

The AQUARIST AND PONDKEEPER

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H. Welter

A type of barrow vendor not seen in Britain—an itinerant aquatic trader of Tokyo with some young customers (picture from the Swedish journal *Akvariet*)

VOL. XIX No. 9

1954

Editorial

AN item of news from show business which attracted our interest last month concerned preparations being made for a London "ice pantomime." In this show chorus girls are to wear, on the ice, costumes portraying tropical fishes, the colourful fish "skins" being stretched over copper wire frames and carried by their human mechanism. Angel fish, pompadour fish and Siamese fighters are reported to be the types on which the designs have been based, and the use of this last word may mean that aquarists will be disappointed if they go to the show looking only for accurate piscine representation. The general idea of fishy costumes is, however, worthy of further examination by aquarists.

As the festive season approaches, adoption of the idea might be made by societies planning social activities for members. Thoughts of an aquarists' ball in which all would attend disguised in the form of the fish of individual choice promote exotic visions of an enormous and grotesque community aquarium with, perhaps, some strange partnerships. There is fanciful fun to be had, too, in allocating fish species to fellow aquarists according to their personalities, though it is advisable that this is done only in imagination. Without a doubt, some names of fishes, to say nothing of their forms and habits, are more flattering than others. Could this be why the pantomime producers have preferred to simulate rather than imitate, we wonder?

WE thought that we knew all the world's periodicals covering similar interests to our own, but *The Junior Goldfish Keepers' Weekly* is one that has not come our way. It has been listed by the *Radio Times* as the provider of the script material for Mr. Tony Hancock in his radio feature "Hancock's Half-hour," and to judge from the first two broadcasts in the series the *Weekly* must make entertaining reading. Not what the reader would have a right to expect from the title, but entertaining, very!

Microscopy for the Aquarist-3 *by C. E. C. COLE*

VIBRATION is one of the greatest enemies of the microscopist, and everything possible is done by reliable manufacturers to ensure the rigidity of their instruments. A firm stand is of paramount importance, but is of no use if placed upon a rickety table—a point to be remembered whenever you wish to use your microscope.

The stand or base of the modern microscope is almost invariably of the horseshoe type—see diagram A. Many of older vintage have a tripod stand—diagram B. The horseshoe shape take up less room than the tripods, but apart from this there is little to choose between them from the operational point of view. At the top of the stand there is usually a hinge joint, which enables the microscope working parts to be fixed at any convenient angle for working. Aquarists buying an instrument would be well advised to invest in one with a hinge joint rather than in the few models which are permanently fixed, either vertically or at an angle.

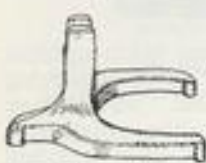


Diagram A

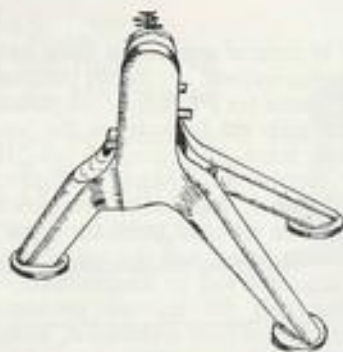


Diagram B

Types of base usually found on microscopes

The "working parts" referred to above consist primarily of a platform (called the stage) upon which to place the object to be examined, a mirror to throw light upon the object, and lenses in a tube to magnify the object. The platform may be of several patterns, but basically consists of a substantial metal plate with a hole in the middle. Upon either side of the hole metal spring clips are rivetted or screwed in. These are provided to hold microscope slides or slips of glass of similar size (usually 3 ins. by 1 in.), in the desired position over the hole in the platform.

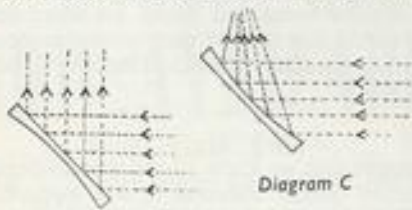
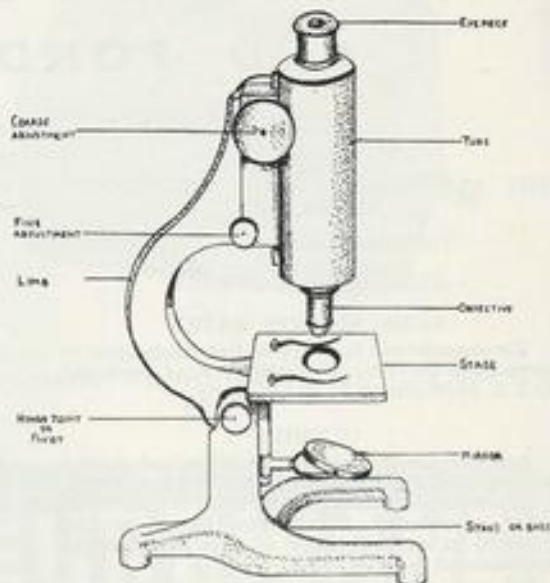


Diagram C

On the left the plane surface of the mirror (in section) is keeping rays of light parallel. The concave surface (right) concentrates the light rays

Accessories used below the stage are called sub-stage apparatus. The only sub-stage fundamental requirement we need to mention right now is the mirror. This will be found to be a double one—one surface being a plane, flat



Parts of the compound microscope

mirror, and the other a concave one. This latter has the function of concentrating all light rays which strike its surface into an extremely small area—diagram C. Either surface can be used at will by simply pivoting the mirror round. Distance from the object to be examined can be varied by sliding the mirror up or down the tube upon which it is fixed.

The tube into which the lenses are fixed may be long or short, again according to the age of the microscope. It is many years now since English manufacturers changed from a length of 250 mm. (ten inches) to one of 160 mm. (the "Continental" length). Tube length has a bearing upon the performance of the instrument, and will be discussed more fully in a later article. The lens at the bottom of the tube will be screwed into it, but the one at the top will be a sliding fit, easily and quickly changed if desired. The tube will be raised from or lowered towards the platform by means of a ratchet, operated by turning a pair of wheels with milled edges. In addition there is usually a second wheel, or a pair, smaller than those just mentioned, which are capable of moving the tube very slowly for an extremely short distance up or down. The purpose of this will be discussed next month, when we start operating the simple instrument described above.

Live Coelacanth Caught

PARIS, November 13.—A coelacanth was caught alive last night in the Comoro archipelago, the French Press Agency reported to-night from Antananarivo, the Madagascan capital.

Several specimens of this primitive "fish," considered an important link in the evolution of mammals, have been caught previously, all off the Comoro islands, but this is the first one to survive capture.—Reuter (*The Observer*).

Heredity in Fishes with Crooked Spines

by Dr. MYRON GORDON
(Geneticist, New York Zoological Society)

ANYONE who has observed the growth of a thousand or more fishes from birth to maturity has also observed some deformed specimens. The commonest abnormality is some form of twisted spinal column. I found one in a platyfish that was so striking that I wrote a story about it for an aquarium magazine some years ago. Since that time I have seen a number in the platyfish, while others have reported them in the guppy and other species.

My short life history of a platyfish with a crooked spine, in part was as follows. As a tiny fish, the little hunchback attracted my attention because it swam differently from its brothers and sisters. Between head and tail a part was either missing or mis-arranged. It seemed as if only half a fish was in motion. The little crooked-spined fish was alert and at feeding time it always got its share. While its brothers and sisters grew much in length and some in width, this part cripple grew only a little in length but much in width. It grew to be a stocky, rotund, roly-poly sort of fish. It seemed as if nature had compressed it together head to tail and sprung its spinal column into a short coil. In addition to its telescoped appearance I noticed that this fish had a single round black mark (one-spot) just in front of the tail. When a normal, pure-bred, one-spot platyfish is mated to another that lacks this mark, all the

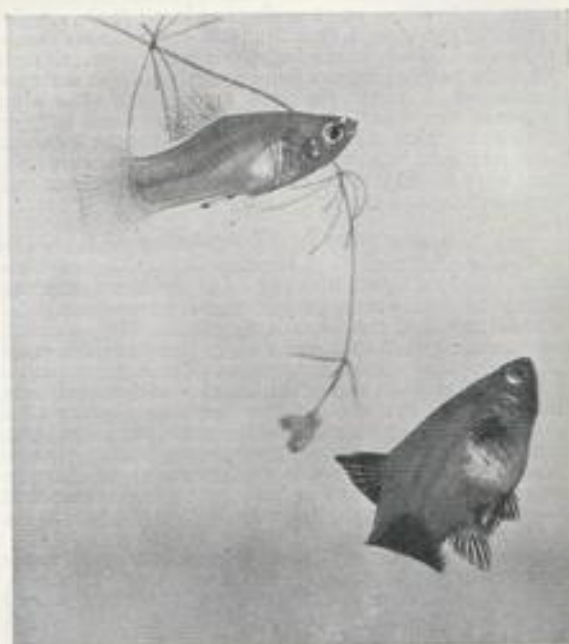


Photo: Sam Dunton (N.Y. Zoological Society)

Lower member of this pair of platys swims constantly in a circular path owing to spinal deformity. The pair produced over 200 normal young. (The plant is *Nitella* and shows the fruiting body at the tip of one filament)



Photo: Myron Gordon

The spine of this hunchback platy is twisted into a coil. A black spot near the tail is the inherited colour pattern known as "one spot"

young are born with this tell-tale spot. When I grew the one-spot young of the first generation to maturity and mated them to members of their own brood, a count of the second generation fishes revealed three times as many one-spot platyfish as fish without this mark. The one-spot hereditary character was referred to a dominant hereditary factor, *O*.

Because this fish had the easily recognisable heritable one-spot colour pattern and because of its spinal deformity, I planned a breeding test to discover if these two characters would appear together in the young of the next generation.

The one-spot platyfish hunchback, notwithstanding its crooked shape, developed into a healthy, fertile female and I mated it to a normal unspotted male. A large brood of 64 fish was born. All of them showed the one-spot pattern but only one of them was a hunchback. I found that the occurrence of a single fish with a twisted spine was difficult to explain in terms of heredity.

Later I mated this same telescoped one-spotted female to a hunchback black platy male, but the abnormality was not quite as great in the latter. From this second mating, 70 young were born. Not a single one showed the slightest spinal deformity. The black pattern was displayed by 38 fishes, which indicated that this character is inherited, but the male was not true-breeding for the black trait. 38 of the non-black fishes showed their one-spot pattern clearly. All 70 would have shown the one-spot pattern but it was covered over in the black-patterned ones. These results show again that one-spot and black colour patterns are clearly inherited, but the spinal deformity, if inherited at all, was inherited in a different manner.

Sometimes a hereditary character skips a generation because it is recessive and reappears in the next. To check the possibility that the spinal abnormality was a recessive character, I mated the two normal one-spot offspring which were descendants of deformed parents. In the first brood of 24 only one was a hunchback. In the second brood of 33, all were normal. If it were a simple recessive hereditary trait there should have been about one-fourth of them, or about 14, hunchbacks. The influence of heredity was demonstrated but not in a precise manner.

What other explanations may account for deformities in fishes? Biologists have taken fertilised eggs of fishes, like those from the killifish, *Fundulus*, and subjected them to various kinds of abnormal conditions to find out the influence of the environment on their development. If the oxygen content of the water in which the fish embryos were developing was reduced to a sub-lethal level their growth stopped. When the normal oxygen supply was restored, the embryos resumed their growth and some hatched out. But what monsters they were! Some of them were fused belly to belly all along the line like piscine Siamese twins. Others were even more intimately fused—only the heads were free; they were double-headed monsters. Others had but one eye—cyclopean monsters.

Monsters by Manipulation

The late Professor C. R. Stockard of the Cornell University Medical School found he could obtain monstrosities by reducing the temperatures of the water during the critical period of their embryonic growth. Or, chemical substances normal to the water when altered or when other chemicals were substituted, produced somewhat similar abnormalities. Dr. Marie Henrichs showed by experiments that double-headed fish monsters result when young killifishes are treated with abnormal doses of ultra-violet light. Curiously enough, shortage of food alone is seldom responsible for monstrosities because the embryos usually have an adequate supply of food in the yolk, but environmental forces which prevent their getting at the available food are responsible.

Some of the various physical abnormalities in fishes occasionally occur in nature. I caught one by seining in southern Mexico in a pool near the Rio Tonto. Among many large, beautiful yellow-tailed swordtails (*Xiphophorus helleri*) that bounced about in one of our seine hauls, there was one that was decidedly foreshortened because its backbone was twisted out of shape. Together with other swordtails and many platyfishes, they were taken alive and shipped 3,000 miles north to the Genetics Laboratory, then in Cornell University, Ithaca, New York. Curiously enough, long after most of the native Mexican fishes had passed away, the twisted swordtail continued to weave its devious path in its aquarium. None of its young were abnormal.

In 1934, when I wrote my first story on hunchback fishes I was unaware that four years before, Tatsuo Aida, a Japanese geneticist, had described a somewhat similar spinal abnormality in the medaka. He called it "wavy," in reference to its up and down body outline that was created by the undulatory curvature of the spine. When Aida mated a "wavy" to a normal medaka he obtained normal fish. When he inbred the normal members of the first generation he obtained 1,528 normal to 469 "wavy" medakas. On the basis of a three to one ratio expected in the second generation he should have obtained 1,498 normal to 499 "wavies." This result showed a small deficiency of "wavies," which Aida explained by saying that the abnormal fish were weaker than the normals. One could assume, on the basis of his data, that "wavy" was a simple Mendelian recessive trait—but when he mated two "wavies" together he obtained one normal out of 80 "wavies." One would expect to get no normals from the mating of two recessives.

Aida found a second type of spinal abnormality in his medakas which he called "fused," because in some fish the vertebrae grew together. Scientists often refer to this condition as *ankylosis*. In consequence of the fusion of the vertebrae the body of the fish is shortened, sometimes radically so, making it appear like a dwarf. When such a dwarf was mated to a normal medaka, Aida obtained 3,212 normal and 988 fused fish in the second generation. On the basis of the three to one ratio expected, he should have



Photo:

Sam Dunton (N.Y. Zoological Society)

"Twisted" guppies bred by H. Rosenthal in America

obtained 3,150 normal and 1,050 fused. Again the discrepancy, though not great, was explained on the basis of the fact that the deformed fish were much weaker than the normal. As in the case of the "wavy" medakas, Aida found that when he inbred two fused fish he obtained a single exceptional normal in a total brood of 70 fused young. The best conclusion that may be made on the basis of all the evidence is that fused is, like "wavy," a simple Mendelian recessive trait.

Russian Investigations

Like olden kings who maintained human monstrosities as jesters in their royal court, aquarists in their small domain have maintained distorted aquarium fishes as curiosities. Either through pity or fascination they have cared for and reared little cripples of many species, such as guppies, platys, swordtails, danios, tetras and others. Geneticists, for other reasons, have been curious to learn if these abnormalities are inherited or whether they are brought about by developmental errors imposed upon growing embryos by adverse environmental influences such as intolerable temperatures, deficiencies of oxygen or by chemicals. The influence of heredity in their causation is unmistakable in some species. First studied in medakas in Japan, then in platys in Ithaca, New York, spinal deformities have also been studied in guppies in Moscow. This was reported in 1935 by W. Kirpichnikov, who was a member of the Institute of Experimental Biology and Research Institute of Pond Fisheries. In those happier days the Russian geneticists were in harmony with their genetic colleagues all over the world, using the same Mendelian terms and using the same Mendelian principles of inheritance in explaining their results. Kirpichnikov discovered two kinds of spinal abnormalities in the guppy which were similar to those found in medakas. Only his names for the deformities were different. The Russian geneticist's "abnormis" seems to be equivalent to Aida's "fused," and his "curvatus" similar to "wavy."

Still later, in 1943, spinal defects in the guppy were studied genetically in Middletown, Connecticut, by H. B. Goodrich and his associates. Seven years later, the Rosenthals in New Jersey, now in Louisiana, described an inherited condition of "lordosis" (a forward curvature of the spine) in the same species. All believe that the abnormal trait is, for the most part, definitely influenced by heredity.



ALTHOUGH Messrs. Bernard and Arthur Deamer are best-known collectively as the Deamer Brothers in tropical fish-keeping circles, it was Bernard alone whom I interviewed recently. Arthur's absence was due to National Service, which has called him to the Suez Canal Zone where, I gather, he pursues his interest in tropical fish with an avidity equalling his brother's, the essential difference being that he is able to study some of the indigenous species *in situ*.

The brothers first took up the hobby some four years ago and later joined the Lambeth Aquarist Society. In the comparatively short time since their introduction to fish-keeping, a large and varied stock has been accumulated, together with a most impressive array of trophies and other awards. This year's N.A.S. show secured for the brothers a first, second and fourth award for platys and a third for a black mollie. The recent fine show staged by the Lambeth Aquarist Society brought them six firsts (for *Aphyosemion bivittatum*, *Corydoras aeneus*, tiger barbs, *Pristella riddlei*, black mollie and harlequin), five seconds and four thirds, with an award for the best fish in the show (*A. bivittatum*).

All the stock is kept in a fish-house measuring 14 feet by 6 feet by 7 feet high, which is double-glazed throughout and stands upon a two feet high brick base. The 29 tanks of mixed sizes are all fitted with light-shades but the lighting is used only for inspection of the fish and during the winter months. Exterior base-heating of all tanks, providing a universal temperature of 75°F., constitutes the heating system, which can be augmented, in the event of extreme weather conditions, with oil stoves. Advocating a diet of *Daphnia* and mosquito larvae, with white worms and Bemax during winter months, Mr. Deamer was emphatic in his dislike of dried food for young tropicals, and added a

AQUARIST AT HOME :

Messrs. B. & A. Deamer

(WEST NORWOOD, LONDON)

Interviewed and photographed

by LAURENCE E. PERKINS

recommendation for daylight as an essential adjunct to success with livebearers and a conducive element to the well-being of all tropicals.

The present stock flourishing in the Deamers' fish-house comprises: 11 varieties of barbs including *B. stoliczkanus*, 12 varieties of characins among which is *Phenacogrammus interruptus*, four varieties of gourami, three varieties of livebearers, eight varieties of catfish and loaches including *Botia*, and five varieties of tooth carps, of which *A. bivittatum* and *A. australe* are worthy of mention. Of the foregoing, successful breeding has been achieved with: ticto, chequer, tiger and rosy barbs, *A. bivittatum*, *Rivulus cylindraceus*, black mollies, moon platys, dwarf and thick-lipped gouramis and white cloud mountain minnows.

The most striking feature of the fish-house which immediately confronts the visitor is a tank measuring 4 feet



In the upper picture Mr. Bernard Deamer is seen feeding marbled cichlids in his fish-house, and the fish are seen rising to the food in the picture above

by 18 ins. by 15 ins., which contains four extremely handsome seven to eight inches long specimens of the marbled cichlid (*Astronotus ocellatus*) which, at an age of 20 months, have been reared from four-week-old youngsters of about $\frac{1}{4}$ in. in length. Commencing on a diet of *Daphnia*, white worms and raw fish for the first three months, they were then fed upon young minnows and livebearers for the next two months, when gentles and crushed aquatic snails were substituted. This was followed by raw meat and freshly-killed pigeon, the latter being provided by Mr. Deamer's father, who is a very keen pigeon-fancier and who periodically thins out his stock in the quest for superior homers.

I watched these beautiful fish being fed on ramshorn snails, which they crunched most audibly and with evident relish, and I was told that they now subsist on these, large garden worms chopped into four and great diving beetles (*Dytiscus marginalis*), which last are eaten in their entirety with the exception of the elytrae. The rearing of these fish is no mean achievement in view of limited space and

accommodation and Mr. Deamer attributes his success to constant aeration from two air lifts and the periodic introduction of rock-salt when renewing the water. Wistfully expressing a desire to breed from these marbled cichlids, Mr. Deamer said that it wasn't a practical possibility with the limited space available.

Freedom from disease has, hitherto, accompanied the brothers' enterprise and they have suffered only from one outbreak of white spot, which was successfully cured by adding sea-salt to the water and slightly raising the temperature. The brothers are both very keen club-members and Bernard, in saying how much he and Arthur were indebted to the Lambeth Aquarist Society for increasing their knowledge of fish-keeping, recommended anyone with an interest in aquaria to join their local club, membership of which would not only assist them in their endeavours and maintain their interest, but keep them abreast with the progress of others and create a competitive spirit which induces a desire for higher quality.

In the Water Garden in DECEMBER by Astilbes

THIS month should be a quiet one for the pond-keeper but much will depend on the weather. Last year there was hardly a frost to worry over the whole month of December, but we never know what is in for us! The weather can change so rapidly that a drop of 20 degrees can be experienced over-night. The freezing over of the pond has been dealt with in previous articles.

Now is the time to plan any improvements to the pond to be made when work is possible. If any concrete work is to be carried out this can be done quite safely during the winter months as long as it is not done during an actual freeze up. Concrete will often harden better in the cold weather, as it then takes longer to set and is always harder than if quickly dried. An extension of the pond may be visualised, and if so this can be planned out or even started now. Where a pond is in existence it may be possible to make another adjoining, either to be connected by a small channel or to be separate but quite close. This extra pond can be used for bog plants, and these can be so planted near the existing pond that they soon become established and reach the old pond edge, when the effect will be a very good one.

If you have a part near your pond where the water overflows when heavy rains occur this would be the ideal position for the new bog garden. It may be necessary to dig out a fair depth of soil so that at least three inches of concrete can be placed in the base. The water depth need not be more than a foot, but if less will tend to warm up too quickly in the summer and may dry up. For this bog garden some of the soil can be returned after the pond has been completed if it is not intended to keep fish in this shallow pond. The pond should not be formal in shape but will look much better constructed in a natural form. Where the new part may be used for breeding purposes it would be well to refrain from placing any soil in the bottom but to rely entirely on water-plant pots when introducing the plants. If you wish to have a water connecting channel from the old pond to the new part you must be very careful where the junction is made. It will be found rather difficult to get the edges of the new concrete to join up with the old. In such cases it is well to try to continue some of the new concrete over and into the old pond so that there is a good chance of avoiding a leak at this spot.

Where a pond has been constructed with deep straight sides it will be difficult to get some of the more shallow-loving subjects to become established. I have described how pots of plants can be raised on bricks, etc., so that the plants are brought up nearer the surface of the water.

If this plan is not liked it may be possible to construct some pockets on the sides of the pond about a foot from the top. Of course it will be necessary to lower the level of the water for a couple of days to do this. Where such pockets are made it must be realised that as the water plants will be planted directly into them it will be difficult to remove them when cleaning out the pond. This need not matter however, as it may be possible to clean out the main part of the pond and leave the pocket plants in position whilst doing so.

The pond can be filled up to its old level about two days after the pockets have been made. There need be little fear of harmful effects to fish from the fresh concrete unless the pond is a very small one and the amount of concrete used considerable. The small amount of free lime from the cement should not be sufficient to do any harm. Any new plants must not be introduced until the spring, but it may be a good plan to get the pockets made now when you have less tasks waiting to be done.

Do not worry if most of your oxygenating plants disappear as the weather gets colder. They will shoot again in the spring and soon make a brave show. Such plants as *Ceratophyllum demersum* will almost sink into the mud at the bottom of the pond. These plants appear to form a hardened top to the stem, which then drops to the bottom to remain dormant until the warmer weather comes. In the spring these horn-like shoots will start to grow and soon appear once more in the water. Having no roots this water plant is an ideal one for the fish breeder as he is able to take bunches of the plant from the pond with eggs for hatching elsewhere in the knowledge that the plants will not die for lack of roots. Such floating plants as the duck weeds (*Lemna minor*, *L. gibba* and *L. trilineata*) may almost disappear from your pond for the winter but many seeds may have been produced which drop to the bottom to germinate in the spring and start a new colony.

Post-Mortem Examination of Fishes:

W. Harold Cotton, F.R.M.S., F.Z.S., 39, Brook Lane, King's Heath, Birmingham, 14. (Phone: Highbury 1603)

Specimens should be sent direct to Mr. Cotton with full particulars of circumstances, and a fee of 3s.

It is important that the following method of packing fish be adopted: Wrap fish, very wet, and loosely in grease proof paper and then in wet cloth. Re-wrap in grease proof or wax paper and pack around with cotton wool in tin box. Dispatch as soon as possible after death, with brief history of aquarium or pond conditions.

AQUARIST'S Notebook



by
RAYMOND YATES

PUBLIC aquaria cannot always survive and some have disappeared for good, such as the Victorian era aquarium at Alexandra Park, Manchester, and the more recent closures at New Brighton and Liverpool, the latter due to enemy action. The reverse of the medal is the wonderful new aquarium at South Bank, London. Many northern aquarists will have taken the opportunity to look in at South Bank this summer (perhaps to escape the rain) and they must have found this new venture even better than they had imagined. It is certainly completely new in layout, modern in design and sets a standard higher than one would expect. The curator (Mr. Eric Bowler) is to be congratulated on much that is original, and on a very pleasing and satisfying display. There are approximately 120 tanks of varying sizes, and as far as possible only one species of fish has been put in a tank, apart from *Corydoras* for scavenging purposes.

Some tanks have large numbers of a single variety, as, for example, one which contains about a hundred full-grown neons and another a similar number of glowlights, whilst yet another contained harlequins. Other interesting fish on view when I was there, were *Pelmatochromis kribensis*, the comb tail (*Belontiina signata*), small discus, *Dorimitor maculatus*, very large puffers and, of course, the piranha. The colour displayed by specimens of *Rasbora maculata*, cherry barbs and Australian rainbows was about the most intense I have ever seen for these fish. On the other hand some of the less common varieties on view were less colourful than as they are usually shown in coloured plates in aquarium literature—in particular, the keyhole cichlid (*C. marouli*), the small discus (only large discus show the colours depicted in Wm. T. Innes' book), and *Rhodostomus*, the red nose of which is generally too washed out to make the fish look colourful.

The plants are relatively few in number but are good, and there is little evidence of blue-green algae. The two large show tanks in the centre contained fully grown giant danios with thousands of young (less than a week old) with no evidence of cannibalism. These tanks have very shallow water but an abundance of tropical plant life above the water. Mr. Bowler told me of the difficulties they had had with their tubular lighting at first, when the plants simply



Photo:

Laurence E. Perkins

The piranha (*Serrasalminus spilopleura*) at the London Aquarium looks as ferocious as it is reputed to be

wouldn't grow, but that is a difficulty no longer. Some clubs have organised visits to this aquarium and all reports I hear tell of very well satisfied members. Special rates apply to parties. The admission fee has been reduced since the aquarium first opened. Refreshments can be obtained on the premises. A visit to this aquarium is a must to any aquarist worthy of the name visiting London. It is easily found, being only a few yards from the Royal Festival Hall.

At the main railway stations in London and the larger provincial cities, steel "left luggage" lockers are provided for the convenience of travellers. One inserts 6d. in the slot and is provided with a key to a rather large locker for 24 hours. I wondered if these would be any use for leaving cans of tropical fish whilst waiting for connections or transacting other business in the town. Carrying cans of fish around is a great nuisance even in warm weather and it would be handy if they could just be stowed away for an hour or so without risk. Unfortunately, these rail lockers are unsuitable when using uninsulated fish cans, even when the can is stood on several thicknesses of newspaper. The entire locker unit (40 or 50 lockers) is a very cold unit indeed, and the temperature of the water in the cans is rapidly reduced, even in summer. It is a pity, but these lockers can only be recommended for insulated (Thermos) jars, where no loss of heat results.

Aquarist wallpaper is something of a novelty and the first I have seen in this respect has recently been issued by the Crown Wallpaper Co. Ltd., of Manchester, for export to the U.S.A. This is sold as washable and fadeproof and is rather expensive, being \$3.75 per single roll, or 12 cents a yard (at current rates of exchange the dollar is worth about seven shillings). The design shows zebras, angels, fighters, and an unknown variety swimming in the midst of varied plants against a silver background. The trade name of this paper is "Lancastria" (title "Ocean Playground"), pattern number 4217, decoration number B.4217, if any reader is interested. Plastic sheets with aquatic designs are now fairly common and curtains of this material are becoming quite popular. Some of the better known chain stores stock some aquatic designs and the price averages 3s. 6d. to 4s. 6d. per yard according to the width of the material. It is attractive, easy to keep clean, and quite long lasting.

Those fishkeepers who have a good public library within easy reach no doubt make good use of the facilities available. It is possible, however, that they may not know of all the books of aquatic interest at their disposal because few people take the trouble to look up the name of every book they are anxious to read in the library index cabinet. The librarians of some of these libraries are not aquarists and can be forgiven if they wrongly classify aquarium books on occasion. Some time ago I spent a wet afternoon looking through the shelves of just such a public library and I was surprised to find the headings under which certain books were indexed, viz.:—"Natural History": *Tropical Fishes as Pets*; *The Aquarium Book*; *Tropical Aquariums*.

"Gardening and Housecraft": *Aquariums*; 1,001 *Questions and Answers*; *Breeding the Egglayers*; *Freshwater*

Tropical Aquarium Fishes; Tropical Fish as a Hobby.

"New Books": *Tropical Fish in the Home; Breeding the Livebearers; Indoor Aquaria.*

"Biology": *Freshwater Life of the British Isles; The Sea Around Us; A Study of Fishes.*

From the foregoing it will be seen that every possible heading under which aquarium books might be classified should be looked through, and one must not put too fine a point on the differences between biology and natural history. I have also found aquarium books under the headings for "Hobbies," "Sports and Pastimes," and "Books for Young People."

Some of the finest photographs in colour of popular tropicals were taken about 20 years ago and these appeared in the January, 1934, issue of the *National Geographic Magazine* (published in U.S.A.). Any club in a position to refer to back volumes of this magazine will find this issue well worth the trouble of looking up. The colour photos include the Australian blue-eye (*Pseudomugil signifer*), *Neolebias ansorgi*, kuhli loach, blue gularis, *Panchax playfairi*, dwarf gourami, harlequins, archer fish, *Mecynnis roosevelti*, fighters, *Barbus everetti*, bloodfins, ulrey barbs, *Nannostomus trifasciatus*, discus fish, *Cichlasoma severum*, jewel fish, hatchet fish and *Ambassis lala*.

It is common knowledge in the hobby that tapping on glass and the like is detrimental to the fish and that some fish are more susceptible to shock than others. Catching and transferring fish is another form of shock. Some cold water varieties are rather touchy, in particular, roach, bream, dace, bleak, and sometimes rudd. The fish becomes tense, the fins stand out and loss of balance and body-quivering follow. Generally a nervous shock or fit of this nature is fatal. Tropicals are not so difficult but angels need care at all times, and mollies are unreliable. When carrying fish in a can it is better to hold the can in the hand to avoid shock, rather than to put it on the floor or seat of a moving vehicle. It is much more trouble, of course, and rather tiring, but it pays dividends. In the case of Thermos jars this precaution is not so essential.

It takes all sorts to make a world and aquarists are no exception. Certainly fishkeepers are a complex lot viewed from the standpoint of their own particular interest in the hobby. It is a common human failing to attribute to others our own likes and dislikes. This, of course, is a mistake, and when we meet other aquarists or listen to lecturers we should realise that their interest in the hobby may not be on the same lines as our own. For some the profit motive is all the hobby holds out to them, although there are many others for whom profit out of the hobby is entirely secondary. Most aquarists keep their fish for pleasure, although this may be purely aesthetic, or the kick they get out of breeding, showing successes or the collector's instinct. Some keep fish purely for decorative purposes or to attract attention in business premises as a subtle form of advertisement. Again there are those to whom the tank and its inmates is "Something to amuse the kids," although this frequently turns father into an aquarist in time. Lastly, there are those few people whose main interest in the hobby is biological first, last and all the time. Some of these interests overlap somewhat but in the main fishkeepers' chief interests are one of the following: profit, pleasure, breeding, showing, collecting, advertisement or biological... which is yours? What a long way we have travelled since the days when fish were kept merely as a source of food or for live bait.

Some years ago, in this magazine, I recommended the use of Chinese or Japanese lacquer on tank frames and for the

outsides of tank covers as a splendid form of rust prevention. Two or three coats give a grand finish and last indefinitely. The lacquer is quite unaffected by water or heat (on the shade) and frames painted in jade green or a bright blue provide an excellent effect. I have also used this form of paint for the interior of fish cans with a view to avoiding rusting and making quite watertight. After the lacquer has dried these are quite safe to use and no ill-effects occur with the fish although a smell of lacquer remains in the can for years. On first sight many aquarists express doubt about this odour being harmless but experience proves it so. On the other hand with ordinary paints and varnishes there is real risk if fish are exposed to fumes for any length of time, and if painting takes place in a room where fish are kept the tank should be completely covered, the window kept open and no aerator used for several days. One of the most lethal paint fumes commonly used is that from what is commonly called lino paint. This excellent paint dries fast but is very dangerous to fish life. If any amount of painting has to be done it is wiser to remove the fish elsewhere for several days until all trace of paint fumes has disappeared. It is much better to be safe than sorry.

Recently a large angel fish managed to wedge itself in some rockery, and this escaped notice for over 24 hours. When the trouble was at last noticed the fish was in a shocking state, all the fins being very far gone with fin rot and fungus combined, the eyes also being covered with fungus. I tried chemical cures for about two days but the trouble was too far advanced and the shock too great on so large a fish for any hope to be entertained of a cure. In the circumstances I put the fish in formalin for demonstration purposes. The amazing thing about this unfortunate loss, however, was the effect the trapped angel had had on the other occupants of the tank. From being a cheeky, impudent lot of mixed varieties who were scared of nothing they became terrified at the slightest noise or movement and for roughly a month made frantic efforts to jump out or stun themselves whenever the tank was approached. By leaving the tank in the dark, and going near to it as little as possible they gradually returned to normal, but for some weeks I despaired of them and the tank, which was continually clouded by the muck stirred up by the terrified fish. It would seem that the trapped fish had, in some way, communicated its plight to them.

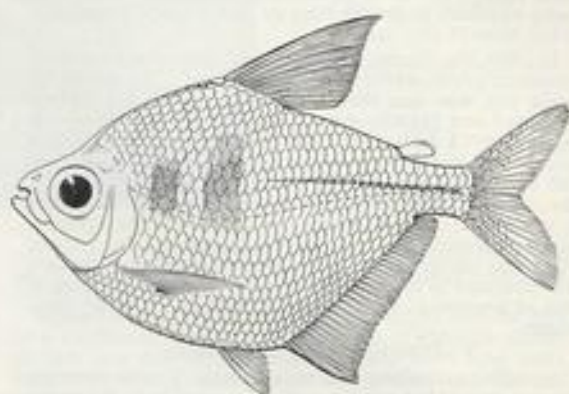
The aquatic trade and the hobby generally has lost a well-known figure in the last few weeks in the person of Mr. Michaels, the well-known dealer and importer, of Halifax. He has now sold his business and left the trade altogether and moved to Selby (in another part of Yorkshire) where he is engaged in the motor trade. He came to England some years ago from eastern Europe and for a time worked in the mills of this area before he started his well-known business in Halifax. He had many Continental contacts and was often abroad, the business being very ably looked after in his absence by Mrs. Michaels, whose charm, personality and knowledge of the business were a great asset. Mr. Michaels made a speciality of young fish and kept literally hundreds of each variety. He was probably the largest importer in the North of England and went to great pains to keep his tanks free from disease, partly with the aid of undisclosed continental remedies. He had many bright ideas and invented a number of aquarium gadgets which are sold by dealers all over Britain. Visitors to his shop were always made to feel most welcome, expert or mere novice, and his time was at your disposal, even to driving visitors to the station in his car. Now that it is petrol and not pH which engages their attention readers will wish every success to Mr. and Mrs. Michaels in their new venture.

RECENT IMPORTS: What is the "Salmon Discus"?

by A. FRASER-BRUNNER

AMONG the comparatively recent importations is a characin from Dutch Guiana which has become popular under the name of "salmon discus." How or when it got this extraordinary label, which is neither euphonious or appropriate, I do not know, but it seems likely to retain it. The scientific name, however, has been in doubt. It has been tentatively identified in Holland and Germany as *Ephippicharax orbicularis*, a species which was known to aquarists as long ago as 1934, but never in any quantity. Some obvious differences, however, notably the more pronounced, sickle-like lobe of the anal fin, the front rays of which bear a conspicuous black mark, have naturally caused a query to be placed after this name.

A short time ago Mr. Bowler, curator of the London Aquarium at South Bank, gave me a number of specimens of "salmon discus" which had died during transit, and I was thus able to compare these with specimens preserved in the British Museum (Natural History) at South Kensington. It was at once evident that it was not *Ephippicharax orbicularis*, although very closely related to it. *E. orbicularis* is much deeper in the body, and the anal fin has no pronounced lobe and very little black; the typical form comes from the Amazon and British Guiana river systems, and has usually 34 anal rays; a southern form, from the Paraguay river system, has usually 36 or more anal rays; this



Ephippicharax orbicularis (Cur. & Val.)

is the only tangible difference between them, and they are therefore considered to be only geographical sub-species.

Immediately in front of the dorsal fin, at its base, is a curious little bony structure that lies flat in a slight groove on the back; at its rear end it is hinged, so that it can be raised up, and at that part it is covered by skin. This little rod of bone, called the predorsal spine, is about half as long as the diameter of the eye, and at its front end there is a downward and backward-pointing hook on each side. This small structure, which would be very difficult to see when the fish was swimming in a tank, is very important to the ichthyologist, for it characterises the species. It is shown in figure 1, and below it is the predorsal spine of the "salmon discus" for comparison. It will be at once obvious that the latter is much shorter (less than a third of the diameter of the eye) and that the "hook" is roughly at right angles to it, scarcely pointing backward. Because it is so short, the spine does not project beyond the basal skin, and so is completely concealed beneath it; to see the structure shown in the illustration it is necessary to remove the overlying skin.

This short, broad, concealed predorsal spine is characteristic of the fish described by Popta in 1901 under the name *Tetragonopterus longipinnis*, and as we have a type specimen

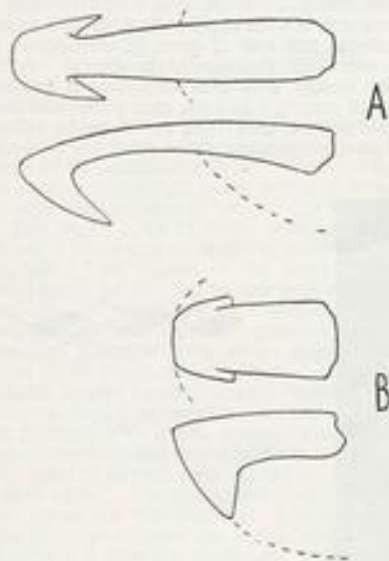


Figure 1: Predorsal spines of A, *Ephippicharax orbicularis*; B, *E. longipinnis*. Upper and side views of the spines are shown for each fish, and the dotted lines represent the scale-like area of skin that binds the spine to the back of the fish



Ephippicharax longipinnis (Popta)

of that species in the British Museum I have compared my recent specimens with it. I find that the "salmon discus" must indeed be assigned to that species, although there are some slight differences in depth of body and number of teeth, which are no greater than we find in the other species. It has 36 to 38 anal rays.

In 1909, Eigenmann decided that *T. longipinnis* deserved a separate genus, which he named *Poptella*. His reason for doing this was that the predorsal spine was completely concealed and "saddle-shaped, scale-like, without projecting spine." I do not think this is enough to distinguish a genus; the spine is concealed only because it is shorter, and it is the overlying skin, not the spine, which is scale-like. In all other characters this fish is very similar to *E. orbicularis*. Moreover, there is a third species, *Ephippicharax franciscoensis*, from the São Francisco river system, which has the predorsal spine pointed and without hooks; this structure is more different from *E. orbicularis* than is that of *longipinnis*, yet Eigenmann included it in *Ephippicharax*.

Distinguishing the Species

So taking everything into consideration, I think there are three species of *Ephippicharax*, distinguished in the following way:

1. Predorsal spine blunt at the end, with hooks.
 - (a) Predorsal spine long, the tip exposed, the hooks backwardly directed. 1. *orbicularis*
 - (b) Predorsal spine short, concealed, the hooks downwardly directed. 2. *longipinnis*
2. Predorsal spine pointed at the end, without hooks. 3. *franciscoensis*

This being so, the salmon discus should be called *Ephippicharax longipinnis* (Popta). In the aquarium it can be distinguished from the typical *E. orbicularis* by the falcate lobe of the anal fin, the front of which is heavily marked with black. It may be a smaller species also, for *E. orbicularis* grows to about four inches in length, and I have not seen any *E. longipinnis* even half that size among the hundreds that have been imported. There are no important differences in proportion, number of scales or fin-rays, number of gill-rakers or form of teeth. My aquarium specimens of *E. longipinnis*, however, differ from the type specimen in having the body less deep, and in having only six teeth in the outer row of the upper jaw instead of eight or more. It may be that these differences indicate a sub-species, but as we do not know the exact

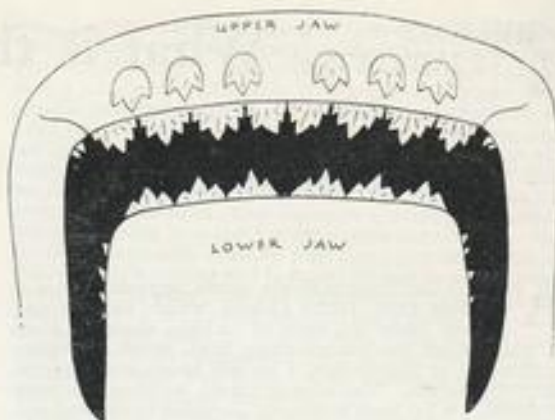


Figure 2: A slightly diagrammatic view of the jaws of *Ephippicharax longipinnis*, to show the teeth

locality from which these fishes came it is not at present possible to prove this.

The teeth of these fishes are quite remarkable. In the upper jaw there are two rows across the front of the mouth, the outer ones having three points and the inner ones having five points; three-pointed teeth in the lower jaw bite against the inner row of the upper jaw, fitting between them beautifully; there are a few much smaller pointed teeth in the sides of the jaws (figure 2). This efficient biting apparatus can only be seen with a microscope, however, when a dead fish is available, for the teeth are very small.

It seems likely that some specimens of the real *E. orbicularis* may be around. A German friend recently showed me a photograph of both species together in the same tank, and assured me that one of them (*E. longipinnis*) was the male, the other (*E. orbicularis*) the female. Although I doubted it, having seen our importations (which could scarcely be all males), I had not then completed this study, and so could not put him right, so I hope he will read this and avoid disappointment.



Specimens of the "salmon discus" photographed in a tank at the London Aquarium (South Bank) by Laurence E. Perkins. The species has been identified by our Advisory Editor, A. Fraser-Brunner, as *Ephippicharax longipinnis*



*A page for
the beginner
contributed
by
A. BOARDER*

THE winter months may be rather uninteresting for the coldwater fishkeeper unless he has some indoor tanks, but at this time of the year the tropical aquarist comes into his own. This is a good time to overhaul the tropical tanks and perhaps one or two which have been undisturbed for some years could do with a re-planting. I have in mind now the set-up ornamental tank, not the breeding or rearing tank. I know that some tanks can be left for many years without any attention other than the weekly servicing, but at intervals it may be well to set up the tank with a different arrangement. One can get tired of seeing the same rock formation or particular groups of plants and so a change may brighten up not only the tank itself but the room also.

When a thorough overhaul is contemplated I advise that the contents of the tank are placed in a spare aquarium and the opportunity is taken to re-paint the tank. The tank should be well dried and all rust removed. When working on the tank take great care to see that no pressure is placed on the outside of any glass. If this is done the glass may move slightly and later a leak may develop in the tank. You must remember that the weight of the water in the filled tank has kept up a continual pressure on the glass and this keeps it well in position. Once the weight is removed by emptying, the glass can be moved by pressing from the outside. This is why so many tanks used at aquarist shows develop leaks when they are filled. Even the cleaning of a glass side when the tank is empty can cause a leak later on.

Once all the rust and loose paint have been removed from the tank frame it can have a coat of either galvanising paint or some type of flat aluminium paint. A good kind to use is the non-leaving aluminium paint which is bought as a paste; as much as is needed for the job is mixed with varnish. This saves a lot of waste when small jobs are being tackled. The paint soon dries, when an undercoat can be applied. This should be the same colour as the top coat and must be allowed to dry well before the top coat is laid on. A good base is essential for a perfect finished job and neglect with the undercoats can mean a scrappy finish. When working on an empty tank it is a good plan to insert some spacers inside the tank so that a gentle pressure is kept up on the glass from inside. Four pieces of Essex board or similar material can be gently wedged in position with a few sticks. This will tend to keep the glass from being pushed inwards.

Once the paint is dry no time should be lost in getting the tank set up again. Use some fresh compost, and coarse sand is the safest for this purpose. Use plenty but see that it does not come above the top of the lower frame. Many aquarists still have too much sand showing from the front and this is not only lessens the picture but can spoil the finished article, especially if some of the sand turns black. The sand can be piled up well at the back and back corners. Well wash the sand under a fast running tap to remove all the very fine particles. Wash the rocks

well and a good scrubbing may be necessary for rocks which have been used before. I always think the old rocks are the safest.

When placing the rocks into position do not do this in a haphazard manner. A good deal of thought should go into this task as they may be there for a long time. Break the rocks up into different sizes so that some form of gradation may be possible. Equally sized rocks placed at regular intervals will look shocking. Do not have too much rockwork, as the more rock the less water and swimming space for the fish. Of course, rocks could be dispensed with, but I think some rocks help to furnish a tank and give it a better appearance as long as this is not overdone. Try to arrange the larger pieces of rock at the back of one end. Then graduate them to almost nothing towards the other end of the tank. See that they all have the strata running the same way so that they may represent a fairly natural lie. The bases of the rocks should be slightly buried so that no uneaten food can get underneath.

In a good sized tank it will be possible to form the rocks into a double row so that a chasm is formed. If this runs back to one end where there is a good clump of water plants the effect will be a very good one. To make a break from the ordinary it is possible so to arrange the rocks that a platform is formed at one end. This platform can be up to six inches higher than the base and then if planted with dwarf plants will look very well and break the flatness of the base.

Any sharp edges should have been rubbed down from the rocks and only those types which are very hard and not



Photo: J. Francis
Natural rock formation, showing the way the strata rise in parallel lines, an arrangement to be emulated in the aquarium

likely to disintegrate in water should be used. One or two pieces should be crushed so that small pieces can be laid on the sand near the rocks to give the whole a more natural look. At even the biggest shows I still see tanks set up with no possible connection between the rocks and the sand. I think nothing looks worse than unmatched rock-work.

Run some water in before planting starts. I always pour the water on to a piece of flat wood—a piece from the back of an old picture frame is ideal. When planting do try to set the plants in small bunches or groups. Avoid like the plague the bad system of sticking in individual shoots of plants at regular intervals. It never looks right. Try to get a good bunch of plants to hide the back corners. I would always like to see too many plants when a tank is set up than not enough. Remember that if they get too crowded after a time a few pieces can always be removed. Keep the front of the tank fairly free from plants and nothing large-growing should be within the front half of the tank. Also do not plant too thickly in front of the rocks. You have gone to considerable trouble to present the rocks in a pleasing manner and it would be a waste of

time if they were later hidden by plants. Rooted plants should be used where possible, and see that the roots are well pushed into the compost. Sometimes a small rock can be placed over the roots to keep them in position.

When planting allow for growth in height. Most plants soon tend to grow up to the top and so there is no need to have too long pieces of stems in the first place. The thought of permanency need not bother you as far as plants are concerned, for as I said before, it is easy enough to prune later on if necessary. If you have the spare tanks it is advisable to leave the fish from the tank for a week so that the plants can get established. If the tank is a tropical one the heater should be on so that the correct temperature is maintained as soon as possible. It may be necessary to empty the tank and re-fill if the water does not look clear. Of course, it will be found that most waters will clear in a couple of days if left alone without fish. When re-stocking with fish see that too many are not put in. There is nothing clever in saying how many fish you have in a tank. The knowledgeable aquarist prefers a few healthy fish to many unhappy ones.

FRIENDS & FOES No. 31

EPHEMEROPTERA

PHYLUM:—Arthropoda, from Greek *arthron*—joint, and *podos*—foot.

CLASS:—Hexapoda, from Greek *hex*—six, and *podos*—foot.

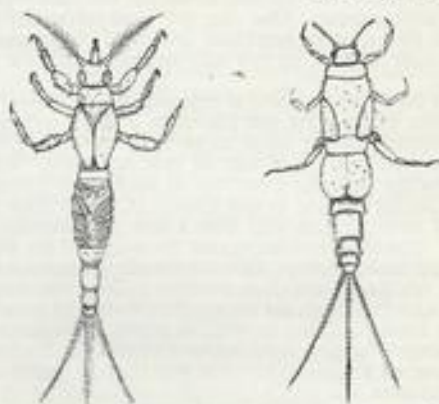
It is not only in masses of aquatic weeds or in still water that one finds mayfly nymphs. They can be discovered living on the bottom or burrowing in the bottom of still ponds, or free swimming in rapid streams. More frequently, however, the species found in streams hug the bottom closely, being equipped with strong legs and claws for this purpose, and possessing streamlined flattened bodies to more easily resist the current. Some species are found only by turning over the stones on the bottom.

At first Ephemeroptera nymphs breathe through their skins, but as they moult and grow they become endowed with gills, appearing as tufts or plates along the sides of the body. Experiment has proven that removal of the gills (of the plate-like variety), as in the case of damsel flies, does not result in the death of the nymph, providing a current of water continues to flow over its body. Observation will show that these plate-like gills are frequently and rapidly "vibrated" by the nymphs, resulting in the production of a current of water when previously none existed, so this may be their sole function, and the chitinous veins may be merely reinforcement and not tracheal ducts, which was once commonly believed.

Only one genus is believed to be partly carnivorous, and this one is quite easily distinguished from any other by virtue of its distinctive gills. All other species are herbivorous, and can safely be introduced into fish aquaria when found. Remember, however, that those found in fast running water may not take kindly to static conditions.

Mayflies, as imagines, are unable to eat. It follows that their life out of water is brief in the extreme, lasting from a few hours to a maximum of two to three days, from which time that spent awaiting the final moult must be deemed completely lost. They swarm in a nuptial dance over the water, usually during the evening. At its conclusion the fertilised females begin to lay eggs. Egg-laying procedure differs according to sub-groups of species. One

Mayflies



Left, a burrowing mayfly nymph (1½ ins. long); right, a carnivorous nymph (¾ in. long)

group dances over the water surface, repeatedly dipping the abdomen beneath the surface, releasing a number of eggs with each dip. Some rest on the water surface to do likewise. Another group release the whole of their eggs in one cluster while above the water, or dip their abdomens into fast running water, which sweeps the eggs away from them.

Most interesting method is that adopted by the species whose females crawl down sticks and penetrate below the surface of the water, carrying an air supply down with them. Selecting a suitable stone or piece of plant they stick a mass of eggs on to it, and re-emerge, if not snapped up by an eager marauding fish.

The genus most likely to be found by aquarists with small garden pools is *Chloëon*, comprising two species, *dipeterum* and *simile*. They are free-swimming nymphs, easily caught by sweeping a net along the fringes of masses of submerged aquatic "oxygenators." It is the three "tails" at the ends of their abdomens which has caused them to be so frequently mistaken for the carnivorous damselfly larvae.

C. E. C. Cole

Black-flag Tetra

(*Hyphessobrycon rosaceus*)

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

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

SPECIES:—*Hyphessobrycon*, from *hyphes*—little, and Greek *brycon*—tear in pieces.

SELDOME exceeding an inch and a half in length, this little gem hails from Brazil and British Guiana. Seen under prevailing exhibition conditions it does not show to advantage, but in a furnished tank, in clear, sparkling water against a background of vivid green plants, its beauty can be breath-taking.

Its semi-translucent body has an overall subdued reddish hue, while on either side of its spine, about the position of the lateral line, there appears to be an internal and more intense red line. Caudal, anal, and pelvic fins show traces of red, but the most striking feature is the dorsal fin, carried proudly in both sexes and sporting a large black patch, outlined in white at the front margin. A fully grown male will bear a dorsal quite as high as his body is deep and terminating in a point. That of his spouse seldom exceeds two-thirds of her body depth, and is rounded.

In spite of their delicate appearance, *rosaceus* are comparatively hardy, and do not need a constantly high temperature in order to keep well. They are perfectly happy for long periods in the lower seventies, and, indeed, can tolerate the high sixties if necessary. It is true, however, that in the lower temperature they are not so active, or so colourful.

They like a high temperature for spawning—something in the region of 80°F. They are a little choosy when it comes to mating. One cannot take any male at random and place him with any old female. As likely as not, failure will result if such a method is adopted. It is better to keep several pairs together and closely observe their behaviour. A male will soon pick out the female he prefers to all the others, and if she tolerates him you have a likely couple for breeding. Plant the proposed spawning aquarium with thickets of fine-leaved plants such as *Ambulia*, *Myriophyllum*, or *Cabomba*, but leave room between the thickets for the anticipated love-play. To bring them into



Male black-flag tetra at the top, female below

tip-top condition, feed plenty of small live food, and raise the temperature of the water.

It is quite possible that the female will come into breeding condition first, and in these cases she may well make passes at the male, but not for long. She becomes the chased, and dashes into the thickets of plants. The couple will emerge, hover round each other with fluttering fins, and once more dash for cover. Assuming positions close and parallel with each other, often near the bottom of the aquarium, the female will drop a small number of semi-adhesive eggs at frequent intervals until she is spent. The eggs are small, and hatch in approximately a day and a half. Similarly, the fry are also quite tiny, and after absorbing the food in their egg sacs must be fed only the tiniest Infusorians. Fresh cultures are most likely to contain the required size, the smaller species of Infusorians usually appearing first, to be replaced in a day or two by the larger kinds.

In spite of their small size, the fry require space in order to grow. As this is a species which is universally popular and for which there is a constant demand, it will pay breeders to raise every one they can. Consequently, split up the offspring over as many aquaria as available. Feed well, gradually increasing the size of live food as the babies grow. Regularly cull misshapen or weakly specimens—they will make acceptable titbits for other fishes—and concentrate upon the others.

Cacti in the Fish-house

A CACTI pest which occasionally is troublesome is the red spider. These are very tiny and are difficult to see without a magnifying glass. They cover the plant with a web and may be seen slowly crawling about over it. These also are sucking pests and the result of this is often more evident than the actual pest. Where a plant should be green and it has turned pale brown in places, especially near the base, it is almost sure to be the result of the attacks by this pest. They thrive in dry, hot atmospheres and so are not so likely to appear in the fish-house. However, if seen they can be dealt with in the same manner as described previously for the mealy bug. The insecticide known as Sybol will also kill them. Another pest sometimes found on cacti is known as scale. These pests appear

as small scabs not more than about an eighth of an inch across. This scab sticks firmly to the plant and the bug is underneath, well protected. The nicotine treatment is again effective for this trouble, or an occasional pest can be picked off with a pointed stick.

It will be found that very often the worst-attacked plants are those which are not in good health. Also some of the plants most attacked by mealy bug are those which do not get sufficient sunlight. See that all the plants are kept under good conditions and turn them now and again so that all sides are exposed to the sun at intervals and this will do much to keep the plants free from pests. It is a fairly simple matter to deal with a few pests but once the whole collection gets involved it is very difficult to get a clean bill of health again. Any plant treated for pests should have another application after about a fortnight in case eggs have hatched out.

What's New on the Market?

- "Sirenstat" Heating Warning Device
- "Aquacheck" Water Hardness Testing Outfit

NEON lights and other gadgets are sometimes used to act as an indicator to the aquarist if his current is on or off. There is always the worry that in mid-winter a fuse will blow and losses follow. A simple way to save trouble in this direction is to have a long lead from the fish-house switchboard to the house and attached to an electric clock. One has only to look at the clock and if the small minute finger is not revolving immediate investigation is called for. The same method can be adopted where tanks are housed in living rooms. This will not help where a thermostat sticks or a heater burns out but otherwise is a great help. What can be done in those cases where the thermostat sticks or a heater burns out or a fuse blows?

Two young enthusiasts in Romily, near Stockport, have solved this problem by inventing a warning device which makes a siren-like noise as soon as the temperature rises to 86° or falls to 70°F. It consists of two instruments, the relay and the alarm. The former is attached with an adhesive to the side glass of the tank. The alarm can be situated anywhere, even in another room. A testing lever is built into the relay so that at any time the apparatus can be tested to see that it is in full working order. Naturally it will rarely sound, and so consumption is nil; when actually in operation it is 15 watts. The alarm should not be allowed to sound for longer than 20 minutes. This device is intended for use when the aquarist is at home, and should not be left connected when the family is away on holiday.

The unit is beautifully made and very compact, and under test gave me excellent results. It is intended for mains use but a battery model is available which uses a twin battery of the bicycle type, and this will work irrespective of a blown fuse. The relay is roughly 2½ ins. by 3½ ins., and the alarm slightly larger (4½ ins. by 4½ ins.). I have seen some ingenious home made fish house alarms, often rather Heath Robinson-ish, but nothing so compact or efficient as this alarm which has been given the rather apt title of "Sirenstat." The two aquarist inventors got the idea when a tank of valuable fish were boiled as a result of a stuck thermostat. They contend (and I agree) that most temperature losses are at the top end of the scale and not the lower, but this apparatus warns of either. I can recommend this alarm to hobbyists who have been looking for something really reliable. (Makers of the "Sirenstat" are Messrs. F. Horton and L. Warburton, 10, Warwick Road, Romiley, Stockport.)

WATER differs in pH and hardness according to locality. Hard water is that which has a high content of mineral substances, particularly the salts of calcium and magnesium. Some of the hardness can be removed by boiling, but one is still left with the "permanent" hardness. It is possible to breed the more common varieties of tropical fish almost irrespective of the water, but the more selective fish have to be pandered to, and most of them prefer soft water. It is therefore a matter of

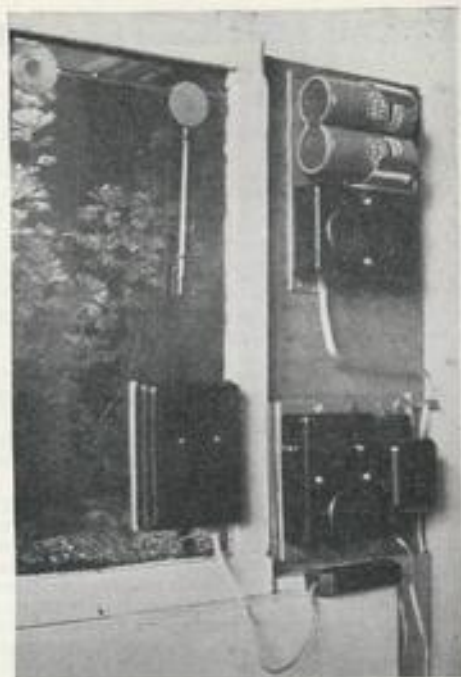


Photo: Raymond Yates

This "Sirenstat" relay (attached to aquarium glass) is wired to two types of alarm—the battery type (upper right) and the mains type

degree of hardness or softness which the aquarist must take into account, and before he can take any action he must first have some idea of the actual degree of hardness of his own local supply. It is possible in very large centres to obtain some information on this point from the local water engineer but elsewhere personal tests must be made.

One method is the soap test, in which drops of soap solution are mixed with a given quantity of the water under test until a good lather is formed. The number of soap drops used indicates the hardness of the water according to a special scale. The Americans issue some very expensive testing sets for this purpose but a really cheap and reliable water hardness kit has recently been produced by an aquarist in Romford (Mr. B. Ashman of 19, Knighton Road). This costs only a few shillings and provides a very accurate check indeed.

The kit consists of a measuring bottle, graduated test tube, two drop fillers and three bottles of chemicals marked Liquid A, B and C and full instructions. With this kit the merest novice can ascertain the hardness of water under review in three minutes, and there is no guessing involved as there may be with the "soap test," where it is a matter of opinion as to what constitutes a permanent lather. Breeders will find this very helpful, in particular those who live on the edge of limestone areas where one never knows what the water will be. As far as I know this is the first time anything of this nature has been offered to the hobby by an aquarist. Mr. Ashman is to be congratulated on putting the degree of water hardness within the reach of all fishkeepers with what he calls his "Aquacheck" kit.

Raymond Yates

THE AQUARIST

OUR EXPERTS' ANSWERS TO READERS' QUERIES

Please can you tell me how I can get rid of blue-green algae?

Blue-green algae is one of those things which it is very difficult to be definite about. It comes and it goes when you least expect it. Certain conditions favour its growth. For instance, it is more likely to appear in a tank containing large cichlids than in a tank containing, say, mollies or platys. Cichlids are heavy eaters and produce a lot of bulky excreta which favours its growth. But it is less likely to make much headway in acid water than it will in alkaline water. Rockwork of a calcareous content encourages the growth of all kinds of algae. And so does a strong light entering the sides of an aquarium having a thick deposit of sediment on the bottom. The surest way of getting blue-green algae under control is to keep rubbing it off the sides of the aquarium with a piece of linen wrapped round one end of a stick, and making sure that the aquarium is not getting too much strong light. Straining the water through peat will help matters, for peat water is acid, and acid conditions inhibit the growth of algae.

A friend has told me that a greenhouse is unsuitable for keeping tropical fish in because it gets too hot in summer and too cold in winter. Is this true?

We would say that a greenhouse would make a good place in which to keep tropical fish, for English summers are seldom so hot that the fish run the risk of being overheated, while during the winter time, the temperature could be kept to a minimum of about 70°F. by small gas burners, oil-heaters, or electric heaters controlled by thermostat. A small hot water pipe system is the ideal, of course, and if you contemplate keeping a lot of tanks in your greenhouse, an outside fired hot water system is worth the initial expense to have installed.

My tropical fishes have been dying in small numbers over the last few weeks. I have read somewhere that metal in contact with water soon poisons them, and for several months now I have had a piece of copper wire wound round the submerged heater to keep it in position. Do you think this piece of wire is to blame for the fatalities in my tank?

Most certainly we think your fish have been killed by the bare copper wire in your aquarium. Remove this wire as quickly as possible, drain away at least half of the water in the tank, and re-fill with boiled water allowed to cool down to the same temperature as the water in the aquarium.

Dark green algae is coating the tips of the Vallisneria plants growing close to the top of the water. How can I get rid of this unsightly growth, please?

You can try cutting down the amount of light entering the top of the tank by covering the surface of the water with floating vegetation such as common duckweed or *Salvinia*. Or you can introduce certain species of fish which pick at algae and keep it under control. Guppies, mollies, platys, sucker catfish and even the so-called talking catfish eat a lot of algae in the aquarium.

I am wondering whether it would be possible to place mirrors in an aquarium to add to the decorative effect? Is there any way of treating the back of a mirror to prevent the mercury coating from peeling off under water?

It is not the usual practice to place a mirror in an aquarium. If mirror glass is used, the usual thing to do is to use it to glaze the back of the aquarium, or have a piece cut to fit the back and attach it to the outside of the glass by adhesive cement applied round the edges. We are not in favour of mirror glass being used to add to the decorative effect of an aquarium. The fishes often spend a lot of their time swimming close to it, and when you try to net them, they often make a dash towards the mirror and crash headlong into it. Choice pieces of rockwork and beautiful plants make the best setting for aquarium fish.

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.

I wish to set up a tank for cichlids, but understand that it is a waste of time to place plants in it as the fish will only uproot them and pull them to pieces. How can I make a cichlid tank look attractive enough to keep in a living room?

A tank intended for cichlids can be made to look most attractive by using rockwork alone. But you will need plenty of it. If you are at all handy with tools, you can shape pieces of slate to fit into corners and along the back, so that when viewed from the front the effect resembles a series of narrow passes and caves. But make sure that all sharp edges are rubbed away with a file or piece of carborundum stone. One of the loveliest tanks we have ever seen was furnished with nothing more than slabs of red granite set in a dark coloured compost. The granite blocks ranged in size from really large lumps down to those not much larger than a marble. The water was kept crystal clear by a filter, and the tank was populated with a number of angel fish, all in the pink of condition.

I am having a room decorated and wonder whether the fumes of oil and distemper are detrimental to fish life?

Fumes of paint, disinfectant, creosote and the like are soon absorbed by water and do not do fish any good. In fact, strong concentrations of paint fumes often prove fatal to aquarium fishes. We advise you to keep the aquarium top sealed by placing several layers of newspaper between the top bar of the aquarium and the cover glass. There is no need to keep the aquarium covered in like this for long. Directly the smell of paint starts to disappear, the newspaper lining the top of the frame can be thrown away.

I have been told that blanket weed is useful to have in the tropical aquarium, but I cannot imagine what use such a lowly form of plant life can be to any aquarist, for it chokes higher plants, and grows in ugly tufts from the compost. Can you please tell me how it can possibly serve a useful purpose?

Blanket weed may be used as a spawning mat by anchoring it to the floor of the aquarium with small stones. Certain species of fish such as sucker catfish, mollies, and many of the larger barbs eat it with evident relish. It may be used to good effect to decorate a small tank populated with tiny livebearers or oviparous species. A good growth of blanket weed along the back of an aquarium will trap floating particles of sediment and help to keep the water crystal clear. A wad of blanket weed may be used in an emergency in place of cotton- or glass-wool in a filter. So you see that blanket weed has its uses after all.

Some time ago I made a large concrete tank against the inside wall of my greenhouse, and in order to seal the lime in the cement, I painted the entire inside surface of the concrete with black bitumastic paint. After it had dried, I gave it a scrub down and then washed it out with several changes of water. Then I placed a thin layer of peat on the bottom and covered this with washed sand. I installed electric heaters controlled by thermostat, and set the bottom of the tank with a variety of submerged plants. In a week or two the foliage of the plants turned an unhealthy colour, and some of them died right back to the crowns or stumps. The fishes I introduced have not died, but they seem off-colour and have to be tempted to eat live food. Please can you tell me what has gone wrong?

It is likely that the tank was not given a long enough soaking before plants and fishes were introduced into it. We suggest that you remove a gallon or two of the water

from the tank every other day, and refill with matured tap-water, or boiled water cooled down to the temperature of the water in the tank.

I have two tanks. In one I keep some common goldfish and shubunkins; in the other I keep a few different species of tropical fish. The tanks and fishes in them are in perfect condition. Unfortunately, I shall shortly have to be away from home for about a fortnight, and there will not be anyone in the house to look after them. Do you think the fish will starve to death in my absence? I am very worried about them.

You need not worry about your fish. So long as they are well fed up till the time you leave home, they will survive until your return a fortnight later. Most fishes will browse on plant life if there is no other food available; and the carnivorous sorts will seek out and devour water snails. If you can introduce into the aquarium a few dozen baby water snails, these will help out the fishes' diet. And just before you leave home, fill a small perforated feeding box with *Tubifex* worms.

I have spawned *Hypoclinemus heterorhabdus* several times, but the eggs fail to hatch out. The water in my aquarium is very hard and chalky. Do you think this is bad for the eggs?

Your water is too hard. Try softening it by straining it through peat moss; or better still, gradually remove most of the water in the aquarium, and re-fill with clean rain-water collected in clean glass jars placed outdoors. But do not use rainwater which has passed along dirty gutters or over a tarred or creosoted shed roof.

I have just bought an aquarium measuring 36 ins. by 15 ins. by 15 ins., and should like to know the number of watts required to maintain it at about 75°F.

It is best to employ two heaters in a large aquarium rather than one heater, for two heaters, each placed close to the floor of the aquarium, at opposite ends, will give a more even distribution of heat. Then again, if one heater fails, the other will carry on and prevent too rapid a fall in the temperature. We advise you to use two heaters rated at 60-watts each. If these heaters are controlled by a thermostat, you will always have plenty of heat in reserve even in the coldest days of winter—that is, even in an unheated room. If the room is always on the warm side, the thermostat will switch the current off when the temperature starts to rise above a certain figure, say, 75 degrees on the thermometer.

Can you please give me some information about keeping and breeding apple snails?

The needs of apple snails are quite simple. Give them a large jar of water or small aquarium heated to about 72°F. A few degrees above or below this figure will not do the snails any harm. For food, offer lettuce leaves, or the soft foliage of water plants. As the snails are heavy eaters and produce plenty of excreta or droppings, the water needs changing every few days. If left unchanged, the water becomes cloudy with Infusoria and will develop a bad smell. A small piece of chalk placed in the water, will help to keep the shells of the snails in good condition.

COLDWATER FISHKEEPING QUERIES answered by A. BOARDER

You have mentioned a minnow trap, could you please explain what this is?

The minnow trap I am familiar with is made of a kind of perforated zinc. It is in the shape of a large cylinder with a lid at one end and an inverted funnel shape at the other. A piece of bread is placed inside the trap, which is then tied to a piece of strong string and dropped into the water. The minnows or sticklebacks are attracted by the smell of the bread and find their way in at the funnel end. Once in they cannot find the exit and if after about 15 minutes the trap is pulled up many young or small fish will be found inside. When I was a boy I used to make a trap with a large bottle, one with a raised base. A hole was punched in this and it worked quite as well as the proper article. You should be able to purchase a trap at an angler's store.

I have been thinking of taking up fish rearing as a hobby, I am quite a beginner and thought I would consult you first. How do I make a start and what are the correct proceedings for success?

I have had many letters asking the same question lately and although I would like to be able to answer these queries as fully as possible I find that it is quite impossible for me to be able to give all the details for successful rearing of fish in the space at my disposal. A whole book could be written on the subject, it is so vast. Why not get my book *Cold-water Fishkeeping* (2s. 8d. post free from *The Aquarist*). This gives in detail all the necessary information for breeding. For a brief answer I advise you to make sure that you have the two sexes among your fish and that you have plenty of tank or pond space in which to rear the fry. If you look back through my articles in "Stepping Stones for the Beginner" this year, in *The Aquarist*, you will find the whole procedure described.

I have a new pond in the garden about 12 feet across and almost circular. I want to put fish in and fancy the bubble-eye. I am also told that small roach, perch etc., are good inhabitants. Can you please tell me—the type of fish you would suggest; how many; should I put in snails and scavenger fish and if so how many; how can I tell if the water is right for the fish?

If the pond is a concrete one and has been filled with

water for a week or two with an occasional scrubbing and refilling, it should be safe. It contains a fair amount of water and so the strength of lime in the water would be very small. My own experience with ponds has been that a pond is quite safe after a couple of scrubbings providing the pond is not very shallow. The fish you mention, roach and perch, are the least likely types of fishes to succeed in your pond. Roach are very prone to contract fungus disease and the rudd, a rather similar but more handsome fish, is not so liable to the disease and so is to be preferred. The perch, one of our most handsome fishes, is carnivorous and is able to eat any fish slightly smaller than itself. The bubble-eyed goldfish would be all right, but remember that if you wish to breed any special type of fancy goldfish you must have this type only in the pond. All types of goldfish would breed together and the resultant young could be useless cross-breds. About a dozen fish would be enough for the pond.

Snails are not necessary in the pond. I know that many people have them but I also know of many who have had trouble with them. They have a few good points but their bad ones outweigh their good ones in my opinion. I consider that they may be carriers of certain kinds of flukes. I have had trouble with flukes on my young fish in the past but since I got rid of all snails the flukes have disappeared; this may only be a coincidence, but it is enough to put me off snails for ever. As for scavenger fish, do be careful with these. So many people are of the opinion that they must be put into the pond if it is to function properly. This is not true. It is quite possible to have a healthy pond without scavengers. After all, most ponds include some goldfish among the inhabitants, and I know of few better scavengers than a hungry, healthy goldfish. Catfish are nearly always recommended for ponds but as these are the type which can grow to a very large size it is not long before the catfish have grown large enough to eat all the other fishes in the pond. My own experience is that the best fishes to put in a pond with goldfish of all types are the green tench. I have kept and bred these fine fish in my pond together with my prize

strain fantails and have never found them do any harm to the fantails. They are mostly bottom feeders and as such clear up most of the uneaten food which falls to the bottom. Do remember that scavengers are only really necessary in a pond if you are continually over-feeding the fishes.

I have just become interested in keeping goldfish and have one which had a black patch on the head and more patches on the fins. They have now disappeared—is this usual?

It is quite usual for the black to go. All goldfish are bronze when young. As the colour change starts the belly pales and this gradually spreads up the sides. As the fish gets more gold so the bronze turns black and this black leaves the fish last on the head and dorsal and caudal fins. I think that this black looks very attractive, but it rarely stays long. Generally the warmer the water the sooner does the fish change colour, but a lot also depends on the particular strain. If uncoloured goldfish are allowed to remain in the pond to breed with the others, many of the young will remain bronze for a long time or may never change at all.

One of my tanks has a slight leak. Is there any way of repairing this without completely re-glazing it?

If the leak is slight this sometimes seals itself as fine mulm infiltrates into the spot. If the leak continues for more than a couple of days once the tank has some sand and water in you could empty and try forcing some mastic into the spot from the inside. It is rarely any good to try to do this when the tank is full, and from the outside. A crack in the glass can often be made safe by forcing a little paint into the crack with a piece of rubber. If the crack is at the back or ends of the tank it is a fairly simple matter. Get some mastic, a waterproof type, and two pieces of greaseproof paper sufficiently big to cover the whole crack. Smear a little mastic on each side of the crack and then apply the paper. Rub gently on both sides until the mastic is spread well along and just over the edges of the crack. This will give a complete seal. Incidentally I use the same method for mending a leaking painted water can or water butt. Even an old enamelled milk saucepan can be made waterproof for use in the fish house by this means!

When measuring fish for judging how many fish should be in a tank; is the tail included?

It is usual to measure a fish exclusive of the tail unless otherwise stated.

I have four fair-sized goldfish in an 18 ins. by 15 ins. by 12 ins. tank. After I have cleaned them out and re-set it with weeds the fish bite the weeds, making them float on the surface, where they rot and form scum on the bottom. Is there any way of curing the fish of this habit?

I know of no way of curing the fish, but there are other things you can do to prevent the trouble from recurring. From your letter it seems that you are continually emptying everything from your tank for cleaning. This should not be necessary. I have two tanks which have been set up for almost six years and they have not been emptied once since. They have a weekly servicing but the rocks and plants are still in the same places. Some of the plants have had to be pruned back and one or two removed but the actual set-up is the same as when first done. The tanks keep very healthy and the water is clear. The plants are so well rooted that they cannot be pulled up. The trouble with your tank is that you have set it up and have put the fish in before the plants have become well established. The only way to make sure that the fish do not remove the plants is either to leave them out until the plants are well rooted or place fairly large stones over the roots or lower stems to prevent any movement. You could also try to get some plants well rooted in jam jars before planting, or even root some in small plastic pots which could later be put straight into the tank with some compost added to hide the pot. By the way, see that you are not overcrowding your fish—your tank will only hold about nine inches of fish.

Would you be so kind as to give me the names of books on trout hatching and rearing?

I have a book in my possession on this subject entitled *A Handy Guide to Fish Culture*, by Armistead. This book was only one shilling when first published in 1897, but deals very broadly with all aspects of trout rearing from the hand spawning to the growing fry. If you can get a copy of this book you will find it very useful and also the advertisements and cost of trout fry will make very entertaining reading when compared with present prices.

I have a small golden orfe, a year old, which spends most of the time swimming rapidly up and down at the end of the tank with its nose on the glass. It seems to do this half the day. Is there any reason or anything I can do?

I think the main reason is that the fish is healthy and full of spirit and is perhaps trying to obtain a longer swim. The golden orfe is not a fish for a small container in my opinion, but is essentially a river fish. To thrive it must have plenty of room and also likes well-oxygenated water. If the water gets too warm and loses too much oxygen orfe will soon die. My guess is that your tank is not large enough to house such a vigorous type of fish.

Aquatic Agonies



"But they don't look like fish!"

"Dash it, aren't we breeders to have any ambitions?"

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.

Delayed Hatchings

I FEAR that I shall be unable to convince Mr. B. Calrow (*The Aquarist*, October), of the validity of my statements in the article on delayed hatchings of *Pristella riddlei*. He states his creed quite emphatically when he says, in effect, that "this cannot be so, because the authorities do not mention it." I might ask, who or what is an authority? One who knows and has observed everything?

Mr. Calrow accuses me in one sentence of being a scientist rather than an aquarist. Indeed, I am both, and am proud to be a member of a scientific profession, but in another sentence he contradicts his assumption by denying me the credit for the acknowledged advantages of being a trained scientist. In other words, he assumes, with gentle derision, that I am incapable of controlling a simple experiment strictly enough to exclude such ridiculous interference as the accidental introduction of other eggs. Whilst flame fish are hardly "fry" at three-quarters of an inch, it is feasible that these eggs accidentally entered Mr. Calrow's pond—he neither knew nor cared at the time—but I did envisage that possibility, and acted accordingly; I did take all possible steps to prevent it, and I did prevent it. Further, having repeated the entire procedure, under even more rigid control, and with similar results, I state here and now that the eggs of *P. riddlei* can and do hatch after several weeks' delay, in wicked defiance of the learned authorities.

I have read many accounts of the variations in pH which occur in nature, but I cannot remotely connect this subject with my statement that *in captivity*, and left to themselves, many fish stabilise the pH at the optimum level. What happens in nature, and especially running waters is obviously beyond the power of fish to control to any detectable degree. The other technical points which I furnished, and which seem to amuse Mr. Calrow, were stated as bald facts, from which no inferences were drawn, and which may or may not have affected the outcome. Finally, might I suggest, in the same spirit of friendship, that the science, I repeat science, of applied biology commonly called aquatics will best be promoted and extended much less by poring over standard partial authorities, than by personal observation, careful assessment of the lessons of experience, an open mind on the observations of other workers, and the publication of any unusual and hitherto unobserved phenomena.

Let us, by all means, read of the experiences and opinions of the recognised workers in this field, but let us never be foolish enough to assume that finality lies between the covers of a text-book.

L. WARBURTON,
Stockport.



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

Earthing Aquaria

AS an electrical engineer and aquarist the remarks concerning the earthing of tanks in "Aquarist's Notebook" (*The Aquarist*, October), were very interesting to me. I think it is fair to state that to-day supply engineers recommend that wherever possible it is advisable to earth electrical apparatus, especially appliances containing water, in the interests of safety. Where equipment such as aquariums, containing mains heaters, are kept in outside fish houses or in rooms with brick or concrete floors, considerable risks are run if earthing is not carried out.

The paragraph refers to a possibly poisonous exchange between an earthed tank frame and the contained water, caused presumably by electrolytic action. I think that with normal tanks and heaters operated on A.C. mains the risk of this happening is negligible. There is a chance of trouble if D.C. mains are used and there is a constant leakage current from faulty electrical components, but to-day D.C. supply is very rare. It is, of course, possible for some electrolytic action to take place between frame and water whether the tank is earthed or not—depending on the mineral content of the water and the nature of the metal frame or of the treatment it has received (e.g., galvanised frames could cause trouble in time). But if the usual practice of siphoning out some of the water every month or so is followed no increase in toxicity of the water could arise unless other conditions were seriously wrong.

Where a direct earth on an aquarium is objected to, I would advocate fitting a mains bulb between each tank frame and earth. This will earth all leakage current and will light up if a serious electrical fault to earth should occur, thus giving visual warning that the tank is dangerous. This arrangement also has the advantage that fuses are not blown, as may happen when a tank is solidly earthed with possible loss of fishes as a result of the heating failure. Its safety factor is greater than a non-earthed tank in damp situations and the visual warning makes it the safest and most useful arrangement for tanks installed in living rooms with dry floors.

S. C. FUDGE,
Stafford.

Dangerous Mites

FOR many years I have cultured mites including *Tyroglyphus farinae* and used them as food for fish fry, so I would also like to ask, with your correspondent in your November issue, why the *Acarus farinae* mite is fatal. During recent years I have known of fishes dying through eating *Daphnia*, earthworms, *Tubifex*, white worm, wheat germ,

porridge, shrimps, beef, liver, biscuit, micro worm, etc., and I have in the past had my own troubles but now I use all without difficulty. Success with feeding is a matter of experience, care and discretion. At least it is a change for *Tubifex* worms not to be receiving the blame for fish losses!

C. R. PARLOW,
Kingston, Surrey.

MR. R. GILL raises an interesting point in his letter to you under the heading "Dangerous Mites" (*The Aquarist*, November). He is, however, not strictly correct in reporting my diagnosis, as I did not attribute deaths of the fish to the presence of *Acara farina* in the intestines, but to food poisoning as the result of tainting or pollution by the mite, which is rather different.

I am not satisfied that the mite itself is harmful. Where it occurs in very great numbers, as in some of the cases I have investigated, the food is grossly tainted and becomes toxic either as the result of chemical changes in the food itself or from the excreta from the mites. The mite is not entirely above suspicion as I have found it alive in water samples and on one occasion in the intestine of a fish, but at the moment I am prepared to give it the benefit of the doubt.

W. HAROLD COTTON,
Birmingham, 14.

MAY I thank Mr. R. Gill for his interesting letter concerning fish deaths due to mites? After reading about this I examined my dried food as a matter of interest—imagine my surprise and horror when I discovered tiny mites within it, visible to the naked eye! I wonder if Mr. Gill and I both use the same brand of food—it is certainly well advertised. It may be that the mite in my dried food is not the *Acara farina* mite but I certainly would not risk using any more of it. It is a real help to be able to learn by the experience of others, and it was certainly a good day for me when I ordered *The Aquarist* each month.

F. MATTHEWS,
Ramsgate, Kent.

Good or Bad Fish?

I FIND all the articles in *The Aquarist* most interesting but, being a newcomer to the hobby, I think it would help if when a fish is described in an article a small footnote could be added to tell beginners whether the fish being described is suitable for a mixed tank. For example, the description of *Badis badis* in a recent issue may have made some others as ignorant as myself buy some of the fish without knowing if our guppies or neons would be safe. Some time ago I bought a lovely male paradise fish, only to find, after a few weeks, that I was no longer getting guppy fry, and that my one angel fish seemed to have shed his lovely fins.

In this part of the country the hobby is of very recent introduction, and as far as I know there is only one other person in this town interested to any extent. Our nearest dealer is in Inverness, six hours away by train, but he carries a good stock at prices comparable with London's, and he will oblige at times by rising at 7 a.m. to send fish to us by the one daily aircraft.

R. McBRATH,
Wick, Caithness.

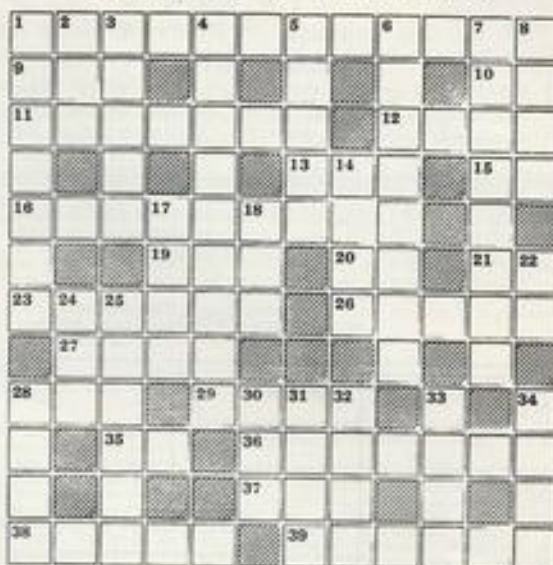
White Spot Treatment

FOLLOWING my letter in your September issue, I was very interested to read Mr. Raymond Yates' article in *The Aquarist* (November) on the merits of quinine and mercurochrome for white spot treatment. I am sure that your other readers will be interested in Mr. Yates' amplification, which fully explains his previous notes on the subject. His experience with quinine coincides exactly with my own, although I think I am correct in saying that, whichever drug

(continued overpage)

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- 1 Tiny fish of *Limia* species (5, 4)
- 2 Whale (3)
- 3 Thank you for the tadpole's head (2)
- 4 Meadow and monarch are dipping (7)
- 5 Rodents around for half the *Asteridea* (4)
- 6 Princely style for young of kingfish? (1, 1, 1)
- 7 Sappers (1, 1)
- 8 I cut line but tangled find it won't stretch (7)
- 9 Too much of this and the less itself might seem to wind! (3)
- 10 Look for this one (2)
- 11 Twenty-one is not out (2)
- 12 Avails in a way (6)
- 13 *Atilia aquatica* or *Argahu* (5)
- 14 Penny and highest card for this fish (4)
- 15 Carp without a tail (3)
- 16 Bag for liquid (3)
- 17 A root stem bearing buds (7)
- 18 Rice cuttlefish, perhaps (3)
- 19 In, and sounds like, a cold-water fish (5)
- 20 ————fish; *Hemigrammus ocellifer* (6)

CLUES DOWN

- 1 Black or speckled tropicals (7)
- 2 Metallic earth from roe (goldfish roe?) (3)
- 3 Piece of fish armour (5)
- 4 A mollusc with a one-piece shell (9)
- 5 Taut (5)
- 6 A box used for fishing through an ice-hole (4, 4)
- 7 Rash fat (anagram) (8)
- 8 The tortoise beat it (4)
- 9 Tiny stream (4)
- 10 Unprofessional (4)
- 11 The original aquarium! (3)
- 12 A cold quarter from half a neon (1, 1)
- 13 A thousand would make a man of her (first, too) (3)
- 14 Insects in first stage after leaving eggs (6)
- 15 Curve of archer fish (3)
- 16 Sounds plump, and is a short, fat, river fish (4)
- 17 The first thing decided by the pond maker (4)
- 18 Pertaining to animal life (4)
- 19 Gas, light, or fish (4)

PICK YOUR ANSWER

1. At one time doctors recommended a cure for consumption eating a live: (a) Chub. (b) Dace. (c) Gudgeon. (d) Minnow.
2. The popular name of demon fish has been given to: (a) *Geophagus oscirops*. (b) *Geophagus brasiliensis*. (c) *Geophagus gymnocephalus*. (d) *Geophagus furcatus*.
3. *Micropogonias paraklythos* (the harlequin catfish) has: (a) 2 barbels. (b) 4 barbels. (c) 6 barbels. (d) 8 barbels.
4. *Cyprinus alburnus* attains a length of about: (a) 2 ins. (b) 4 ins. (c) 6 ins. (d) 8 ins.
5. The moor goldfish is known to the Japanese as: (a) Demekin. (b) Kirashi. (c) Ranchu. (d) Shukin.
6. The lines: "And persons up the golden fish, In bowl no bigger than a drum," were written by: (a) Robert Browning. (b) John Galsworthy. (c) Thomas Gray. (d) John Massfield.

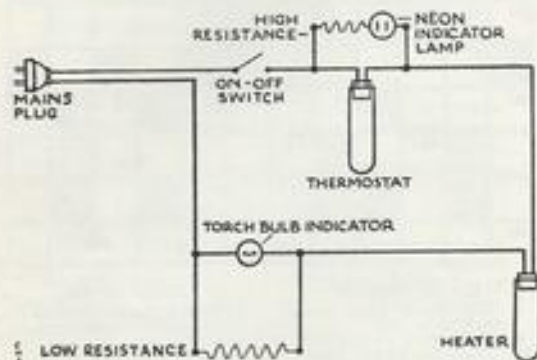
(Solutions on page 199)

is used, its effectiveness can vary considerably depending on the acidity of the aquarium water to which it is added. I would like to express my thanks to Mr. Yates for his timely notes on this subject.

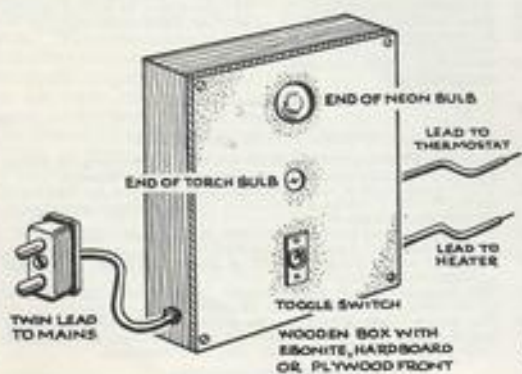
J. M. SKINNER,
Wakefield, Yorks.

Heating Failure

I READ with interest the article by Mr. B. H. Gates describing an aquarium heater indicator in the April issue of *The Aquarist*. However, I consider that this circuit has a serious defect in that no check of the heater circuit is possible if the thermostat is in the "off" position or if the heater to mains wiring is broken by a loose wire. The circuit I have developed provides a check on the heater and wiring continually, and I think readers may be interested in constructing an indicator on the same lines.



I have drawn the circuit and from this it may be seen that a torch bulb and a by-passing resistance are connected in series with the heater, and this part of the circuit has been fully dealt with by Mr. Gates. The simple but important addition to his circuit is that a half-watt neon bulb, such as is used for an indicator on 250-v. mains, is connected across the thermostat. This neon bulb has a built-in resistance and it will draw a minute current through the heater and wiring when the thermostat is in the "off" position; the current will be so small as to cause negligible heat in the heater windings and the torch bulb will not light up. When the thermostat comes on the neon bulb will be shorted out and the torch bulb indicator will light up.



A Merry Christmas to all our readers

Thus it may be seen at a glance if the heater is functioning properly, for either the torch bulb or the neon indicator should be on. If both are off something is wrong—either the heater has burnt out, a connection has broken, or the indicator bulb has burnt out. The neon bulb should be practically everlasting, though its failure is, of course, a possibility. The complete indicator unit should be built into a small box, with the neon bulb and torch bulb close to each other, and then the working of the heater may be checked at a glance at any moment.

M. L. BUSWELL,
Wellingborough, Northants.

Decorative Stand



THE above photograph shows how an aquarium stand can be made to be a piece of furniture and painted to fit in the scheme of a room. It consists of 2 ins. by 2 ins. timber faced with hardboard. The beading and two handles fixed to the front gives the appearance of fitted doors, which are only mock ones, and boxwood was used for the skirting at the bottom.

G. H. CRADDOCK,
Newcastle-on-Tyne, 4.

FOLLOWING a meeting called by the Bedford and District Aquarist Society it has been decided that advantages will be gained by the formation of a regional group of societies. Societies within or close to the circular area in 30 miles radius from Bedford are invited to participate in the formation of the group, as yet un-named, and secretaries of societies interested should communicate with Mr. R. R. Pope, 51, Aylesbury Road, Bedford.

AMONG specimens demonstrated and described by members of the British Herpetological Society (London Group) at a meeting devoted to young animal rearing were spotted salamanders fed chiefly on fly maggots (by Dr. D. Frazer). Mrs. M. White showed a six-months-old San Francisco alligator lizard born in captivity and fed on snails, meal worms and spiders. A garter snake, bred in captivity and feeding on worms and raw herring, was shown by Mrs. M. Green, who also exhibited two young terrapins (*Glemys leprosa*) whose growth rate was one millimetre a week. Mr. B. Smith showed his salt-water crocodile which he has had for five years, feeding on fish, meat and mice.

WINTER "instructional programme" of the Catford Aquarists' Society has now commenced and members are pledged to publicise the hobby as much as possible. Coach trips to dealers are planned as well as shows, lectures, debates and "quizzes". Aquarists interested in joining in these activities should communicate with assistant secretary Mr. J. W. Davies, 40, Sandhurst Road, Catford, London S.E.6.

MEMBERS of the East of Fife Aquarists' Society visited the Aquarium in the Zoological Park, Edinburgh, in October, and were shown round by the curator, Mr. C. Beveridge. Mr. J. Ogilvie has lectured to the society on breeding barbs. Meetings are held in the Y.M.C.A., Leven, Fife, 7.30 p.m. on the first Wednesday of each month.

A COLLECTING expedition to the coast enabled a fine marine tank display of shellfish, crabs and shrimps to be made at the Erith and District Aquarists' Society's annual show. Winners in the furnished aquaria classes were Mr. A. G. E. Jessopp (tropical) and Mr. R. B. Stonnard (coldwater). New members will be welcomed at the meetings on the second and fourth Mondays of each month, 8 p.m. at St. John's Hall, Erith, Kent.



Photo: Stephanie
Young member of Hampstead Aquatic Society, Howard Ward (aged six), demonstrates his aquatic abilities to fellow members at the society's third annual show this year. The show was the largest one staged by the society and received 119 entries. Best fish of the show was an American sunfish, owned by Mr. E. G. Harris.

News

from AQUARISTS' SOCIETIES

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

A copy of *The Aquarist's Directory of Aquarium Societies* will be sent free to any reader on receipt of a stamped, self-addressed envelope.

GROWTH in membership over the past year was reported at the annual general meeting of the Hounslow and District Aquarist Society. Tribute was paid to the help given by the South West Middlesex Aquarists' Association in providing speakers at meetings.

SECOND annual show of the Kettering and District Aquarists' Society was judged by Mr. C. W. Creed, and in the egg-laying brood class the first seven awards received one gold and six silver stars (F.B.A.S. "Star Scheme"). High pointings were given in all classes, indicating a high standard among the entries.

AT a table show staged by the Kirkcaldy and District Aquarists' Society last month members of the East of Fife society also participated and prizes were donated by members and friends. Aquaria were exhibited by the society at a local Chrysanthemum Show on 13th November. Future meetings of the society will be held on the first Tuesday of each month, 7.30 p.m., at the Denver Cafe, High Street, Kirkcaldy.

REPORTS from members who visited the P.N.A.S. Autumn Assembly in Manchester this year are included in the October Bulletin of the Nottingham and District Aquarists' Society. In the report from the breeders' section of the society notes from a talk given by Mr. D. McCann, section secretary, on the principles of fish breeding mention that new tap water can be used successfully if not too hard and that aeration is usually advantageous for breeding. The notes recommend that the adult fishes should not be scared by clumsy netting or trapping on transfer to breeding quarters, and it is

advised that live foods should not be given to the adults in the spawning tank since these may attack eggs.

HEADQUARTERS of the Southern Amateur Aquarists have been changed to Second Floor, 8, St. George's Place, Brighton 1, Sussex. Secretary is Mr. H. M. Wright, 2, Rotherfield Crescent, Brighton 1.

New Societies

Dartford Aquarists' Society Secretary: Mr. K. G. Downs, 26, Chastilian Road, Dartford, Kent.

St. Helens and District Aquarists' Society Secretary: Mr. R. E. Skidmore, 36, Bruce Street, St. Helens, Lancs. Meetings: Next meeting 21st December, 7.30 p.m. at the Y.M.C.A. Building, St. Helens.

Thameside Aquatic Society Secretary: Mr. A. L. Parsons, 20, Melstock Avenue, Upminster, Essex. Meetings: Alternately at the Methodist Hall, Becontree Heath (Monday evenings) and at the British Legion House, Hornchurch, (Wednesday evenings).

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies: Croydon Aquarists' Society (Mr. P. S. Boyes, 48, Hamilton Road, Thornton Heath, Surrey); Todmorden and District Aquarists' Society (Mr. J. Holroyd, The Cottage, Railway Street, Todmorden); Worthing and District Aquarists' Society (Mr. H. G. Mitchell, 4, Sugden Road, Worthing, Sussex).

Crossword Solution

M	O	S	Q	U	I	T	O	F	I	S	H
O	R	C	N	I	I	T	A				
L	E	A	K	I	N	G	S	T	A	R	
L	L	V	H	R	H	R	E				
I	N	E	L	A	S	T	I	C	F		
E	A	L	E	L	O	I	N				
S	A	L	I	V	A	L	O	U	S	E	
D	A	C	E			P	H				
C	A	R	S	A	C	S	Z	I	N		
H	V	C	R	H	I	Z	O	M	E		
U	A		C	U	T	I	O				
B	L	E	A	K		B	E	A	C	O	N

PICK YOUR ANSWER (Solution)
1(c). 2(d). 3(c). 4(a). 5(a). 6(b).

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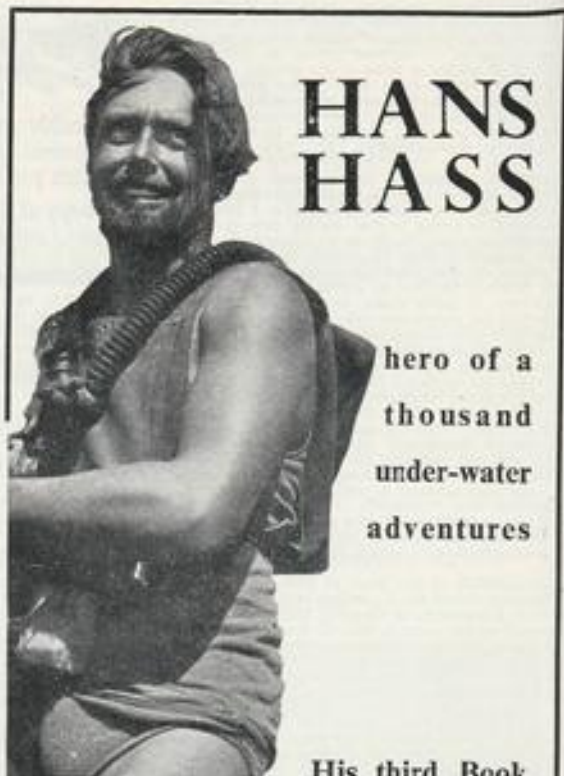
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