you for the magazine, The Aquarist!

D. R. HUBBELL,

Our first correspondent was probably thinking of the provisions of the Cruelty to Animals Act, 1876, which imposes legal restrictions on anyone “experiment calculated to inflict pain upon a living vertebrate animal”. Diseases such as fin rot are treated by fish with a proper licensed person. However, it would seem unlikely that an offence would be committed under this Act if surgery were carried out on a fish for curative purposes, and indeed it is difficult to see how anyone could object to surgical procedures applied by an aquarist (unwittingly or otherwise) to his fish unless the owners were permitted to have the fish killed and unstated treatment methods used on their fish.

—EDITOR.

Public Aquarium

As the wife of a keen aquarist and a regular reader of your magazine I looked forward to a visit to Blackpool last October and a chance to visit the Tower Aquarium. I recalled a note in “Aquarist’s Notebook” that spoke so highly of the Aquarium. Was I impressed when I looked round? On the contrary, I felt that your writer should pay them another visit!

My impression was that the water was cloudy, with algae-covered front glass and plants so thick that if there were any fishes, it was impossible to see them. The worst offence was in the labelling of tanks to enable non-aquarists to identify the fishes.

Some tanks were without labels or worse still the fish were in a tank labelled with names of previous residents! I stood at the side of a fellow aquarist who called to her family at the next tank “Come and look at the sea horses”; and her son took in details of the so-called “sea horses”. I know they were wrongly labelled, but how many of the thousands of other visitors did?

(Mrs.) J. M. RICHARDSON,
Bishopthorpe, Nr. Newark, Notts.

Pigmented Plants Wanted

May I, through your columns, appeal for the help of readers of *The Aquarist*? I require material for research into the pigmentation of aquatic plants and it has occurred to me that some of your readers might be willing to assist, by sending specimens which they have in their aquaria or fish houses or are able to collect from natural coldwater habitats.

I should be pleased to receive any number of specimens, large or small, of any aquatic plants which are bearing foliage with any brown, red or purple pigmentation. It would also be extremely valuable if the following information could be given:

(a) the name of the plant and the location from which it was collected;
(b) the temperature range of the water in which it was growing;
(c) in the case of aquarium plants, the nature and intensity of illumination;
(d) in the case of wild plants, the nature of the habitat, e.g. still or flowing water, depth of water, type of soil in which rooted, whether growing in light or shade etc.

The plants should first be wrapped in polythene, and then despatched to me at the address given below. I shall be pleased to pay for the specimens at wholesale rates and to refund postage in full.

C. D. SCULTHORPE, B.A.,
Department of Science,
Salford Technical College,
Pep Park,
Salford, 5, Lancashire.

Fellow Enthusiasts?

I would be very grateful if you could put me in touch with any club, society or any person who keeps...
tropical fish in this area. I have been an aquarist for about 3 years and I have not met one person who has the same hobby.

A. J. CHRISTIAN,
7a Sea Road, Felixstowe, Suffolk.

Readers living in Mr. Christian’s area are invited to communicate with him.—EDTOK.

Winter Treatment of Terrapins

CAN you recommend a diet for a terrapin living in our school pond? Would it be wise to bring it in during the winter or to leave it outside?

J. HUNTER,
Marlow, Bucks.

Robert Bustard writes: The best food for your terrapin is earthworms, or small pieces of raw meat. If feeding with the latter, do not leave any raw on the water which are not immediately eaten. Strips of raw fish are also suitable. Small American terrapins need a good proportion of vegetable food and adults will also eat this. Water plants are ideal but falling this lettuce leaves floated on the water make a good substitute.

The winter care of terrapins depends on the size of the terrapin, the species (i.e. whether European or American) and the maximum depth of the pond. Generally speaking I would advise that any European terrapins in good condition be allowed to hibernate outside provided the pond has a depth of 2 feet. This will ensure that the terrapins can hibernate safely below the ice. American terrapins are best brought indoors, and baby specimens must be brought into heated quarters in the winter. I write an article entitled “American Terrapins” for The Aquarist in August, 1964, and I am sure that this would be of interest to you.

First Breeding Experience

LAST summer I had several young goldfish hatch out from eggs laid by my goldfish in a 12 in. by 8 in. tank. Two of the adults were won at a fairground at Easter, 1959, and the one we now know to be the male was similarly acquired at Easter, 1960. At first they were kept in an ordinary glass bowl, and the tank was obtained last year. Their tank is kept on the window ledge of the morning room, where the room temperature is probably about 65 to 70° F. The tank receives a lot of sun in the mornings, and is cleaned out every time it becomes green. Early in April, 1961 one fish was noticed to be rubbing the underside of the fish with its head. A few days later this pair were seen to be courting round the tank, and when I looked closely I saw lots of eggs on the glass, on the plants and at the bottom of the tank on the pebbles. I began to worry about the time of the female was chased for so long, since I knew nothing about what should and what does happen and didn’t want the fish to die. However, I found that the chasing was normal and that I should do nothing.

After a couple of days we were very disappointed to find that the fish had eaten all the eggs, but about 2 weeks later the third goldfish was being chased by the male and more eggs were laid. The fish continued to spawn and I saved some eggs by removing the fish from the tank after a spawning on 29th May. They hatched after about 4 days, and 24 of the tiny things looking like two black eyes connected to a thin black line, moving with sharp, darting movements, were seen. A dealer in fishes laughed at me when I told of this experience, especially after I had told him that my goldfish are only about 21 in. long. He thought it to be an unusual experience. Is this so?

(Exe.) E. CARVE,
Chorlton-cum-Hardy, Manchester, 21.

A. Boarder writes: The spawning of your goldfish was a particularly unusual happening which will take place in any normally-run tank. Goldfish can breed when only a year old and not more than 3 inches long overall.

The AQUARIIST

Crossword

Compiled by J. LAUGHLAND

(Solution on page 520)
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 general meeting of the Kith and kinship of the Society was held on 11th inst., at the Bridgehead, London, S.W.3. The meeting was well attended and the business transacted included the election of the new committee for the ensuing year. The Board of Management was re-elected and the following officers were elected:-

President.-Mr. W. F. Smith. Vice-President.-Mr. J. E. Brown. Secretary.-Mr. D. W. Woodard. Treasurer.-Mr. G. H. Turner. Committee.-Mr. F. A. Lister. Mrs. M. J. Woodard. Mr. J. M. Johnson. Mr. G. H. Turner. The following resolutions were adopted:

1. That the Society be thanked for its services to the aquarists of this country, and that the officers be thanked for their work in behalf of the Society.

2. That the Secretary be requested to communicate with the various local authorities in regard to the proposed sale of certain land for the purpose of establishing a new aquarium.

3. That the Secretary be requested to arrange for the holding of a special meeting at the Bridgehead, London, S.W.3, for the purpose of discussing the question of the proposed sale of certain land for the purpose of establishing a new aquarium.

4. That the Secretary be requested to arrange for the holding of a special meeting at the Bridgehead, London, S.W.3, for the purpose of discussing the question of the proposed sale of certain land for the purpose of establishing a new aquarium.

5. That the Secretary be requested to arrange for the holding of a special meeting at the Bridgehead, London, S.W.3, for the purpose of discussing the question of the proposed sale of certain land for the purpose of establishing a new aquarium.

The meeting closed with a vote of thanks to the Secretary for his work in behalf of the Society.

THE annual general meeting of the Alcove and District A.S. was held on 12th inst., at the Bridgehead, London, S.W.3. The meeting was well attended and the business transacted included the election of the new committee for the ensuing year. The Board of Management was re-elected and the following officers were elected:-

President.-Mr. W. F. Smith. Vice-President.-Mr. J. E. Brown. Secretary.-Mr. D. W. Woodard. Treasurer.-Mr. G. H. Turner. Committee.-Mr. F. A. Lister. Mrs. M. J. Woodard. Mr. J. M. Johnson. Mr. G. H. Turner. The following resolutions were adopted:

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The Aquarist's Badge

PRODUCED in response to numerous requests from readers, this attractive silver, red and blue bird design is the most popular badge for the aquarist. The badge is designed for wear by all members of the Society and can be obtained at a nominal cost of £1.00.

To obtain your badge send a postal order for £1.00 to The Aquarist, The Barn, Half Acre, Brentwood, Essex, and please specify which type of badge you require.
dinner has been arranged for Thursday, 17th February, at the Rose Inn, Pengeham, Heron.

The Hamptons A.S. held their tenth anniversary meeting at 24, St John's Road, N.W.1, which was their original meeting place in 1957-1958, and which was the setting for their original meeting place, the Schoolroom, which is now used as a meeting place. The dinner was arranged by the Executive Secretary and Treasurer, Mr. J. A. Brown, 6, St John's Road, N.W.1.

The annual dinner of the Sheffield and District A.S. was thoroughly enjoyed by all who attended. The dinner was arranged by Mr. A. A. Potter, 4, St John's Road, N.W.1, and was held at the Hotel, 2, St John's Road, N.W.1.

The annual dinner of the London Aquarium and Pondkeepers Association was held recently at the Seven Kings Hotel, Goodmayes. During the proceedings Mr. W. B. Bell, chairman of the Association, presented the following awards: Mr. A. A. Potter, 4, St John's Road, N.W.1, Mr. A. A. Potter, 4, St John's Road, N.W.1, Mr. A. A. Potter, 4, St John's Road, N.W.1, Mr. A. A. Potter, 4, St John's Road, N.W.1, Mr. A. A. Potter, 4, St John's Road, N.W.1.

At the annual general meeting of the London Aquarium and Pondkeepers Association, the following officers were elected: Mr. W. B. Bell, Chairman, Mr. W. B. Bell, Chairman, Mr. W. B. Bell, Chairman, Mr. W. B. Bell, Chairman, Mr. W. B. Bell, Chairman.

We regret to announce the death recently of Mr. W. B. Bell, at his home in Barnet. Mr. W. B. Bell was a founder-member of the London Aquarium and Pondkeepers Association, and was for many years an active member of the Executive Committee. For the past eighteen months, due to ill health, he had been unable to attend the meetings of the Association, but was keenly interested in its activities. Over the years, Mr. W. B. Bell had made many friends with aquarists throughout the country.

At the annual general meeting of the Bristol Tropical Fish Club, the following officers were elected for 1963-64: Chairman, Mr. W. B. Bell, Chairman, Mr. W. B. Bell, Chairman, Mr. W. B. Bell, Chairman, Mr. W. B. Bell, Chairman.

The Secretary reported that there had been a considerable increase in membership during the year, and the annual business meeting showed that the Club was in a very sound state financially.

A meeting of the London Aquarium and Pondkeepers Association was held recently at the Hotel, 2, St John's Road, N.W.1.

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Well printed and profusely illustrated with the work of foremost bird artists and photographers, this monthly magazine contains a beautiful coloured plate in alternate issues. Pages are devoted in each issue to the Budgerigar, Canary, Foreign and British Birds, and articles appear regularly on the construction and maintenance of aviaries, ailments, feeding, breeding, the latest techniques of colour feeding, genetics and many other topics of interest to both the advanced aviculturist and newcomer.

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<th>VICTOR ALL OVER BACK LIGHT SHADE</th>
<th>HEATERS</th>
<th>THERMOMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.P.</td>
<td>40, 45, 50, 75, 100, 125, 150 watts</td>
<td>Exs, Ex Standard, Ex Super, Ex Electrical</td>
</tr>
<tr>
<td>36 x 15 x 15 in.</td>
<td>£16.10.0</td>
<td>£16.10.0</td>
</tr>
<tr>
<td>36 x 15 x 15 in.</td>
<td>£16.10.0</td>
<td>£16.10.0</td>
</tr>
<tr>
<td>36 x 15 x 15 in.</td>
<td>£16.10.0</td>
<td>£16.10.0</td>
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<table>
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<tr>
<th>PRESSED STEEL</th>
<th>REMEDIES</th>
<th>THERMOMETERS</th>
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<td>15 in.</td>
<td>36 x 15 x 15 in.</td>
<td>£16.10.0</td>
</tr>
<tr>
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<td>36 x 15 x 15 in.</td>
<td>£16.10.0</td>
</tr>
<tr>
<td>15 in.</td>
<td>36 x 15 x 15 in.</td>
<td>£16.10.0</td>
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<table>
<thead>
<tr>
<th>PLASTIC TUBING</th>
<th>F.I.C.</th>
<th>THERMOMETERS</th>
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<tbody>
<tr>
<td>F.I.C. Flexible Non-Toxic Clear Air Tubing</td>
<td>Brine Shrimp</td>
<td>Exs, Ex Standard, Ex Super, Ex Electrical</td>
</tr>
<tr>
<td>15 in.</td>
<td>36 x 15 x 15 in.</td>
<td>£16.10.0</td>
</tr>
<tr>
<td>15 in.</td>
<td>36 x 15 x 15 in.</td>
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<td>£16.10.0</td>
</tr>
</tbody>
</table>

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- Encyclopedia of Tropical Fish (Axelrod) | £6.0.0
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- Diseases of Fishes (Oulij) | £6.0.0
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<table>
<thead>
<tr>
<th>Plant</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THE FABULOUS LACE PLANT</strong></td>
<td></td>
</tr>
<tr>
<td>Large plants in good leaf</td>
<td></td>
</tr>
<tr>
<td>Double crowns 30/-</td>
<td>6 for 7/6</td>
</tr>
<tr>
<td>Single crowns 15/-</td>
<td>12 for 12/6</td>
</tr>
<tr>
<td>stocks very limited</td>
<td></td>
</tr>
<tr>
<td><strong>BEAUTIFUL CABOMBA</strong></td>
<td></td>
</tr>
<tr>
<td>1/6 each</td>
<td>6 for 7/6</td>
</tr>
<tr>
<td><strong>VARIEGATED JAPANESE RUSH</strong></td>
<td></td>
</tr>
<tr>
<td>Bushy plants</td>
<td>6/- each</td>
</tr>
<tr>
<td>3 for 10/-</td>
<td></td>
</tr>
</tbody>
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### TROPICAL FISHES

**SPECIAL OFFERS FOR FEBRUARY ONLY** (55 orders for this month only, carriage free)

<table>
<thead>
<tr>
<th>Fish</th>
<th>Price</th>
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<tbody>
<tr>
<td><strong>CARDINAL TETRAS</strong></td>
<td></td>
</tr>
<tr>
<td>4 for 50/-</td>
<td></td>
</tr>
<tr>
<td>10 for 100/-</td>
<td></td>
</tr>
<tr>
<td><strong>VEILTAIL GUPPIES</strong></td>
<td></td>
</tr>
<tr>
<td>RED, BLUE, GREEN</td>
<td></td>
</tr>
<tr>
<td>1 Young pair of each</td>
<td>60/-</td>
</tr>
<tr>
<td><strong>CATFISH</strong></td>
<td></td>
</tr>
<tr>
<td>LEOPIARD, BANDED, GOLDEN, BRONZE, SPOTTED</td>
<td></td>
</tr>
<tr>
<td>1 of each for 37/6</td>
<td></td>
</tr>
<tr>
<td><strong>USEFUL SCAVENGERS</strong></td>
<td></td>
</tr>
<tr>
<td>1 Whiptail Loricaria</td>
<td></td>
</tr>
<tr>
<td>1 Red-tailed Black Shark</td>
<td></td>
</tr>
<tr>
<td>2 Kuhli Loach for 30/-</td>
<td></td>
</tr>
<tr>
<td><strong>GREEN SAILFIN MOLLIES</strong></td>
<td></td>
</tr>
<tr>
<td>6 for 30/- (good size)</td>
<td></td>
</tr>
<tr>
<td><strong>LARGE NEON TETRAS</strong></td>
<td></td>
</tr>
<tr>
<td>6 for 41/-</td>
<td></td>
</tr>
<tr>
<td><strong>TINFOIL BARBS</strong></td>
<td></td>
</tr>
<tr>
<td>15/- each</td>
<td></td>
</tr>
<tr>
<td>5 for 60/-</td>
<td></td>
</tr>
<tr>
<td><strong>UNSEXED BUTTERFLY FIGHTERS</strong></td>
<td></td>
</tr>
<tr>
<td>5 for 10/-</td>
<td></td>
</tr>
<tr>
<td><strong>CLOWN BARBS</strong></td>
<td></td>
</tr>
<tr>
<td>2/- 6</td>
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</tbody>
</table>

### COLD-WATER AQUARIUM FISHES

<table>
<thead>
<tr>
<th>Fish</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 ASSORTED BASS (4 varieties)</td>
<td>for 40/-</td>
</tr>
<tr>
<td>LIONHEADS 40/- each</td>
<td></td>
</tr>
<tr>
<td>LARGE ORANDAS 60/- each (females)</td>
<td></td>
</tr>
</tbody>
</table>

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