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"EVERYTHING FOR PONDS AND AQUARIA"
(2 MINUTES LEICESTER SQUARE AND CAMBRIDGE CIRCUS)
Editorial

At first sight aquarium-keeping would seem incapable of providing opportunities for its devotees to make themselves nuisances to their fellow-countrymen, still less to make it possible for them to become law-breakers by the pursuance of their aquatic interests. Without giving thought to the matter many would believe the aquarist, quietly busying himself with his collection of aquaria, to be the quintessence of spare-time activity harmlessly and enjoyably engaged. Few spheres of human effort in modern society do not call for some sense of responsibility and thought for the possible consequences of apparently harmless actions, however, and the aquarist must be mindful of some potential troubles that aquarium-keeping can originate.

In tanks and ponds aquarists often have charge of living specimens that are foreign to the waters of this country. They should never be tempted to use rivers, canals, streams or natural ponds as dumping places for any unwanted stocks. The results of introducing alien species to the established flora and fauna of any region are unpredictable; this has been proved time and again in ecological experiments made in countries all over the world. What may seem a beneficial introduction of a new species has often proved a curse, and no less than deliberate attempts to establish an alien (without facilities for its control should it be necessary) are introductions made by carelessness to be deprecated.

Just over a hundred years ago the Canadian pond plant Elodea was loosed here and by its lusty growth did incalculable harm to our canal systems and inland waterways. Last month aquarium-keepers were blamed in a leading article in The Times for the appearance of a species of Lagarosiphon in a Middlesex river. This foreigner has already choked the water and crowded out other plants, and in view of the close relationship of the genus to Elodea legitimate anxieties about its future spread have arisen. But thoughtless disposal of aquatic plants is not the only matter meriting the aquarist's attention.

There are still rivers unspoilied by industrial pollution in these islands in which tragic results could accrue were diseased and unhealthy fishes imported from abroad to be
released in them. Introduction of foreign fish parasites and bacterial diseases by such action is an offence against our fisheries regulations, and legal consequences should act as a deterrent to the thoughtless even if biological considerations cannot dissuade them. A real responsibility rests here with all aquarists: to see that no careless action of our own brings about any trouble and jeopardises our interests and the delights of our natural waters, and to see that similar awareness of the risks involved is aroused in the minds of others in our ranks.

* * *

No one who has ever spent any period in a hospital bed needs reminding of the boredom which develops during the recovery period, and physicians are agreed that lack of interest in the patient's surroundings can undo a great deal of the good brought about by skilled treatment and nursing. With very young patients their natural ineptitude to remain engaged with any one interest for long makes the problem of providing a sufficient number of suitable diversions especially difficult. All children love animals, however, and although pets cannot be tolerated in a hospital ward, it must be a source of pride to aquarists that aquaria are suitable for this purpose, a tank of fishes then becoming, by virtue of the attention it provokes, an instrument of real therapeutic value. This is being increasingly realised by those in charge of hospitals and convalescent homes all over the country, and many requests for information and help have been addressed to this magazine. Aquarium societies have provided, installed and maintained tanks in quite a few hospitals now, with very gratifying results. The need for more work of this sort is still great though, and it seems a great pity that eagerness to carry out the practical details has often in the past been hampered by lack of money for the initial outlay on equipment. Members of the public would be willing to donate a small sum towards this, it is thought, only the lack of a liaison between them and the societies preventing this.

Accordingly, The Aquarist is to institute a Hospital Aquarium Fund. Public donations are to be sought, the Fund to be administered by a committee now being formed. Money will be used to provide complete outfits for installation in hospitals all over Britain, economy in outlay being possible by such central administration. Practical help from aquarium societies in the vicinity of hospitals is essential to the scheme; secretaries willing to participate are asked to write to the Editor as soon as possible.

Next month, details for sending donations will be announced and all readers are requested to invite their friends to join in so that the Fund can be got going with minimum delay. Remember, our hobby benefits from all advancements of its interests, and the value of this particular humanitarian application can be readily appreciated.

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at BELLE VUE, MANCHESTER

Entry to the competitive classes for prizes and awards is open to all aquarists in Great Britain at the B.A.F., to be sponsored by "The Aquarist," and next month's issue will contain full details for society secretaries and others concerning entries and the attractions of this unique occasion in the history of British aquarium-keeping.
Fishes of the Hatchet Family

by

A. FRASER-BRUNNER

Now that the little “freshwater flying-fishes,” or Hatchet fishes, are once more making their appearance at market, aquarists may like to know something about them. There are not many species, and they form a family which is fairly closely related to the great Characidae to which so many aquarium species are actually included in the larger family for which they were named. One remarkable feature is the great expansion of the pectoral fins, which, when in action, form a large keeled lobe like a bird’s wing, and is therefore closely related to the remarkable ability of birds to fly. These fishes fly like birds, but they certainly do it much better than any other fish. The pectoral fins are in a very thick upper ray, and can be flapped up and down-stroke being by far the most powerful.

The fish leaps up from the water it is thus able to surface rapidly with its “wings” and skitter the keel cleaving the water like the prow of a boat. On looking at the fish it does not need a guess of aerodynamics to see that the likelihood of the fish becoming airborne is very small; the base of the anal fin is by a black line, which will be level with the water, and the tail fin will be below water. It is interesting that the lateral line is bent abruptly downwards to the body to the anal fin, so that the end of it will be in contact with the water during skittering, presumably serving some function such as balance.

If the fish is airborne it is likely to be due to a leap by means of a stroke of the tail, the impetus gained during skittering carrying the body forward, the pectorals possibly supplying further lift; but such a flight would be very short-lived. This habit of rising above the surface no doubt aids the fish considerably in catching insects (for which purpose some species have large hook-like teeth on the maxillary bones of the mouth) and may also help it to elude enemies.

The fish leaves the water primarily by a strong leap, the skittering being only a means of prolonging its stay above the surface. Needless to say, care has to be taken to see that a cover is kept on the aquarium when dealing with fishes of such considerable jumping powers. They have been known to jump from one tank into the next, then into the next and so on along a series of six tanks.

Treating New Specimens

Hatchet fishes are reputed to be delicate, but they are certainly not more so than many popular characins. The reason for this belief seems to lie in the fact that they will not take dried food except when extremely hungry and then only if at ease in their surroundings. Consequently they take no food during their transit to this country, nor when first removed, frightened, from their dark containers. Moreover, most dealers place them among other species, where they are shy to take even live food. Consequently they are very weak and the first few days after arrival may see many deaths.

The proper treatment is to give them a tank to themselves, treating for white-spot (which they often develop on arrival) and feed them with small Daphnia and finely cut Tubifex.

For the ordinary aquarium the small forms (Carnegiella) are the most suitable, as they are less active and at home among plants. The larger species require a big tank (36 inches or more) with plenty of clear space in which they can swim. All are sociable creatures, being found in the wild state in little shoals, often in company with small characins.
The family is confined to South and Central America, and includes several species which have been somewhat confused in the past. There has also been some confusion as to the grouping of these species, owing to the fact that, except for *Carnegiella*, the genera had not been properly defined until the present writer studied them recently. It is now clear, however, that there are only three genera.

The first is *Gasteropelecus*, in which we must at present recognise four species, though we may eventually find that there are only two. These have comparatively small scales, numbering 26 to 35 along the side of the body, with very few grooves radiating from the centre as in Fig. 2. There are 10 or 11 dorsal fin rays and 22 to 36 anal fin rays. The upper jaw has only one row of teeth, or a second row is represented by one tooth only. An adipose fin is present.

*Gasteropelecus sterniela* was the first species ever described, by Linnaeus in 1758, and comes from British Guiana. It is bright silvery, with olive-green back, and along the side there is a black stripe bordered above and below with pale stripes of nearly the same width. There are three or four strong teeth on each maxillary bone.

Closely related to this is *G. coronatus* Allen, from the western Amazon in Peru, and *G. lesi* (Eigenmann) (picted on page 165) which is common in the eastern part of the Amazon system. These differ from the preceding only by their teeth, *G. coronatus* having only one tooth on each maxillary, *G. lesi* having none at all. In the aquarium they look exactly like *G. sterniela*, and I believe we shall one day find that they are only sub-species or local races of the same species.

Quite different, however, is *Gasteropelecus maculatus* Steindachner, an attractively spotted fish which we have not yet seen in the aquarium. It inhabits the waters flowing down the Pacific side of the Andes in Panama and Colombia (Fig. 3).

**The Genus Carnegiella**

The only difference that can be clearly stated between the genus *Carnegiella* and the foregoing is the absence of an adipose fin, but members usually have a different look about them. They are smaller, more delicately built, and have a more distinctive colour-pattern. This at least could be said until very recently, but now there has been found a fish which is like *Gasteropelecus sterniela* in all respects except that it lacks an adipose fin, which raises doubts as to the importance of this feature in distinguishing genera; this new fish is *Carnegiella myersi* Fernandez-Yepez, from the Peruvian Amazon, and is far is known only from the original description.

Much better known is the pretty *C. striata* (Günther), recognised at once by the oblique stripes which traverse the body. There are two forms, shown in Fig. 4, which are regarded as local sub-species. The one from British Guiana, which I have called *sup-species vesca*, has the second oblique dark band double for most of its length, and reaching the ventral edge near the middle of the keel; also the dark band along the base of the anal fin hardly extends to the keel at all. These differences can be seen also in the accompanying photographs of living specimens. Both sub-species have been seen in our aquaria in the past, and specimens of *C. striata vesca* have recently been imported again; not long ago I had the pleasure of seeing some in the aquarium at Belle Vue, Manchester.

The second species, *Carnegiella martha* Myers, has no

(Continued on page 170)
Hatchets of the Genus 
*Carnegiella*

With the generous cooperation of Mr. Wm. T. Innes we are able to illustrate, by means of photographs of the living fishes, differences between the three best-known forms of the *Carnegiella* genus of hatchet fishes.

Upper right is a pair of *C. strigata*, sub-species *nassa*, from British Guiana, in which the two middle stripes are thin and separate until they join at the middle of the abdominal keel, and the black stripe along the base of the anal fin extends well forward on the edge of the keel. These fishes can be compared directly with the typical sub-species, *C. strigata* from Brazil (lower right). Note how the two middle oblique stripes in this form become united as a single broad stripe, joining the keel farther back, and the anal stripe does not extend forward on the keel. The inset to the illustration of this species shows a head-on view of the fish.

Shown on the left of this page is another species of the genus: *C. marthae* from the Orinoco. This also has a sub-species in the Amazon, *(C. marthae schereri)* apparently differing only in the more numerous rays in the anal fin.

(Photos: W. T. Innes)
reached this country to my knowledge; some specimens sent to me under this name some years ago turned out to be C. striata. The well-known photograph by Mr. Innes, which he has let me reproduce, shows its main colour-pattern, a continuous black line along the lower margin of the body, no oblique bands, and a few rows of black spots on each side of the breast. This species, which seems rather scarce, has been taken in the Peruvian Amazon, the Rio Negro and the Orinoco system.

These little fishes are said to be found in shady forest streams rather than in the open waters favoured by *Gasteropelecus*, and it is perhaps for this reason that they adapt themselves more readily to the aquarium.

**The Genus Thoracocharax**

There remain to be mentioned two other species which I have not seen alive, although they have been pictured by the German aquarists Arnold and Ahl (who unfortunately transposed the names). Except for the depth of the body and the length of the pectoral fins these species are so alike that they may easily be misidentified.

They constitute the genus *Thoracocharax*, which is very sharply distinguished from those which have gone before, firstly by the remarkable scales, which are very large, numbering only 19 to 22 along the side of the body, and have numerous grooves radiating from a circular groove in the middle, as shown in Fig. 5. There are 14 to 16 dorsal rays and 39 to 44 anal rays, and an adipose fin is present. There are two rows of teeth in the upper jaw, the front row consisting of three teeth on each side.

The commonest species is *T. stellatus* (Kner) which is found throughout the upper Amazon system, and southward in the La Plata system as far as Santa Fe in Argentina. The colour is silvery, olive on the back, sometimes with a brighter silvery stripe along the side; there is always a dark mark at the front of the dorsal fin.

The other species, *T. secus* (Filippi) is recognised by its deeper body and longer pectoral fin, as shown in the illustration (Fig. 6); there is no dark mark on the dorsal. It is known from Amazonia, where it is sometimes caught together with *T. stellatus*.

So far as I am aware, no one has yet bred any species of hatchet fish, but there seems no reason why it should not be done with a little care and patience. Here is a chance for someone to be a pioneer.

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**Luxurious Fish Room**

The professional and elegant appearance given to a fish room by paneling the tanks is shown in the picture of a Canadian reader's collection on the left, contrasting with the practical arrangement of equipment "behind the scenes" pictured above.
Why Not Grow the Sacred Lotus?

W. E. SHEWELL-COOPER

There is always something very mysterious and beautiful about the whole idea of lotus blossoms—probably because it is so often sung about in the most sentimental type of ballad. The beautiful Indian maid is said to be like a lotus flower—or her eyes are lotus-like—or even her hair is fragrant like the scent of lotus. Curiously enough, if you study Indian poetry you will discover that almost every part of the body has been compared at some time to the lotus plant. The lotus can be said to be the flower of the Indian Empire as it once was, and this sacred blossom has been used again and again by so-called “doctors” to form a love potion which could cause the most profuse affection of a beautiful maid.

It is difficult to come down to earth after such thoughts but in reality the lotus is largely grown in the East as a food. Undoubtedly when the Bible says “Cast thy bread upon the waters, for thou shalt find it after many days”—it is referring to the lotus. The Egyptian put the seed into a moulded ball of clay about the size of a tennis ball and then threw this into the water and the plant grew. Flour came from the centre of the lotus or “seed pod” which was dried and ground into a brownish-white substance—-the seeds were eaten too. Both of these are composed of a flour-like substance.

Nelumbo Growing

If you would like to grow a sacred lotus in your garden, or at any rate very near to it, you must consider the Nelumbo. One of the troubles is that the bigger kinds send very long roots which, if it is claimed abroad, may easily spread thirty feet in a season. The pool grower therefore will try to confine the roots into some receptacle sunk into the water and I suppose at the same time, say, the John Innes Potting Compost No. 3. Another trouble about Nelumbo is that they are easily damaged by frost and the special summers we get in Great Britain do not seem sunny enough or warm enough to ripen the tubers properly. Therefore, you may have a plant one season and lose it in the winter. The advantage of the tub system, however, is that you can get the plant up and get it into the greenhouse or somewhere that is frost-proof during the winter.

Keen gardeners will think of all kinds of ways of coping with the demands of the lotus, which wants to grow in quite shallow—think of the silt of the Nile—and which likes to be planted firmly, for the seed is thrown in by the oriental fairly well anchored in the soil by those long roots. Some of the plants are, of course, not natives of the Nile at all but come to us from as far away as North America or Japan or even the Philippine Islands. There will be some readers who are lucky enough to have pools in the greenhouse and they, of course, will have no trouble in coping with the problem. Some of the species cannot grow in water colder than 55° F. and it is a pity that the lotus cannot be grown more easily over here because it is very much from fossil remains that it used to be used as a natural plant in early ages, almost all over Europe, but after that it was changed it became lost to the bulk of the Western Hemisphere.

My American friends tell me in Minnesota one of the most popular lotuses is Nelumbo lutea. This bears flowers which are often ten inches in diameter and are the most lovely shade of pale yellow. It usually takes about five or six years before it flowers properly, but the leaves make quite a show before then, standing about thirty inches above the water, often being eighteen inches across. It is evidently quite an easy variety to cultivate but does insist on plenty of heat for tuber ripening in the winter.

The Hindu lotus is the Nelumbo nucifera. The blooms are a lovely rose colour and they gradually get paler as the flowers age. They may easily be a foot across. The leaves themselves are most attractive because they are deep green in colour and have a kind of metallic sheen to them; they can easily be seen because they are always well out of the water. There’s a Japanese kind which collectors like to include if they can, Nelumbo nucifera alta palmarum—that as its name suggests, bears double flowers which are of a beautiful creamy white colour to start with and then the creaminess gradually pales until on the third or fourth day the petals are snowy white. There’s the most lovely scent about them and once you can get this variety happy it goes on living throughout the summer months.

I must not end without mentioning the baby variety N. pygmaea alta. This produces flowers about five inches across, pure white and usually scented with leaves only five inches across also and borne about 1 foot 6 inches above the general level of the water. There’s a double form of this variety and there’s one which produces beautiful pink coloured blooms with the apt name “Dawn.” These are the kinds that are usually grown in tubs and which may therefore prove just what readers need.

Waterproof Labels

Not infrequently the aquarist requires to place in experimental or exhibition tanks labels to remind him of some special treatment the tank has received or to give information about the identity of plants etc. for non-aquarist viewers or beginners. Labels placed on the outside are not always satisfactory from this point of view, unless they bear illustrations of the subjects they name, and paper labels in such a position are liable to be very short-lived when exposed to the splashes and scrapings of aquarium maintenance. Labels within a tank can be placed in close relationship to the objects, and specimens other than animals, named. The problem is to find a material that is waterproof, non-toxic to fishes and not too unsightly in the aquarium, on which the data may be written indelibly without any great trouble.

Very useful for this purpose have been found the Hartley etched and anodised plant labels sold for use by gardeners. These grey metal labels and tags, made in various shapes and sizes, do not affect the water in an aquarium and their specially prepared surfaces readily allow pencil or indelible ink notes to be made on them without fear of losing decipherability under water. Several months testing has shown that only growth of algae causes the writing to be lost. Another use for the labels is in identification of fish specimens preserved in spirits—including the label in the preservative together with the specimen solves the problem of the jar from which an external label has disappeared. The makers are V. & N. Hartley Ltd., Greenfield, Nr. Oldham, Lancs.
In 1938 I became interested in the inheritance of calico fishes and before the war put a temporary stop to my efforts, I was convinced that British goldfishes were not exactly fitting the groups described by Chinese works. In 1945, I was able to resume work and finally in 1947, completed "The calico group of the goldfish, Carassius auratus L., with an analysis of the pigmentation found in these fishes." During that period, I was lucky enough to buy and breed a great variety of fishes. Part of the range of fishes found in the second of the three groups (the mottled or mosaic transparent) is shown by the following examples :

1. The whole fish is pale pink with the exception of two small streaks on the dorsal fin and two extremely small orange spots at the base of the caudal fin. Three scales appear metallic. From Chen's description, this specimen would appear to belong to Group 3 but a test cross proved it to belong to Group 2.

2. The fish is mottled in colour. None of the scales appear metallic while the opercula and eyes lack reflecting tissue (i.e., they are not shiny). According to Matsui, this fish should belong to Group 3 but a test cross showed it to belong to Group 2.

3. The fish is self-orange in colour and might at first be mistaken for a common goldfish. Most of the scales, however, appear transparent. A test cross showed this to belong to Group 2 although it does not fit Chen's definition.

4. The fish is self-yellow in colour but most of the scales appear transparent. A test cross showed it to belong to Group 2 but it does not fit either Chen's or Matsui's description.

5. The fish is blue in colour with black markings. In the second part of the work it was discovered that the colour blue is produced by black pigment situated deep down in the body. This fish, therefore, only contained one pigment, viz., black, but most of the scales appeared transparent. A test cross showed that this specimen belonged to Group 2 although it does not fit either Chen's or Matsui's description.

Other specimens examined possessed two or more colour pigments and a few or no scales with metallic appearance. From these observations it is clear that British fishes in Group 2 exhibit a greater range of variation than that recorded in either China, Japan or both countries.

Light Reflecting Layer

The reason why some scales appear metallic is because under them there is a layer of reflective tissue which acts in the same way as the "silver" of a mirror. When the scales appear transparent, this reflective layer is absent. In all cases, therefore, the scales are transparent and the difference in their appearance is due solely to this reflective tissue layer. Besides the reflective layer just under the scales, it may be found in a layer much deeper down, when it gives the fish a dull, mother-of-pearl-like shine. This is characteristic of Group 2. The reflecting tissue may also be found in other places still deeper down in the body.

When a scaled fish is dissected and the scales with their reflective backing removed, the layer of tissue responsible for the mother-of-pearl appearance in the calico fishes will be found to cover the whole area. It cannot be seen in the live scaled fish, of course, because it is masked by the outer layer of reflecting tissue. In calico fishes, the mother-of-pearl shine can be seen in patches and sometimes occurs all over the fish. In a heavily pigmented specimen it may not be very noticeable but it is there, and can be seen if the fish is examined carefully.

Transparent fishes normally lack reflecting tissue in both the layers described although occasionally there may be an isolated scale or two with a metallic appearance and very small areas showing the mother-of-pearl shine. The latter characters are the exceptional ones. Most aquarists with a little practice will have no difficulty in recognising these fishes, although when having much pigment they are not transparent. How may one distinguish between Groups 2 and 3 with certainty, if neither colour nor scales may be used as guides? The essential difference is in the amount of reflecting tissue.
Goldfishes

AFFLECK, M.Sc.

...the author's original coloured matt goldfishes. The left orange with a few black markings in the tail region; the fish is heavily pigmented and appears blue, black, and brown. At the right is a powder blue fish with orange marking behind the head.

They demonstrated the above facts to the Goldfish Society of Great Britain, the members of the committee supported by the other members of the group, after years of deliberation and tests, into three groups of goldfishes. In an attempt to divide between the groups so that all aquarists, newly newcomers to the hobby, will not be misled by the misnomer names, the G.S.G.B. has adopted the following criteria for the groups:

1. METALLIC. Fishes in this group have a polished or burnished metal.
2. NACREOUS. Fishes in this group have a mother-of-pearl-like (nacreous) shine.
3. MATT. Fishes in this group generally have a matt appearance, although small isolated areas metallic or nacreous.

I noticed some well-coloured matt fishes in a group of these specimens came from a late batch of they were only about one inch long by the end of Mr. Kettens fortunately came to my aid and kept them in his heated fish house over the winter. Their colours had improved considerably, and the matting had colour ranges as great as that found in a good shubunkin. These coloured matt fishes used this year as parents.

G.S.G.B. has recognized that there are three main types that may be crossed, it follows automatically that a breeding of a shubunkin, for example, should be recognised as metallic, nacreous or matt. The committee of the G.S.G.B. has decided that all specimens should be as colourful as possible, so that it is useless exhibiting metallic fishes that have only one colour (self-orange), or matt fishes that are colourless (pale pink), expecting premier awards. Members of the society are, therefore, endeavouring to produce new strains possessing the desired characters. This year I have been concentrating on producing nacreous and matt specimens of the single tail.

The following is a list of all possible matings and the offspring to be expected from them:

Metallic x metallic produces 100 per cent. metallic; Metallic x nacreous produces 50 per cent. metallic, 50 per cent nacreous; Metallic x matt produces 100 per cent. nacreous; Nacreous x nacreous produces 25 per cent. metallic, 50 per cent. nacreous, 25 per cent. matt; Nacreous x matt produces 50 per cent. nacreous, 50 per cent. matt; Matt x matt produces 100 per cent. matt.

Breeding Potentialities

From the above it will be seen that a nacreous x matt cross will give the best results for my purpose. At this point it must be stressed that although the above matings will produce so many matt, nacreous or metallic specimens, they will not necessarily be good ones from the exhibition point of view. Before good specimens will be produced strains must be built up by selective breeding and test crossing.

How is it possible to learn something about the potentialities of a fish for breeding if its pedigree is unknown? This is a question that is often asked. The answer is that you must make test crosses and raise the whole of the spawnings. This second point is very important because in animals like goldfishes where so much variation occurs it...
is possible to obtain a very inaccurate idea of the kind of young being produced if only a hundred out of a thousand youngsters are raised.

I possess two female matt fishes which have fairly intense motiled colours, and Mr. Upchurch loaned me an extremely good nacreous male. I only know the pedigree of the matt fishes for one generation back—they arose from two matt specimens with very little colour. My first problem was to know with which female should begin to build up a strain. The obvious thing to do was to mate each of the females with the same male and see what happened. As a result I as yet do not know that one female has produced some well-coloured fishes while the other one has not done so.

**Spawning Diary**

The female matt that gave the better result had a body length of just under two inches when she spawned, so that I expected approx. 400-550 eggs—the actual numbers were 499 fertile and 14 infertile. Counting eggs is a tedious job, but if unplanted tanks are used and the eggs thrown on rubbish, the job is much easier than one might imagine. My diary for the spawning reads as follows:

16.5.50. Fishes spawned.
17.5.50. 414 infertile eggs and counted and trans=
ferred to two other tanks.
19.5.50. Eggs hatched.
21.5.50. 499 alevins counted into two tanks. All fertile eggs hatched.
30.5.50. 484 alevins alive. Loss, 15.
11.6.50. 436 alevins alive. Loss, 16. Of the live ones four were killed for detailed examination, and 479 transferred to two ponds (approx. 6 ft. by 3 ft.).
18.7.50. Ponds drained and fish counted. In doing this job two were accidentally killed. 474 live fishes counted, which, allowing for the two killed, means that three have died since last count. Fishes are very uniform in size. Body length of smallest approx. 1 inch, largest approx. 1½ inches. The smaller were almost entirely matt fishes and the larger nacreous.

This fish was exhibited at the S.G.B. meeting.
23.7.50. 474 live fishes. Losses due to natural causes.
19. Killed, six. Live fishes placed in three ponds (approx. 6 ft. by 3 ft.).
28.7.50. Fishes are a little overcrowded and feeding is becoming a real problem. Variation in size becoming apparent.

**Achieving Uniformity**

The young fishes are still in the ponds and I have not yet made a detailed examination of them, but not one of them is a metallic, as was noted by The Aquarist's photographer. I do know, however, that the spawning has produced a comparatively large number of coloured matt specimens and that approximately one-quarter of the nacreous ones appear fairly good. It is still a little early to obtain a really accurate idea of the colours in the matt fishes as, at least in my experience, they appear much slower in developing than their metallic or nacreous brothers and sisters. Even some of those that are quite pale at three months (1½ inches long) may be very intense in colour at a year old.

In case readers should wonder how the fishes were kept fairly uniform in size, the method is to feed extremely heavily and to change the water as often as possible—every three days if you can manage it. When they are transferred to a pond, this becomes a difficult matter; as a result, feeding cannot be so heavy (the water will soon become foul if you over-feed) and the "natural bullies" will have more than their share of food and so increase in size more rapidly than their unfortunate relatives. In a mixed spawning (i.e., including more than one group) the matt fishes always tend to be smaller than the others and will quickly die out if food is scarce.

**Harlequin Spawning**

*recorded by*

**The Harlequin fish (Rasbora heteromorpha), is one of the most beautiful tropical aquarium fishes, but aquarists have to rely on imported specimens as the fish has proved most difficult to breed. The writer was inspired by Wing-Commander A. H. Marsack's article in The Aquarist (August, 1949), entitled "Exploring the Jungle Streams of Malay," to attempt to breed this fish.**

Eight young harlequins had been bought in the spring of 1949 and were about half an inch long at the time of purchase. They were placed in a 48 by 15 by 15 in. aquarium with a miscellaneous assortment of other varieties. As they grew it became possible to sex them by the deeper body of the female and the more slender appearing appearance of the males. This is very apparent and is a sure method of sexing. As luck would have it the eight harlequins turned out to be four true pairs. During the growing-up period the fish had been fed on a mixed diet, garden worms, Tubifex, Daphnia, white worms and dried food. They showed a marked preference for white worms.

The first attempts at breeding were made with individual pairs in separate breeding tanks, but no inclination to spawn was observed, although the females were heavy with roe. The pairs were separated and placed in different tanks for a few days. A 24 by 12 by 12 in. aquarium with bottom heat was then set up with fresh tap water at a depth of six inches; no gravel was used and about six Amazon sword plants with the roots weighted with lead strips completed the set-up. The temperature was adjusted to 82° F. and strong aeration applied for 24 hours. The aeration was then reduced and all the eight harlequins placed in the tank late at night. As soon as the lights were turned on the following morning intense activity was noticed. All the four females were observed periodically to be upside down, rubbing their underparts on the underside of the sword plants, but the eggs were laid at this point.

The males were "showing off" to one another, swimming side by side with all fins extended and in beautiful colour. After some time the males joined the females under the leaves and the actual spawning took place. Each male wrapped himself around a female in an embrace similar to the Siamese fighting fish and the eggs were deposited on the underside of the leaves. The eggs are large, as big as angel fish eggs and are crystal clear. It was noticed that although some of the eggs remained attached to the leaves, the majority fell to the glass bottom of the tank, and were clearly visible. All the fish took part in the spawning and no individual mating up was noticed.

The spawning continued at intervals all day, being still in full swing at 10 p.m. that evening, when the fish were removed. The bottom of the tank was covered with eggs.

The next morning a considerable number of the eggs had become white but a large proportion remained clear; one was examined under a microscope and found to be fertile. The next morning, however, fungus had developed on the infertile eggs and spread out, covering the fertile ones and presumably killing them. No fry hatched from this spawning. The writer has had this trouble when spawning Hypseblennius roseus and in this instance the use of boiled tap water was the solution.

Accordingly, cooled boiled tap water was used in the
John Alred

In Home Aquaria

The attempt was made to see if the breeding tank was set up

but with the addition of a layer of quarter inch
divides on the bottom, the idea being to try and isolate the

breeding tank was allowed to be at night as before. Spawning

place but the result from this effort was two fry only.

about this time other aquarists in the district were

resulting in the poor results from spawnings and

the cause of local tap water, which appeared to be

chlorinated and formed a scum on the surface after

days in an aquarium. For the next spawning

fourteen days later a quantity of water was obtained

a nearby underground spring. This water was

clear and had a pH of exactly 7.0; as it flowed

a rusted iron pipe it presumably had a small

amount of iron.

The breeding tank was arranged exactly as in the second

This time, however, it was decided to experiment

fish were left in the tank for two days, spawning

continued on the second day. They were removed

6 p.m. on the second day although still spawning.

the adults make any attempt to eat any of the

Three days later numerous fry could be seen hanging

plants and on the glass panels. Five days after the

swimming and were surprisingly

slightly bigger than Barbus tetrazona fry. They

given newly hatched brine shrimps which they took at

a week old, micro worms. At ten days old

black triangle of the harlequin appeared. At

this month old, feeding on chopped

chopped white worms and fine dry food. They

over half an inch long and in full adult colour.

further spawning has resulted in about twenty fry, but

proposed to give the adult harlequins a rest before

any further breeding. To sum up, it appears that for

breeding (1) the water used is of great importance; (2)

harlequins are community spawners; (3) the spawning

period continues over two days or more.

The writer hopes that the above notes will encourage

other breeders to try and breed this fascinating fish, for the

sight of a shoal of them makes all the trouble well worth

while.

How and Why?

Can I keep male and female fighting fishes together in the

same aquarium?

specimens may be kept together without

but the males are of breeding size the temper

erations is unpredictable. Individual males vary

in the species; in cases where constant chivyng of the

male it is only necessary to place the pair together only when

true breeding condition—with the male blowing

the female well coloured and plump with

A quickly planted corner as a retreat for her should

the spawning may leave her weak and unable

to take interest in a nest of eggs or for any reason

the eggs in a nest from the tank very few of the eggs hatch, from the lack of attention given by the con-

mendation and bubble-blowing of the good parent.

The numbers hatching out can be considerably increased, however, by scooping up the nest of eggs, before it dis-

integrates, in a shallow dish of the aquarium water. This

may be floated in a tank with three or four inches depth of

water, into which the fry may be tipped gently after hatching.

Why do my young fighting fish fry do well for about a

fortnight and then begin dying off rapidly?

The deaths are the result of insufficient food and space.

It is not possible to rear a full brood unless the fishes grow to be "thinned-out" into other aquaria. A

twelve gallon tank will raise enough for most aquarists’
purposes providing a good supply of Infusoria (the cultures

need to be started when spawnings begin) is given. The

fry commence eating after about forty-eight hours and from

time onwards to the brine-shrimp or sifted Daphnia

feeding stage a continuous drip of the strained Infusoria

culture organisms dispersed in clean water should be

arranged. A suspension of hard-boiled egg yolk made by

squeezing it through muslin and shaking it well with water,

can also be employed.

J.F.

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Artificial Spawnings from Goldfish

by A. BOARDER

For some time I have considered whether it would be possible to spawn goldfish artificially. There were many points of advantage which I thought might be obtained. A while ago I had a very interesting talk with a man who bred trout and he described how he stripped the fish of the eggs and milt. If this were possible with other fish it might be worth trying with my fantail goldfish. Whilst I was turning the matter over in my mind an acquaintance friend lent me three fish upon which I could do the experiment. I thought that it might be worth while to try with my own fish. I had bred a few goldfish and was able to get a good supply of eggs. I was also able to get a good supply of milt from a fish which I had bred. I thought that the temperature of the water might be changing and I would try to see what effect it had on the eggs.

I had not been able to spawn any of my fish successfully. The method described in the book was to strip the eggs from the female fish first, and then to strip the milt from the male over the eggs and add water. The water was then swilled around the eggs and they became fertilised. I decided that I would try to obtain the milt from the male first, and then to strip the eggs. The milt from the male fish in the same way as I had the milt from the female fish. I used a light stroking action and the eggs simply flowed out in a stream into the bowl. The whole process was over in a matter of seconds and the fishes did not appear to be harmed in any way by the process. I was able to strip out the water for a short time.

I then quickly introduced some water to the bowl and swilled it around the eggs for a minute or two. Then I poured the water into the bowl quite strongly and the washing around did not lessen them in any way. The eggs looked amber in colour, a much deeper colour than they appear to be when they are laid naturally on water weed. I think that there were from one hundred to two hundred eggs in the clutch and I decided that if I made another attempt at any time I would endeavour to spread the eggs out more in the bowl. It was noticeable that many of the eggs were in a close group and although they were not exactly on top of one another they appeared too crowded for my liking.

After an hour or so I washed the water out of the bowl and allowed some fresh water to run over the eggs. This washing did not loosen the eggs from the bottom of the bowl at all, their adhesive qualities were enough to hold them fast. This was all that I could do at the time. All that I knew definitely was that I had obtained plenty of eggs but did not know whether I had been able to fertilise them. The temperature of the water in the pond where the fishes had spawned on their own was 65°F, and I tried to see that the temperature of the water which I added to the eggs was about the same.

The following day the eggs appeared just the same as when they were extruded. None seemed to show the fungus of the infertile eggs but none appeared to have affected in any particular. I could see no signs of infertile eggs. I had placed no plants of any kind in the bow1 and as I thought that the water might be lacking in oxygen, I changed it. The eggs stuck well to the bowl.

On the 3rd August the eggs appeared the same and though I had not seen any signs of fungus I had found that the eggs were not normal. I had placed no water plants of any kind in the bowl and as I thought that the water might be lacking in oxygen, I changed it. The eggs stuck well to the bowl.

On the 5th August the eggs appeared the same and though I had not seen any signs of fungus I had found that the eggs were not normal. I had placed no water plants of any kind in the bowl and as I thought that the water might be lacking in oxygen, I changed it. The eggs stuck well to the bowl.

By the evening I could count about three dozen fry and they appeared quite normal, although it was of course too early to say for sure whether they would turn out healthy and perfect. From this date the fry made normal progress and seemed to feed quite strongly on Infusoria. I shall have to wait some time, I know, before I know whether there will be any more fry among the hatch but in any case it will be very interesting to watch their progress.

Having been successful in obtaining some fry from this artificial spawning I can now examine the process and consider whether I can in any way improve on the technique another time. I was perhaps helped in my experiment by the fact that the fishes which I attempted to strip had actually been spawning that morning. Further experiments later on will prove whether the recent spawning had much effect on this particular experiment. Obtaining the milt in the bowl first I consider quite a good plan as the male germs are then waiting ready for the eggs when they drop into the bowl. The part which did not seem satisfactory was the way that the eggs grouped. I would have preferred that they were spread out more and not touching each other in any way. I shall try the use of some selected clean water to see if the eggs stick to these and so keep apart. I shall also see if it is possible to use clean water in the bowl so that the fishes can be held in the water whilst they are stripped. This method would probably ensure the eggs were spread out more as the female would no doubt help to spread them around with the wishes of her tail.

Will artificial spawning be of any value? In the first place it will enable fertile eggs to be obtained from any selected pair of fish. It will also be possible to get the eggs at any time convenient to the aquarist, which is a very important point for many. At the same time one could use more than one bowl and after having used one male to fertilise the first bowl of eggs another could be used for the next one. Only a few eggs need be exposed in each container for experimental purposes. Another very good
Having dealt with the advantages of the method I will deal with the disadvantages. As far as I can see at present the only thing against the stripping is that some damage may be done to the parent fishes. In my case the fishes which were stripped on the Tuesday were taken to an open show on the Thursday following and did not appear to have been harmed in any way. The fact that they were unbeaten proved that. If only slight pressure is used I do not think that harm can be done to the spawners. The female stripped quite easily and no doubt with practice I should be able to get milt from the male more readily.

Weighing up the pros and cons I think that the benefits which are possible with the method far outweigh any disadvantages that can be seen at present.

December, 1950

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Two Unusual Tropical Aquatics

by JACK HEMS

Here is no denying that to look into clear water and see gracefully formed and bright green plants growing beneath the surface is a pleasure that most of us can enjoy; for the underwater scene is one that never loses its interest or its power to stir the imagination.

In the early days of the tropical aquarium keeping hobby, there were few plants from which to choose—sel grasses mostly, and one or two swamp plants such as Ludwigia. But during the last two decades new plants from the warm parts of the world have been introduced to aquarists almost as often as new fish, which is, I think, as it should be, for the tendency to grow bored with too familiar things is one of the failings of mankind. Change is a marvellous tonic.

The two plants mentioned at the head of this article are highly decorative and will flourish in a temperature of about 75°F. and a medium to bright natural or artificial light. As the roots are vigorous, it is best to provide a rather deep compost for them to spread around in. A two inches thick layer of coarse sand spread over a shallow bed of loam or clay makes an excellent planting medium. Given the necessary warmth, the rich compost and the right degree of light, both species tend to outgrow the average small aquarium. They need a tank at least twelve inches deep and as wide across.

The Amazon sword plant (Echinodorus intermedius) was introduced into this country from America in 1938. It makes a fine feature plant for the deep tank containing angel fish or similar species. The strong-stemmed, somewhat translucent leaves measure about two inches across and eighteen to twenty-four inches long. They taper away Roman sword-like to a fine point. A strong rib extends down the underside of each leaf. A large plant will have as many as twenty leaves.

During the early summer, runners are sent up from the woody crown. Baby plants soon make their appearance at various points along the runners. The young plants grow faster if the runners are weighted to the bottom of the water, and left undisturbed for a few weeks. When the new plants have several leaves, each about five inches long, they may be separated from the parent stem and planted.

The Texas mud baby (Echinodorus radicans), one of the loveliest plants the writer has ever seen, will almost fill a twelve-gallon tank with its elongated shield or heart-shaped foliage. The leaves average about three inches across by five inches long. They are held at right angles to the substantial stems. In water not more than nine inches deep, the plant produces both floating and aerial leaves as well as the conventional submerged foliage; the leaves in contact with the atmosphere develop a highly glazed, water-repelling surface.

Of the two species, E. radicans needs the more light. During the summer-time the plant sends up a stalk which in due course bears attractive white flowers. Large fertile seeds make their appearance as the flowers dwindle away. Baby plants are also formed between the seed pods.

When this delightful plant was first made available to aquarium keepers in the U.S.A. —sometime in 1934—it was erroneously listed as Sagittaria guayanensis. A few specimens came into this country in 1935. But in 1936, Dr. John Fogg, Jnr., of the University of Pennsylvania, identified the plant as an Echinodorus. According to William T. Innes, the range of the plant is "from Florida to Texas and along the Gulf of Mexico."

Unfortunately for the tropical aquarist, the plant seems to have become as elusive in this country as that other aquatic beauty, the Madagascar lace plant. Let us hope, however, that its name will reappear in the dealers' lists before long, for there is no question that the Texas mud baby is something worth waiting for, like most of the good things in life.

Photo: L. E. Perkins
Young Amazon sword plant grown in poor light

Photo: Ashford & Beddows
A present rarity—the beautiful Madagascar lace plant
Useful Tips

Silken Siphon

When I have found, originally by accident, and by perfection of experiment, that the easiest, safest, and most sanitary, and the sharpest method of removing surplus water from tanks by feeding Infusoria is to use a length of silk stockinet, I have been pleased to find that the end in the tank should be kept at the lowest level and that the water must not fall, and the end outside be slightly lower, as with the usual siphon tube. The lower end can drip into a jar and the flow can be increased by the amount of material used. To ensure an drip the material should be soaked before use, and the length of time varies with the method is used. I defy any fry to swim up and out when this method is used!

James Nott

Carlisle.

Electric Lamp Protection

Some time I have been concerned about the amount of time that my electric lamp holders become wet. Being in the electrical trade, I know how dangerous this could be, so I have devised a simple solution, which takes only a few minutes to fit. All you need is a short length of old bicycle inner tube on to the end of the light bulb, then insert the bulb into its holder, and roll back the rubber tube over the connection to make a nice water-tight seal.

G. H. Hicks

Teddington, Middlesex.

Miscellany

In conclusion, here are a few tips culled from recent articles on Fish Aquarium: to obtain Tubifex free from mud and from a river, place it in a bowl, cover with a lid and place the bowl over a low gas flame. The worms will rise to the surface and can be picked up with forceps. Paraffin heaters can be eliminated by adding a small amount of turpentine to the oil. When adding fresh sand to an aquarium and planted tank pour the sand through a glass and then directed to the chosen spots without slowdown or any trouble.

The AQUARIIST Crossword

Compiled by J. LAUGHLAND

CLUES ACROSS
1. Scalefin genus (12)
8. Syntarsus thorakalborensis from Madagascar (7, 4)
10. Unusual fish for troubled aquarium water (3)
11. The Spanish of eggs (2)
12. Reverse of sight (5)
15. Expenditure (6)
17. A stunt between banks but sometimes carried by crooks (3)
18. Bladder on bag (3)
20. Slippy catcher (4)
21. Gold of the oranda (2)
22. Catcher of fish (6)
24. Fish of lily family (2)
25. Put to some purpose (8)
27. Variety (4)
28. Unit of electrical resistance (3)
29. Little girl in a pet's nest (2)
31. Look by lacuna (2)
32. Think of income at (1, 1, 1)
33. Ascending rivers to spawn (10)
36. Swimmers (3)
37. Rivers do after rain (4)
38. Mix the fry for fish (3)
39. May be waves (4)

CLUES DOWN
1. Oyster gem, Indian fish (5, 7)
2. To implant firmly (6)
3. An unhealthy condition caused by overcrowding (8)
4. Mouth breeder genus (12)
5. A salmon sport (7)
6. Artichoke, perhaps (9)
7. Objective case of 1 in Medaka (2)
9. Girl or sweetheart of the Sisowat (3)
12. Instrument for measuring percolation of rain through soil (9)
14. Main limbs of water boatmen (3)
16. The French of Lebistes (2)
19. An uncrowded sea (1, 4)
23. And French again, tetra (2)
28. Escape artfully (5)
29. Fertile spot in desert (5)
30. Orfe (3)
32. Aqua — is pure water (4)
33. As good as a week (3)
35. Warrant Officer, Class 1 (1, 1, 1)

PICK YOUR ANSWER

(1 mark each. No cheating, if you please)

1. The naturalist Pallas was: (a) Greek. (b) German. (c) Russian. (d) Swedish.
2. While we are about it, he named: (a) Tetraodon labiatus. (b) Beta splendens. (c) Beta caliculata. (d) Anubias tranquillae.
3. The scientific name of the dragon fish is: (a) Hemibarbus semicentrotaenia. (b) Eocharina elegans. (c) Eotropus semicentrotaenia.
4. Hidacanthus sculchini is popularly known as: (a) Theropy broc. (b) The fire characin. (c) The forest characin. (d) The dwarf tetra.
5. Which of these fish has a supplementary breathing organ: (a) Phoxinus montanus. (b) Chalinocharina elegans. (c) Aequidens elegans. (d) Aequidens elegans.
6. Belontia signata (the comb-tail) is native to: (a) Cuba. (b) Madagascar. (c) Sumatra. (d) Cayman.

G. F. H.
Society News

FILM shows have been popular features of meetings of the Blair Aquatic Society in recent months. The society is building up a library of books of interest to aquarists, and the subjects covered in lectures at the weekly meetings, ranging from water plants to reptiles, indicate how wide these interests are.

LAST month's Open Show of Bristol Aquarists' Society is reported to have been a great success, the hall being filled throughout the two days which visitors viewing the 331 goldfish and 122 tropical entries. The Annual General Meeting of the society followed the show, which the president declared to be the largest ever staged in Bristol.

CARDED pond construction was the topic treated by Mr. A. J. Studen, a member of the Cambridge and District Aquarists' Society, at their November meeting. Nitrification, building methods and planting were fully covered. A members' table show was arranged for the early part of this month.

AT the November meeting of the Coventry Pool and Aquarium Society Mr. E. S. Walker of Birmingham gave a talk on setting up a furnished aquarium, preparing fish for shows and the care, breeding and wintering of shubunkin and vittails.

FROM data obtained from Japanese goldfish breeders, Mr. G. F. Harvey was able to pass on a lot of valuable information to members of the East London Aquarists' and Pondkeepers' Association in a recent lecture. In November Mr. A. Leechster gave a talk illustrated by lantern slides on snakes. Plans for a revival of the association's annual dinner and dance are being made, and it is hoped that this popular event of pre-war days will be held early in the new year.

LAST month's table show of the Guppy Breeders' Society staged nearly 60 guppies, and this event was followed by Mr. W. G. Phillips' lecture on line-breeding. The society's Annual General Meeting is to be held this month.

MEMBERS of the Hounslow and District Aquarist Society were fortunate in being entertained at the home of Mrs. Kathleen Cooke last month, when they were able to examine her fine collection of tropical fishes kept in a well-equipped fish house. At the previous meeting a table show of gouramis and black line tetras was held.

AQUARIST problems of members were answered by Mr. T. Millinson after his lecture on mollies and barbels given to the Nelson and District Aquarists' Society last month.

OWNERS receiving awards at a recent table show of breeders' fishes held in Newcastle-upon-Tyne and District Aquarists' Society gave talks afterwards to other members, describing the methods and details of breeding of their specimens.

NEARLY 7,250 people visited the three-day show of the Scottish Aquarian Society held in Glasgow last month. It was the society's sixteenth annual show, and a new feature was the inclusion of an inter-club class which made the event an "international" one since societies from Ulster and Newcastle entered. A well prepared catalogue of exhibits, covering the 300 entries, included hints on aquarium keeping and enjoyed a full sale of all copies. The panel of three judges included one artist member of the society, the combination working excellently.

GREATER attention to the needs of beginners in aquarium-keeping is the future aim at meetings of the South London Aquarists' Society. No time is to be allotted to "office business" at general meetings unless this should be essential. Last month a fine table show of this year's fry was staged, tropical fishes being represented by fryahs, mollies, guppies, with amano, characins, goldfish, rasbora and angelfish, and dwarf gouramis. Coldwater fishes included vittails and fantails but show entries were absent. Membership of the society is rapidly increasing but the secretary, Mr. R. H. J. Reid, Beverley, Wilbury Avenue, Chesham, Surrey, is still glad to hear from any others interested in joining.

SECOND meeting of the South Western Aquarists' Association was held in October last, Mr. L. F. M. Baker (Mid-Somerset) passed round a home-made heater during his talk on making this appliance. Mr. P. Campion (Bath) read a very interesting paper on cichlids as aquarium fishes.

KINDLY act reported last month concerns a well-known London aquarist and a sick member of The Study Aquarist and Pondkeepers' Club. During this member's illness he derived great satisfaction and experience from keeping and breeding his fishes, and when he required specialist help the club's committee approached Mr. R. G. Meehan, who, despite the many calls on his spare time, visited the aquarist and gave him the necessary advice.

MEMBERSHIP of the Swansea and District Aquarists' Society after only three meetings now exceeds forty and is steadily growing. There were last week reports on live foods and their substrates at which living specimens in small glass tubes were passed around the audience. Shubunkin breeding and standards is the subject of December's lecture.

SPECIAL efforts have recently been made by members of the Welwyn and District Aquarists' Society to interest juvenile aquarists in their meetings. Several local schools were notified and a good attendance resulted at the next meeting. Various fishes were on show and members answered many questions.

THE Wandle Valley Aquarists' Club will be increasing its membership in the new year to a maximum of fifty, and a special meeting for this purpose is to be held on Friday, 5th January. Interested aquarists in the Mitcham area are invited to communicate with the secretary, 46, New Barnes Avenue, Mitcham, Surrey.

FOLLOWING a long run of lectures and demonstrations of practical subjects as making and glazing tank frames, heating aquaria, setting up decorative exhibits and community tank-keeping, members of the West Greenwich and District Aquarium and Pondkeepers' Association last month held a talk on the way that a fish swims. A Sunday outing of members to the London Zoo aquarium also took place last month.

AQUARISTS of the West Middlesex Aquarists' Society have gained awards for tanks entered in open classes for furnished aquaria at the last four shows that have been entered, a matter on which the chairman of the society has given congratulations. A film show was the main feature of the society's November meeting.

MEMBERS of the Palmerston Junior Aquarium Society (U.S.A.) , young folks from 12 to 14 years of age, will be glad to correspond with aquarists of similar ages in Britain. Miss Beren Reinhardt, 439, Lafayette Avenue, Palmetto, Pennsylvania, U.S.A. is secretary.

COPIES of the first issues of the Bulletins of the Federation of British Aquarium Societies and the Federation of Northern Aquarium Societies have been received. The F.B.A.S. Bulletin is issued free with the aim of acting as a liaison between club and non-club aquarists. The F.N.A.S. Bulletin is for the publication of new information on matters of aquarium interest, and contains a review of the tiger barb and breeding in the first issue; it is priced ninepence.

New Societies

ANNOUNCEMENT is made of the formation of the Palsley Aquarium Society, secretary of which is Mr. G. Clark, 10, Well Street, Paisley.

SECRETARY of the newly formed aquarists' society in Rugby is Mr. C. Cook, 45, Fisher Avenue, Rugby, and meetings are held at 7.30 p.m. on the first Friday of each month at the Hillmorton Community Centre in Rugby.

Crossword Solution

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

PICK YOUR ANSWER (Solution)

1 (b), 2 (d), 3 (c), 4 (d), 5 (b), 6 (d).
6 marks—Very good; 5 marks—Good; 4 marks—Fair; 3 marks—Poor; 2 marks—Read the magazine.
TOM NORTH
AQUARIST ---- ORNITHOLOGIST

With a grand show of
TROPICAL FISHES
at reasonable prices

- All sizes of Goldfish, Shubunkins, Comets, Golden Orfe, Catfish, Bitterling, Silver Rudd and Bass, etc.
- All sizes of aquariums, including bowls of various designs.
- Large range of appliances and fish foods.
- High class pedigree Budgerigars.

S.A.E. FOR LATEST LIST OR CALL AND INSPECT
217 ILFORD LANE, ILFORD, ESSEX

MAKE YOUR OWN AQUARIUM

BLACK MAGIC GEN.—No. 5

TWISTED FRAMES

I have purchased a frame and I find it is not quite square. When I lay the glass in its place, there is a gap of about a
inch at one corner while it rests snugly against the frame at
the other three corners. Can I make a successful tank with
it, and can you tell me how to proceed?...

This is a pity, but please do not despair. You can make quite a good job of
it in spite of this serious but quite common defect. In cases of this kind,
always keep that part of the frame which
must receive a thicker deposit of cement than the other parts located at
the top of the aquarium.

In other words: bed
the glass evenly into
the bottom section of
the frame and so allow
any discrepancy to lay
as near the top of the tank as is possible. In this case allow the newly
placed tank to stand empty for a further 48 hours, when all should be well.
(I trust this will not be an inducement to frame makers to be careless with
their work when they are aware that even badly made frames can be made
into serviceable aquarium thanks to Black Magic—of course!)

WONDERFUL NEWS!

Look out for news shortly of the Black Magic "MINI-TANK."—a little tank
7" x 6" x 6" which can be made by any handy person for a few shillings. No
welding—no soldering—no riveting!! Does she intrigue you? The
"B.M." back-room boy wins a great victory over the wretched goldfish
bowl! Please do not write about it—yes. Thank you.

Ask at your local dealer or pet store for Black Magic, and do not be palmed-off
with worthless substitutes. In case of difficulty please communicate
with the undersigned, who can always supply you—and quickly, too!!

XMAS AND NEW YEAR GREETINGS to aquarists everywhere. And to
Wholesalers and Dealers (whether they sell B.M. or not).

S.C. Proprietor: GEORGE F. ROWMAN. Aquarist & Breeder,
4 FAIRWAY, PENWORTHAM HILL, PRESTON, LANCASHIRE

Suggestions for Xmas

TROPICAL FISH

| Neons    | 10/-  |
| Glowights| 10/-  |
| Serpae   | 10/-  |
| Ulrey    | 10/-  |
| Harlequin| 10/-  |
| Beacons  | 4/6   |
| X. Ray   | 4/6   |
| Flames   | 4/6   |
| Alestes Longipinnis | 17/6 |
| Neolebias Trilactus | 17/6 |

and 60 other varieties

COLDWATER FISH

| Goldfish | 9d. and 1/- |
| Shubunkins | 1/6 to 7/6 |
| Large breeding pairs | 15/- pair |
| Fantails | 2/6 to 3/6 |

AQUARIUMS

10/6 to 17/ Special sizes made to order

PLANTS

Tropical ... doz. 4/6 and 7/-
Coldwater ... 4/6

ACCESSORIES

Heaters ... from 10/6
Thermostats ... 10/-
Pumps ... £ 5 0
Garden Pumps ... £ 15 0
e tc., etc.

Back numbers Aquarist and
Water Life in stock
S.A.E. FOR LIST

The PRESTON AQUARIUM
44 BEACONSFIELD ROAD, BRIGHTON
Telephone: Brighton 2920

December, 1950

x1
TOM C. SAVILLE
Fish Breeder
Aquatic Dealer
(Member of the Marine Biological Association of the United Kingdom and the Nottingham and San Francisco Aquarium Societies)
Member of the Aquatic Traders' Association

31 HAWTON CRESCENT, WOLLATON PARK, NOTTINGHAM
(Near 45 Trolley Bus Terminus)

WHOLESALE & RETAIL
Tropical and Coldwater Fishes, Plants, and all Equipment for the Aquarist

IMPORTER & EXPORTER

SPECIAL NOTICE

We are in the process of moving to larger premises, and must apologise for any delays in fulfilling both wholesale and retail orders. Please note that we have now ceased to open on Sunday mornings; our weekday hours remain as usual, 10-6 daily.

Watch for details of opening date and address of our new premises—one thousand square feet of floor space set aside to cater especially for Aquariums!

L. CURA & SONS
NATURALISTS
Water End, Hemel Hempstead, HERTS.

Phone: Water End 44 Established 1859

Goldfish all Sizes

TRADERS SEND FOR LIST

P. Sluis' FISHFOOD

This well-known leading Continental Fishfood is now obtainable in this country. Experts in Holland, Belgium, France, Switzerland and other countries have proved its worth, and are unanimous in praising its qualities.

PACKED IN 3 GRADES
No. 1 (Coarse) for Coldwater fish.
No. 2 (Medium) for Tropicales.
No. 3 (Fine) for Fry (coldwater and trop.)

PER 1/6 CARTON
also in 4d. packets

Ask your dealer to supply, but if unable to obtain locally, send 1/9 for a trial carton, and give us the name of your usual supplier.

A limited number of Wholesalers required in all districts. Please send for Samples and Trade terms.

Sole Importer and Trade Distributor for the U.K.

E. W. COOMBS Phone: BLUEBEL HILL 288
The Woodlands, Walderslade Road, Chatham, Kent

THE AQUARIUM
THOMAS BLACK

Opening Announcement

Our new Showroom is now open with a selection of 40 different tropica at popular prices

SPECIAL OPENING OFFER

A selection of our own-bred Fish given free with each Tropical Outfit. Orders received now for Christmas will get Free Fish offer

TROPICAL FISH

AQUARIUMS

Aquariums from 30/-
Complete Tropical Outfits from £3 upwards

PRICE LISTS ON REQUEST

3-14 DOUGLAS STREET, DUNFERMLINE

Telephone : 1500-1501

THE

STAR NEON SIGN SERVICE

Proprietor: W. Howarth

Verulam Passage, WATFORD

Herts.

Telephone: Gadebrook 2425

CALLING ALL AQUARISTS

We are now manufacturing auto-syphoners and sediment removers and can offer them at attractive prices. Send for price list.

All enquiries for tubular glass-work are welcome and will receive prompt and personal attention.

TRADE ONLY

JOHNSTON’S AQUARIUM

2 London Road, Tooting Junction, S.W.17

Buses 45, 77, 80, 88 and 630 pass door. From Tooting Broadway Tube Stn.

HOURS OF BUSINESS — Mon. and Tues. 10.30-6; Wed. 10-30-7; Thurs. 10.30-7; Fri. 10.30-8; Sat. 10-7; Sun.—advice and viewing, 11 a.m.-1 p.m.

THE NEATEST AQUARIUM

20 x 10 x 12 mounted on metal base 22 x 12 and equipped with hinged cover reflector, and fitted with metal framed condensation tray. Frame drilled to take heater, thermostat and aerator leads.

The Neatest Complete Aquarium on the market at the price

Fitted with thermostat, heater, light fittings and switch—all you do is plug it into the mains

60/-

110/-

THE “NEATA” AQUARIUM

Can be supplied with deeper base to take two light bulbs for heating.

Complete aquarium

With bulbs, fittings and switches

65/-

85/-

PRESSED STEEL AQUARIA

18 x 10 x 10

18 x 10 x 10

18 x 10 x 12

18 x 10 x 12 with cover, glass tray, strip lamp—holder and mounted on metal base—

18-6

19-6

21-6

40/-

ANGLE IRON AQUARIA

(1 base and 32 oz.)

18 x 10 x 10

18 x 12 x 12

24 x 12 x 12

24 x 12 x 15

38 x 12 x 12

38 x 12 x 15

35/-

37/-

45/-

55/-

72/-

85/-

TWO TIER STANDS

24 x 12 x 36 high

35/-

OFFERS OF GOOD QUALITY HOME BRED TROPICALS WANTED

At the time of going to press, the following are in stock

PADBOURN AQUARIUMS
(PADBOURN LIMITED)

We have one of the greatest varieties of healthy tropical fish in London, *all British bred*; also a large selection of plants and an excellent stock of equipment and accessories for the aquarist.

**RETAILERS ONLY**

**LIVE FOODS ALWAYS IN STOCK**

8 CHAPEL STREET, MARYLEBONE, LONDON, N.W.1

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**Christmas Greetings**

to

**All Aquarists**

from

**WINGATE**

DE LUNN BUILDINGS,
JEWRY STREET,
WINCHESTER

Telephone 2406

MY LATEST PRICE LIST CONTAINS MUCH OF INTEREST. WHY NOT SEND FOR IT AND SOLVE YOUR CHRISTMAS GIFT PROBLEMS?

---

**ARE YOUR FISH OUT OF SORTS?**

A very slight change in the pH value of the water in your aquarium makes a great deal of difference to the comfort and well-being of its inhabitants. The pH measurement is easily checked to within 0.3 pH by the JOHNSON COMPARATOR TEST PAPERS. Books of twenty leaves 2½ in. by 3 in. are sold in boxes of one dozen. The most useful COMPARATOR books for the aquarist are:

No. 5267 for pH 5.2 to 6.7
(faintly acid to neutral)
No. 6883 for pH 6.8 to 8.3
(neutral to faintly alkaline)

Enquiries and orders can be sent to
PHILIP CASTANG, 91, Haverstock Hill,
Hampstead, London, N.W.3

PHONE: PR. 1842

MANUFACTURED BY
JOHNSONS OF KENDON LTD.
Established 1743
THOMAS BLACK
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Aquariums from 30/- Complete Tropical Outfits from £3 upwards
PRICE LISTS ON REQUEST
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Telephone: 1500-1501

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Verulam Passage, WATFORD
Herts.
Telephone: Gadebrook 2425

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TRADE ONLY

Johnson’s Aquarium 2 London Road, Tooting Junction, S.W.17
Buses 45, 77, 80, 88 and 630 pass door. From Tooting Broadway Tube Stn.

HOURS OF BUSINESS — Mon. and Tues. 10.30-6, Wed. 10.30-1, Thurs. 10.30-7. Fri. 10.30-8. Sat. 10-7, Sun.—advice and viewing, 11 a.m.-1 p.m.

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The Neatest Complete Aquarium on the market at the price
60/-
Fitted with thermostat, heater, light fittings and switch—all you do is plug it into the mains
110/-

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Can be supplied with deeper base to take two light bulbs for heating.
Complete aquarium
65/-
With bulbs, fittings and switches
85/-

PRESSED STEEL AQUARIAS
14 x 10 x 10
18 x 10 x 10
28 x 10 x 12
28 x 10 x 12 with cover, glass tray, strip lamp
holder and mounted on metal base
18/-
19 6
21 6
40/-

ANGLE IRON AQUARIAS
18 x 10 x 10
18 x 12 x 12
24 x 12 x 12
24 x 12 x 15
38 x 12 x 12
38 x 12 x 15
35/-
37 6
45/-
55/-
72/-
85/-

TWO TIER STANDS
24 x 12 x 36 high
35/-

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December, 1950
Whitwell and Smykala
THE BREEDERS OF TROPICAL FISHES
WEST BERGHOLT, Nr. COLCHESTER, ESSEX
Telephone: FORDHAM (ESSEX) 223
Telegrams: TROPICALS, COLCHESTER

WE ARE BREEDING REGULARLY AND IN LARGE NUMBERS SUCH VARIETIES
AS H. HETERORHABDUS, H. ROSACEUS, H. SERPAE, H. PULCHER, NANNOSTOMUS ANOMALUS, AND THAYERIA OBLIQUA, IN ADDITION TO THE
USUAL KINDS

ALL FISH OFFERED FOR SALE ARE BRITISH BRED

BY ORDERING OUR FISH THE TRADER AND HIS CUSTOMER ARE FREED FROM
ALL WORRY ABOUT THE POSSIBILITY OF DISEASE

A POST CARD WILL ENSURE THAT TRADERS RECEIVE OUR WEEKLY LIST

RETAIL—CALLERS ONLY

WADDINGTONS
of BRIGHOUSE
FOR ALL AQUARISTS’ REQUIREMENTS
Telephone: Brighouse 439

EVERYTHING FOR THE FISH KEEPER IN STOCK
INCLUDING ALL STOCK SIZES OF TANKS,
TOP COVERS, HEATERS, THERMOSTATS, AIR
PUMPS, ETC., ETC.

60 VARIETIES OF TROPICAL FISH
USUALLY IN STOCK
CALL AND SEE OUR DISPLAY

For the benefit of those unable to attend
during normal shop hours, we are open on
Monday, Wednesday and Friday evenings
from 7 to 9 p.m.

7, BETHEL ST., BRIGHOUSE, YORKS.

DENSON
AVIARIES and AQUARISTS
557 BATTERSEA PARK ROAD,
BATTERSEA, LONDON, S.W.11

Come to us for your
TROPICAL
and
COLDWATER FISH

Illustrated — our Three-
Tier Stand, to take three
24 x 12 x 12 in. tanks. Prices
as follows:— Stand £2 5s.,
plus carriage; Tanks for
same, £2 10s. each, plus
carriage. Also Bow-fronted
Aquariums, perfectly fin-
ished, 24 x 12 x 12 in., £5 5s.
each, plus carriage.

Hours of Business:
9 a.m. to 6 p.m.
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