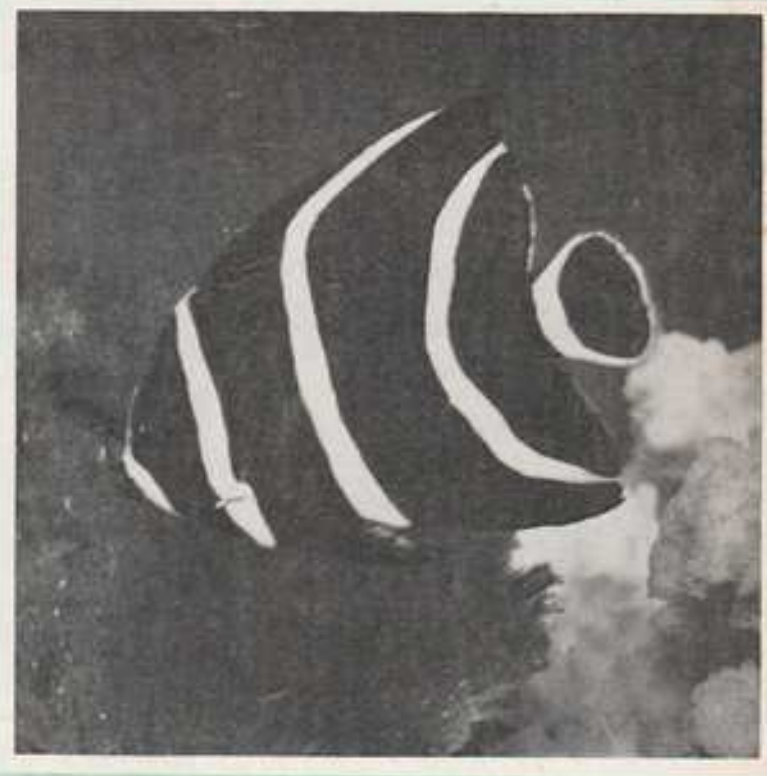


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JANUARY, 1962



MONTHLY
Vol. XXVI No. 10

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1962

Editorial

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 ceases 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.

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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 sub-tropical seas are a striking and thrilling feature of the reefs and sea gardens which hold visitors enthralled 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 skillfully 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 emperor angel (calculated to leave any freshwater aquarist transfixed and aghast), 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 monotone 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 flaming 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 edging on the flowing 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 masochistic 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 ventrals and anal fin always draws a protracted "Oh-h-h-h" 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 piling, and are quite unconcerned by the roar of heavy motor traffic scarcely 2 yards above the water.



Black angel fish



In an aquarium belonging to the author are orange damselfish (just visible against the coral on the left) and black angel fish (right)

The black angel 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 hardy, remarkably 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 angel (or any other angel), 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 angel a retreat. This shelter should be on 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, on 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 angels of an inch or less will accept brine shrimp, dried food and raw shrimp, 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 uneaten food. Brine shrimp, unless very big, is best avoided for larger angels, as it is too small for them to bother about but large enough to annoy. Lettuce is greatly appreciated by all angels 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 toly-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 angel 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 wharf 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 teaspoonful of sulphathiazole sodium to every 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 "pock order" will be established at feeding time, but the several escape holes and the fishes' divided attention should insure reasonable harmony. Projecting backwards from each operculum is a straight stout needle-sharp spine, with which an irate angel will deal stabbing blows at its neighbour by shimmying 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 exasperating 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 fish. Newcomers should be alert to the confusion 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 foods. 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 disfigurement 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* (or *Pseudomonas*) *penetrans*, one of the organisms responsible for abdominal dropsy 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 tails, 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 *Rhodotermis glutinis*. 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 no further, so that those parts of the tail which had been diseased could be cut away with no difficulty. The cure achieved was permanent in nature, 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 sterilised 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, Inmunología y Serología, Facultad de Farmacia y Bioquímica, 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. Verrea, Head of this Department.

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

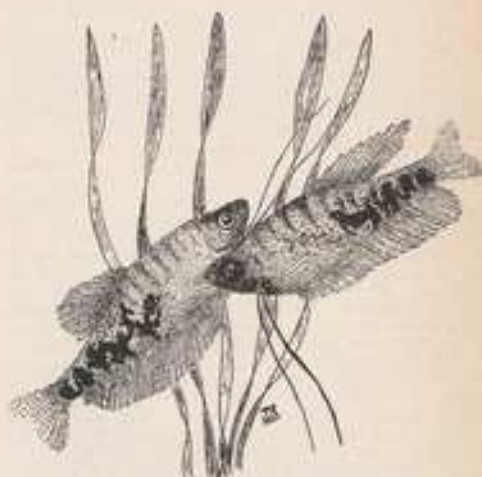
Opaline Gourami and Pigmy Corydoras

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 (*Trichogaster trichopteri*), to which the opaline is closely related. The basic blue colouring is much brighter and richer, forming a perfect background for the velvety, purplish-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 recognisable 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 hue. There is little or no colour change with the female.



Opaline gourami (left, female; right, male)

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 mimic 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.



Corydoras hastatus

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 Breeders 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 trianglerail, 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 has dominated to the exclusion of other considerations!



Trianglerail (male)



Wedgetail (female)

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 Breeders 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 pinnails 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.

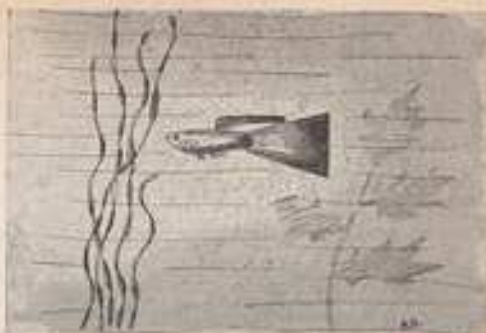
Illustrations of the new shapes accompany this article and it will be seen that the trianglerail breaks entirely new ground and will demand a great deal of patient work from breeders to produce good examples. The fantail might be described as being somewhere between the veiltail and the scarftail and 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 Hahnel strain of reds and is most colourful. This strain, with appropriate outcrosses, may well form the basis of a good tripartite and is the basic material on which I am working at the moment. However, I am under no delusions 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



Fentel (male)

simply say "try it and see for yourself, chum, you will be amazed at just how difficult it really is".

The *Guppy Breeder's Standard Handbook* is obtainable for 5s. 6d., plus postage, from Mr. B. Ashman, 19, Knighton Road, Romford, Essex.

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 small characins including black widow fish. I have been told that black widow fish are quarrelsome. Is this true?

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

Are *Jordanella floridae* easy to keep and breed?

Jordanella floridae, 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 mossy algae, but if your tank doesn't grow sufficient of this lower form of plant life, then provide the fish with a substitute 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 fanned 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. floridae* 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 an 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 rinsed 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

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 as quickly as I plant it in the aquarium. 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 sized fish in my aquarium. They have developed darker bars on the sides, keep twitching their bodies and fins and have tiny protuberances like tubes 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 metals 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.

My dealer 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 gasping, and I do not want to empty the aquarium and start all over again if I can possibly avoid it. I have three *Cryptocoryne* and six *Vallisneria* plants in the tank, which holds 7 gallons of water.

Dip-tube or siphon the floor of the aquarium to remove uneaten food 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*, set 1 inch apart, along the back and ends of the tank. And place a clump or two of Indian fern or *Hydrophila* in the centre.

What sort of conditions and food suits *Corydoras* catfish best?

Corydoras catfish prefer rather shallow and preferably alkaline water maintained at a temperature of about 68-72°F. They like to shuffle over a soft floor (fine sand or brown sediment over 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 *Nandaeuchania 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 worry large ramshorn snails to death, and will eat all the small ones they can find.

I should appreciate some information about the breeding habits of *Pelteobagrus teranisi*.

P. teranisi 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 doze on the eggs and fry, another couple may completely disregard all the rules of correct parental behaviour and make a meal from the eggs as soon as mating is over. The obvious way out of this



Photo: Laurence E. Perkins

Pempodour fish (*Symphysodon discus*)

difficulty is to remove the cannibalistic parents from the aquarium before they get a chance to finish their banquet. A gentle stream of air bubbles from a diffuser some placed near the remaining eggs will keep them well oxygenated and free from sediment. At 80°F the fry hatch out and become free-swimming within about 5 days. Normally they feed right away on micro worms, brine shrimps or similar alternatives.

I have just started to keep tropicals, and of the fishes I have seen that really appeal to me, the pempodour takes first place. Would two pempodours live happily among my guppies, platys, mollies and tiger barbs in a 30 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 planorbis snail, 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 (*Bullina*), the vivid-yellow-bodied *Paludina vivipara* snail and the Columbian striped ramshorn snail (*Morina*).

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 proclivities?

Among the most avid plant-eaters are the so-called silver dollar fish (*Metyouia*), Malayan angel fish (*Momodactylus*), *Moenkhausia oligolepis*, *Barbus filamentosus* and *B. arulius*. 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 choicer aquatics.

Does the angel fish (*Pterophyllus*) make a reliable occupant for a community tank?

After the angel fish reaches a length of about 1½ in. it becomes a source of danger to most species under 1 in. long, though it is less likely to molest tiny fishes that haunt the bottom of the water than those that swim at or near the top. A 3 in. angel fish is quite capable of swallowing a short-finned male guppy at one gulp.

Some time ago I bought a pair of two-spot gouramis (*Trichogaster bimaculatus*). One of them has assumed really dark markings on distinctly ash-grey sides. Is this darker coloration a symptom of disease?

So long as your gourami is in the prime of life, eats well and swims about normally, we do not think you have any cause to worry. Male and female two-spot gouramis usually develop dark marblings on darker hued sides when they are about to spawn. If your fish is a male, easily recognized by his larger and more pointed dorsal and fuller anal fins, it will not be long before it gets down to the business of building a bubble nest.

I have about a score of neon tetras living in a well-lighted 24 in. by 12 in. by 12 in. tank. The water is soft, and is well planted with *Cryptocoryna*. The other day I noticed that some of the fish appear to be losing the colour on the caudal peduncle. The area affected looks as though it has been bleached to a smoky white. Can you give me any idea what is wrong with these fish?

We feel pretty sure that your "bleached fish" are suffering from the so-called neon disease, which manifests itself in yellowish white to bluish white patches or blemishes. There is no guaranteed cure for this disease, but treatment with a strong concentration of methylene blue (5 per cent. solution of medical-quality dye) has proved effective in many cases. The fish to be treated should be transferred to an unplanted tank screened with thin paper to cut down bright light. Keep them in the methylene blue bath for about a month. If the pale areas show signs of diminishing before

then it is not unlikely that the fish will grow out of the disease and revert to their former bright coloration. If the pale areas spread rapidly towards the head, the fish will soon die.

What sort of conditions are needed to breed *Corydoras* catfish?

We must say at once that some members of this fairly extensive genus are easier to breed than others. In fact, many species have not yet been bred in captivity. Among the species that will breed in the aquarium are *C. palomus* and *C. aeneus*. The water should be alkaline and average about 65° to 72°F. Because the female sticks her eggs to a smooth surface, flat-bladed plants or slabs of slate or granite should be provided as a spawning ground. But whatever preparations are made, it is quite likely that the female will choose some unusual spot to place her eggs, such as a side of the aquarium or a heater tube. After the eggs hatch out, the fry drop down on to the compost and seek the security of the sediment around plants and in corners. There they will feed on anything small such as micro worms, dust-fine dried food or mashed white worms.

Is it dangerous to use potassium permanganate to clear aquarium water?

Not unless too strong a concentration is used. Never add the crystals direct to the aquarium; dissolve them first in tepid water. Potassium permanganate is most effective in acid conditions.

I have just bought a 3 foot tank and would like to know the names of a few small "tropicals" that are prettily marked and bred to one another and the plants.

As a start we suggest you buy pairs or trios of the following: *Pristella riddlei*, *Hemigrammus pauciter*, *Nannostomus anomalus*, *Barbus semifasciatus* (or its golden variety *schuberti*), *Brachydania rerio*, *B. albiventris*, *Hyphobrycon innex*, and the ubiquitous guppy in any of its splendid forms.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have four goldfish and would like to make or buy a container, not one with transparent sides, about 4 ft. long, 2 ft. wide and 2 ft. deep, also a table for putting the aquarium on. Could you suggest something?

You can buy tanks of varying sizes from dealers who advertise in *The Aquarist*. I do not see why you want one without transparent sides, as you will be unable to see your fish. One side at the front should be of glass so that the inmates can be inspected. As for a table to hold your tank, when filled with water etc., the tank can weigh about 950 lb., and so something very strong such as angle-iron framework will be essential to hold this weight.

I have recently obtained some show fantails which I have in a small pond 9 in. deep. Can I transfer them to my larger pond, which is at least 4 ft. 6 in. deep, or would it be safer to bring them inside in a tank for the winter?

If the fantails are of a hard-scaled type they should be able to stand the winter in your larger pond. The scaled fantails are more likely to be safe in the pond than are shubunkin fantail types. Some people refer to the scaled fantails as "metallic," but I do not like this term as there is nothing metal-like in the appearance of the scales. They are just hard and scaly. The shubunkin type appears to have had the scales scraped off. This type is more often attacked by such troubles as swim-bladder derangement than are the scaled fish, and the finnage is often the place where fungus gets a hold during the winter. Therefore, examine the fish: if they are scaled leave them in the large

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.

Whilst 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 from the mud?

Use a wire tea-strainer about 5 in. across and scoop up a quantity of the mud and worms. Then swirl 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 realize 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 pond. 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 uncoloured goldfish. Young goldfish are bronze in colour for some time when young.

My goldfish bang themselves against the sides of the tank and gravel. 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, moulting 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 traps 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 main difficulty in raising water to a fair height is its weight. A number of intermediate valves are usually inserted so that they 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 roach and tropical breams? Goldfish, orfe, shubunkins, rudd, catfish, comets and fantails are all coldwater fishes and able to withstand a winter out of doors (at least in Jersey where I live), but celestials, lionheads, fringetails and telescopics 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 rearing 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 platys 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 cool 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 wattage 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 unless 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 choicest water plants 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 draining. 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 browsing 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 cleaned.

I have had some trouble with a brown sludge type of matter which floats to the surface of my pond. When touched it disintegrates and sinks. 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 encourage 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 then time scarcity 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 footing 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. Nossi-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 failing (if it is one) to covet money 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.



Photos:

C. W. Allen

Two varieties of the Madagascar lace plant. On the left is the plant with the long thin type of leaf

On the merits of their business acumen, I will not dwell. Then bureaucracy stepped in. To preserve the supply of plants, the local Colonial Authority instituted a licence system. They were not the originators of licences but they appear to have used the idea long before they became of everyday usage in Europe. The monies derived from such licences, which appear to have been granted for the export of plants for scientific purposes only, partly supplied the Colonial exchequer and partly went to the maintenance of the Botanical Institute in Tananarive. This, of course, was in the time of the French Colonial Administration. Supplies did come out of the Island, without the benefit of licence, in devious ways, as the rhizomes have only very little weight.

Many collectors, however, never left the Island alive, having met their deaths through malaria, heatstroke,

drowning or crocodiles, and it has been stated that no matter what an *Aponogeton 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-Heinrich Fugger and Manfred Seinpfeffer.

Name and Habit

The records show that the *Aponogeton* rhizomes were known to the natives as "Uvirandrana," which in the Madagascar dialect gives us the name of "rough bulb," which is not unapt. Literature gives, I think, the date of earliest recorded report as 1806, by the French botanist M. Du Petit Thouars. This is apparently the earliest reference to be found at present, yet we find that Linnaeus gave us *Aponogeton* in 1781, some 25 years earlier, and this, of course, after the established order of things takes priority over the Uvirandrana which Petit Thouars adopted.

It is also stated that the natives used the rhizomes 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 *Aponogeton* 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.

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 certain fishes. 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 15°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 in 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 "sticky" state. Of three test jars, one received 12 rainbow trout fry (average standard length, 25 millimetres); one, six rainbow fingerlings (51 millimetres); and one, 12 goldfish (39 millimetres). The rainbow fry were dead in 3 hours, the rainbow fingerlings 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 three 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 and well flushed before it is used. (From "The Progressive Fish-Culturist", U.S.A.)

Gourami with a Thick Lip (*Colisa labiosa*)



Photo

Berry Pongilly

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 colorings 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°

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 clean 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.

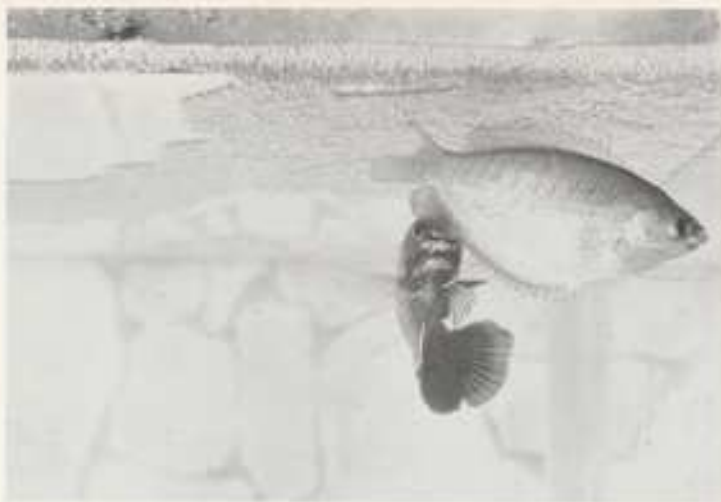


Photo:

Berry Pengilly

Photograph taken underneath the bubble nest of a pair of thick-tipped gouramis. The darker fish is the male.

Glass tetra (*Moenkhausia oligolepis*)

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.



Photo:

Hendon Aquatic Society

A New Species of *Bedotia*?



Photo:

Bedotia species (approx. natural size)

Hendon Aquatic Society

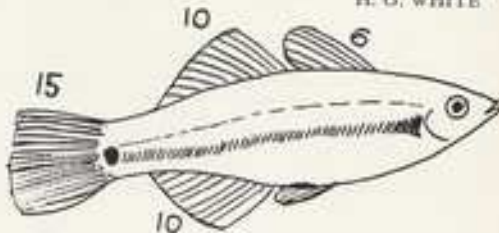
Some notes on a new fish with its home in Madagascar that is probably a species of *Bedotia*

THE photograph reproduced above illustrates a fish that has recently been purchased by a number of members of Hendon Aquatic Society. Specimens were seen in a number of London pet shops and were marketed under the name of *Javanicus gobius*, and were described as African fish. However, later information revealed that they were Dutch-bred and were possibly silversides 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 goayi* (Pellegrin) and *Bedotia trisulca* (Pellegrin) 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 *goayi*, 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 deeper-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.

Raising Big Guppies (PART 2)

by PETER DENDY

LAST November I described the feeding of fry in the initial 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 contaminates 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 stored 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 24 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 pigeon-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 home-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, tinned 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 foods 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 should be crumbled and mixed with an equal proportion of powdered Bemax; the larger lumps and pieces of bone, of course, require to be removed before it is used.

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 micro worms on it. 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 genetical 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 pretty small then feeding, while helping, will not be the answer, and it may be time to improve the virility of the strain by importing new "blood" or to try an entirely new strain.

GLASS and the Aquarist

HAVE you ever given any thought to just how important a part glass plays 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 minutes 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 ardour 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 new-born livebearer fry to slip through into safety. In both these cases the glass is easier to position if rubber channelling is slid over the edges that will come into contact with the aquarium sides.



Glass used as divider



Slit rubber tube used on edge of glass



Glass strip used to hold back gravel

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 8 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 torn or damaged fins appear.

If you consider that the clear-area policy detracts from the appearance of a nicely set-up tank then use a piece of glass laid flat on the gravel under the feeding ring. It is practically invisible and serves the same purpose, preventing fine particles of dry food from working into the compost and enabling the fish to see and pick up the food that has dropped more easily. The flat piece of glass also has the advantage that it may easily be taken out for cleaning and removal of algae.

A flat piece of glass on the gravel is a help to male ana-

baeids, too, and increases the size of the brood. When the bubble nest is being built and its location is obviously fixed, place the glass directly under it and the recovery of dropped eggs by the parents is greatly facilitated. Worms can be dropped on to the glass and will remain in view, making it easier for a weary Dad to snatch a bite to eat now and again.

A piece of glass makes the collection of Grindal worm a piece of cake. Place the glass over the Grindal worm culture after feeding and the worms may be scraped off the glass practically clean and ready for feeding. The knack here is to learn just how much food to put on the culture to get the best results. If it is judged just right then the worms are there for the taking; if too much food is given then the glass is covered with food and worms, and you have a problem to get rid of the food. If, however, too little food is given then the worms will have finished their meal and have gone home again, leaving a worm-free piece of glass. The damper you keep the culture the better the system works, as long as you don't overdo it, but your nose will soon advise you as the food will go bad before it is eaten.

Fishkeeping handbooks tell you that it is easy to collect white worm by making a hole in the medium and filling this with porridge, so that all that is necessary then is to remove the worms from the hole the next day. Well, that does not go for me, because with the worms are collected

bits of food which have not been eaten, with the consequent danger of fouling the tanks. It is much better to get a small dish of oven glass or pottery and place in it a good dollop of culture medium complete with worms. Cover it with a saucer and place on the gas or electric stove with the lowest possible heat. 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 collected 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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Living Amphibians of the World by Doris M. Cochran, Hamish Hamilton, London. 199 pages, 220 illustrations, 63s.

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 geislerianus*), which appears like an exceptionally drab 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 photograph of Badgett'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 grass 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 (*Phylllobates 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 fashion themselves. A little Goeldi's frog (*Plectrohyla goeldii*) seems to carry a burden of eggs almost as large as itself on its back and Rohde's leaf frog (*Phyllomedusa rohdei*) is shown mating. A colour print like that of the spotted hylambates (*Hylambates maculata*), 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 text 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 interspersed by accounts of her travels, and we are just allowed to glimpse the lengths to which Dr. Cochran has gone in search of her

quarry. At the end of the book is an encouraging section entitled "How to keep amphibians as pets" (alas, 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 *Gastrotheca marmorata* (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 tail-less amphibians, the newts, salamanders and caecilians.

H.R.B.

Illustrated Dictionary of Tropical Fishes by Hans Frey. 768 pages. Illustrations in line, half-tone and colour. T.F.H. Publications Inc., New Jersey, U.S.A. 65s.

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 main 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 technique 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: "bottom-standing," "emerged," "emissions of sound," "generational change," "new water," "protection of nature," "semisubmerged," "taxies"? 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 formulae in the formulae 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 descendancy (sic) getting always smaller and finally losing its ability to reproduce" (page 117); "In comparison to the generally one-sided nutrition in aquaristics, it has to be stated that, as a rule, the feeding as done by 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 655). The text is turgid with such examples of obscurities, jargon and prolix, 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 AQUARIST

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 gallons 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! He is 5 inches from snout to the base of tail, green-grey in colour with slightly yellowish fins. His 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



Photo:

Common sunfish

Laurence E. Perkins

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 on to the table, and from the table on to 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 fright 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 mating migration.

The specially designed needle for whale use measures nearly 5 1/2 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 gain 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 needles.

(*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 S3. 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.

No. 1 — Common Goldfish

by A. BOARDER

THE common goldfish (*Carrasius 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, so that not only will the beginner be able to recognise them but the serious fancier will be better able to see which fish are nearest to the desired shape etc. and so be worth keeping and breeding from. The Federation of British Aquatic Societies have made standards for exhibiting these fish and they are a very good guide for any aquarist who wishes 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 common goldfish is a sturdy fish with normal-shaped fins, that is with no long tail or flowing finnage. In body shape the fish resembles that of the common carp with a fairly stout body showing a clean curve from the nose 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 laid 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 down-point a common goldfish at a show. The ends of the caudal fin should be nicely rounded.

The colour of 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

favoured by the majority of judges, and rightly so. Few fish can be found to compare favourably with a 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 a 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 recognised 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 meats as offered for cats and dogs can be used. For live foods there is a good choice. The garden worm is excellent, then the following can be given when procurable: white worms, *Tubifex*, maggots, water fleas (*Daphnia*), mosquito larvae, or dead flies etc.

When considering whether a fish is worth 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 "snouty" look. A hollow belly 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 almost equal amounts of red and silver. The eyes should be normal and show no signs of protruding. The fish must be scaled, which means that they should show all the body well covered with hard horny scales. If one or two scales are missing the fish could lose a few points but 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.

The next goldfish to be described will be the comet.

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 then, 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 metal. 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



Brine shrimp nauplius

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 uneaten, 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.



Photo:

Love me, love my fish

F. J. Burchett

Aphanius 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 is so 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. by 12 in. tank, rather heavily planted with *Ambulia*, 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 76°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 is 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 have already suffered a drop in temperature of 30°F through a heater failure without loss.

R. A. Thomas

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 Oligochaeta. 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

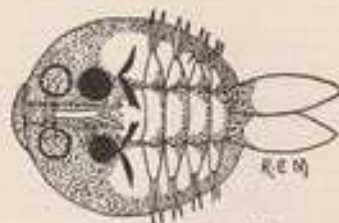
The correct procedure is this; as soon as the worms have been extracted from the earth they should be placed in glass jars for an hour or so (without soil or a filling of any kind), where they will lose their mucous covering and evacuate their intestine. Only after these operations have been performed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



Argulus (magnified $\times 25$)

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 paint the body of the louse 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.



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

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 maroni*) 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. HADLER,
East Finchley, London, N.2.

IHAVE, I am sorry to say, no marvel 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. HURULA,
Peckham, London, S.E.15.

Our first correspondent was probably thinking of the prohibitions of the *Cruelty to Animals Act, 1876*, which imposes legal restrictions to any "experiment calculated to inflict pain upon a living vertebrate animal". Fishes come within the scope of the Act, as vertebrates, and experimental surgery should therefore be carried out only by a properly 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 (mistakenly or otherwise!) to his fish when fishmongers are permitted to slice living eels and anglers treat fish in the way that they do without restriction. —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 of cloudy water, unfit tanks of fishes, 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-aquarist visitors to identify the fishes.

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

(Mrs.) J. M. RICHARDSON,
Hilshorpe, Nr. Newark, NOTS.

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,
Peel 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.—EDITOR.

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 Bastard writes: The best food for your terrapin is earthworms, or small pieces of raw meat. If feeding with the latter, do not leave any in 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 relish this. Water plants are ideal but failing 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 terrapin in good condition be allowed to hibernate outside provided the pond has a depth of 2 feet. This will ensure that the terrapin 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 wrote an article entitled "American Terrapins" for The Aquarist in August, 1961 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 and another fish was noticed to be rubbing the underside of this fish with its head. A few days later this pair were seen to be chasing 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 after some time about the female being 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.

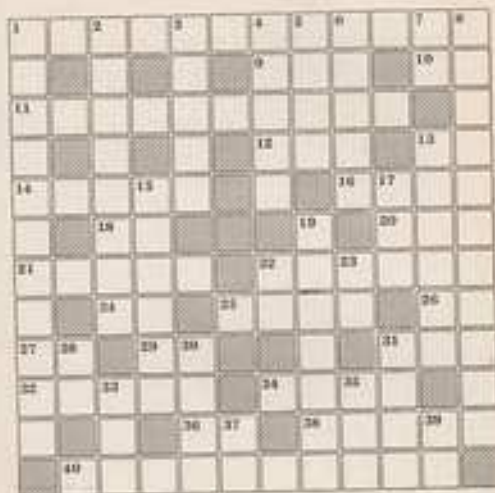
After a couple of days we were very disappointed to find that the fish had eaten all the eggs, but about 2 weeks later the third goldfish was being chased by the male and more eggs were laid. The fish continued to spawn and I saved some eggs by removing the fish from the tank after a spawning on 29th 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 2½ in. long. He thought it to be an unusual experience. Is this so?

(Mrs.) E. CARY,
Chorlton-cum-Hardy, Manchester, 21.

A. Boarder writes: The spawning of your goldfish was a perfectly normal 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 AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1. Fish with two heads or water polo? (7, 5)
2. One way of spelling 19 Down (8)
3. Fish lost its head for this abbreviation of Harold (Chamber's Twentieth Century Dic.) (3)
4. The Spanish (2)
5. Gemine (4)
6. Something very soft in the grey (2)
7. Half of number six's fish is a great luncheon (1, 1)
8. Act (2)
9. Mean jerry tin (7, 3)
10. Place mark on head of Epiplatys (1, 1)
11. Suitable name for headless goldfish (7)
12. Tail (3)
13. Nonsense (2)
14. Drop the fat gently into the water in recurring common thanks to make it (5)
15. Automobile in the association for tropical fish (5)
16. Elephant boy (4)
17. That is all right in the tank but do not do it to it (4)
18. You cannot be far out with this answer (2)
19. The French part of Labeaux (2)
20. Cool and gold are this; so may be every position (5)
21. Could be Mr. Dyal or, better, aquarium plant (5)
22. River in a way used for marking sheep (7)
23. Cary family (10)

CLUES DOWN

1. Family that contains fighting fish, gouramis and paradise fish (11)
17. Eggs (3)
2. Having only one shell (8)
18. Six 8 Down (7)
3. Perhaps the greatest spawning fish (5)
19. Cypher of our last king (1, 1)
4. Prober's claw of a crab (7)
20. Nappers (1, 1)
5. No danger; it's temperature system in tropical sea (4)
21. Cool rises to the captain and drops a penny (1, 1)
6. Body man (5)
22. To the aquarist this means a male and a female fish (4)
7. English fish (1, 1)
23. Hunt sea fish that follows the sandline and pitted thasin (9)
8. With 19 Down a tropical fish is colour this month (5-6, 7)
24. Any answer for this (3)
9. Dish of small fishes from Italy (6)
25. You may make this at your aquarist society's auction (9)
10. Crab in a certain condition; no hard shell (8)
26. Uster (1, 1)
11. Eucalyptus (2)

(Solution on page 220)



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 Erith and District A.S. was well attended despite the weather. The Chairman (Mr. E. Quirk) in his remarks said that the Society had enjoyed yet another successful year. However he gave warning that more effort and enthusiasm will be necessary in 1962 if the expansion and success are to continue. Officers for 1962 are—Chairman, E. Quirk; Treasurer, D. J. Cooper; Secretary, J. Mercer, 83, Northale Road, Plumstead, S.E.24.

The Society still meets at the Congregational Hall, Bexleyheath, on the first and third Wednesdays of every month. The meetings start at 8 p.m. and a welcome will await anybody who cares to come along.

THE monthly meeting for January of the East of Fife A.S. will be held on the 15th inst. in the Birkdale Sports Club, Leven, at 7.30 p.m. The date for the table show is in March.

Recently Mr. A. Nimmo acted as delegate at the meeting held in the Kirkcaldy Aquarist Society Clubrooms to draw up the date and venue for this year's Inter-Club meetings, and they are as follows— 8th February, Duncalmuir, Swinhin, Dwarf Gobbles, Baris, Barbour, 13th May, Allow, Melodie, Large Gobbles, Pigstern, W.C.M.M. Breeders class (Jury), 26th August, East of Fife; Plates, Toothbrush, Conisburgh, Dundee, 4th November, Kirkcaldy; Cupwinners, Glen, Chirnside, A.G.V. Breeders class (Table). A breeders class is to be introduced in May. Entries can be exhibited in jars. Standard jars for normal sized fish and large-sided jars for the larger species. Details can be had from the secretary. Arrangements have been made for an Inter-Club Show with the Alloa Aquarist Society to be held in the Birkdale Sports Club, Leven, on Sunday, 28th January at 2 p.m.

AMONG the forthcoming events of the Merseside Aquarist Society will be a show to see the films shown by Mr. Mason Smith of Cambridge. This meeting will take place on 8th February, when all local Societies will be invited. At the last meeting the Show Secretary stated that the recent Table Show had been a resounding success. It was agreed that the Society should issue a challenge to any Society within a radius of fifty miles, to compete in a Table Show (and quiz if desired) and to offer a return match to any interested Societies.

AT the December meeting of the Cambridge and District A.S., a table show for first-timers was the main feature of the evening, all members participating in the judging. A discussion took place between members on particular points of the different entries, and while the points were being handled, new members and beginners were invited to ask questions of the "old hands" or present any problem with which they were faced, and while ready-made solutions were not guaranteed, it was thought that much advice and help was available. Mr. Bailey's Red Blooded took first prize with 73 per cent.

THE annual general meeting of the Hounslow and District A.S. was held recently when the new officers were elected for 1962 as follows—Secretary, Mr. D. Woodward, 24, Elmfield

Road, Hounslow. Chairman, Mr. Barber; Treasurer, Mr. Luff; Show Secretary, Mr. Pratt; Press Secretary, Mr. Booth; Librarian, Mr. Patrick; Public Relations, Mr. Willis; Committee members, Mr. Woodhead (senior) and Mr. Nettleton. A very successful year was reported by the Secretary, and the most successful member was Mr. H. Pratt who won the following classes, Characin, Coldwater, Livebearer, A.O.V., Labryrinth, Best Fish of the Year, Highest points (185); Mr. Giles won Barbs; Mr. Woodhead the Breeders and Mr. Barber, Home Freshwater Aquaria; Mister Coley, Highest Junior Points (47). The meetings of the society are held at the Labour Rooms, 20, Heath Road, Hounslow, on Wednesdays fortnightly.

AMONG the recent activities of the Drewsbury and District A.S. have been a microscope night at which members were able to use instruments brought by two fellow members. Several specimens of pond water, tank water, Infusoria, algae, etc., were viewed. The society also took part in a three-cornered quiz and table show with the Skipton and Bradford Societies. While the Drewsbury Society did not gain a first place, all members present agreed that the event was very interesting and enjoyable. At home, the Society held a quiz on fish-keeping and general aquatic knowledge, the questions being set by the

President, David Crowther, with the Vice-President acting as question master. Arrangements have been made for the Society's Annual Dinner to be held once again in the Prospect Hall, Clackhame, on January 18th, 1962.

AT the annual general meeting of the Alreborough and District A.S., Mr. W. Roberts, Chairman, opened the meeting by discussing the activities of the society during the last year. He also expressed appreciation for the help and support given by the Bradford and District Aquarist Society and especially to Mr. and Mrs. J. Skinner, for their advice during the first year as a society. The result of the election of Officers for 1962 was as follows—Chairman, Mr. W. Roberts; Treasurer, Mr. J. T. Senior; Show Secretary, Mr. J. Myers; Librarian, Mr. P. Birch; Publicity Officer, Mr. B. Wade; Secretary, Mr. B. Armstrong; U.S. Charter Secret, Harford. Elected to the Committee were Mr. Lawson, Mr. Thompson, Mr. J. K. B. Yeaman. The winner of the year's table shows was: 1, Mr. B. Wade, 11 points; 2, Mr. H. Myers, 9 points; 3, Mr. Lawson, 8 points. A plaque will be presented to Mr. B. Wade. The Society welcomes new members for the New Year and if they will get in touch with the Secretary full particulars will be sent.

INCLUDED in recent meetings of the Blackwood and Fyde A.S. has been a discussion on Marine Aquarists and also a visit to Rosall Beach in order to collect specimens for salt water aquaria.

Mr. G. N. Hadley, Vice-President, reported considerable success with his marine aquaria before speaking to the meeting about "Getting up a Freshwater Aquarium". This was followed by a number of coloured films illustrating beautiful under-water colour arrangements. Later at this meeting an Auction was held of equipment surplus to requirements which was disposed of at give-away prices to members. The following table shows final results as now available for 1961. Singleton Trophy: 1, Mr. B. Simmons (31 points); 2, Mr. B. Dene (24 points); 3, Mr. G. Gower (15 points); 4, Mr. H. Barnes (12 points). Junior Single Fish Trophy: 1, Bryan Crowther (34 points); 2, Neil O'Hare (28 points); 3, Kenneth Silverwood (22 points); 4, John Kilgour (14 points). Robbison Trophy Final: 1, Mr. B. Simmons (14 points); 2, Mr. B. Dene (11 points); 3, Mr. G. Gower (9 points); 4, Mr. J. Fisher (9 points). Junior Plate of Fish Trophy: 1, John Kilgour (8 points); 2, Bryan Crowther (9 points); 3, Neil O'Hare (7 points); 4, J. Widdell (5 points). Legge Trophy (Breedery): 1, Mr. B. Simmons (25 points); 2, Mr. B. Dene (23 points); 3, Mr. E. Williams (4 points). Junior Breeders Trophy: 1, Bryan Crowther (10 points); 2, Kenneth Silverwood (9 points); 3, Neil O'Hare (7 points); 4, Terence Harrap (4 points).

AT the Stroud and District A.S. recent annual general meeting, the following officers and officials were elected: President, Alderman L. Moulden; Chairman, Mr. B. Hewlett; Vice-Chairman, Mr. L. Griffiths; Secretary, Mr. W. G. Gray; J. John Dunning Way, Churchdown, Glou.; Treasurer, Mr. T. Arton; Committee Members, Messrs. F. Doherty, A. Hainbridge, R. Isaac. The Society has been fortunate in obtaining new meeting rooms in the Science Laboratory of the New Archway Secondary Modern School, Pagford, Nr. Stroud, where they meet the first Tuesday in the month at 7.30 p.m. Meetings for the forthcoming year include 10m and slide shows, lectures and table shows. 1961 was a very successful year and resulted in the club passing two awards for furnished aquaria in open show and several members gaining best in classes.

At the December meeting a very interesting talk was given by Mr. B. James of Chichester. The subject being sculpin and amphipods which was very well illustrated with live or preserved specimens of sculpin, minnow, perch, trout and terrapin. Mr. B. James was able to give first hand information, having travelled in the Middle and Far East. A raffle kindly donated by Mr. F. Doherty was won by Mr. B. Sutton of Chichester. The Society's annual



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