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THE AQUARIST
# Queensborough Fisheries

**See Overleaf for Further Information**

It may be necessary to withdraw certain plants owing to the time of year.

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### Tropicals

<table>
<thead>
<tr>
<th>No.</th>
<th>10 plants including:</th>
<th>Cost</th>
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<tr>
<td>1</td>
<td>Variegated Waxplant</td>
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<tr>
<td>12</td>
<td>Myriophyllum</td>
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<tr>
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<td>Ludwigia</td>
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<td>Elodea Densa</td>
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<table>
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<th>No.</th>
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<td>Giant Amazon Sword Plant 6-8 inches</td>
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<tr>
<td>12</td>
<td>Elodea</td>
<td>£1</td>
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<tr>
<td>1</td>
<td>Amazon Chain Sword</td>
<td>£1</td>
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<tr>
<td>1</td>
<td>Porcini Riccia</td>
<td>£1</td>
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<tr>
<td>1</td>
<td>Pteriella</td>
<td>£1</td>
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### Tropical or Cold

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<th>No.</th>
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<tr>
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<td>Dwarf Hygrophyta</td>
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<tr>
<td>1</td>
<td>Aquarumalaleum</td>
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<tr>
<td>1</td>
<td>Vallisneria</td>
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<tr>
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<td>Elodea Densa</td>
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<td>1</td>
<td>Porcini Riccia</td>
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<td>Vallisneria</td>
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### Live

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<tr>
<td>Dipteria</td>
<td>2/-</td>
</tr>
<tr>
<td>Tuberosa</td>
<td>3/-</td>
</tr>
<tr>
<td>Microcarpus</td>
<td>3/-</td>
</tr>
<tr>
<td>Wiltonian (Sea Kelp)</td>
<td>6d. ea.</td>
</tr>
</tbody>
</table>

**Owing to Popular Request Our Wraysbury Branch Will Be Open on Saturdays As Well As Sundays From 10 a.m.—4 p.m.**

Queensborough House, FERAY LANE, HYTHE END, WRAYSBURY, Nr. STANSTED

January, 1966
Special News
See Page ix

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ALL POSTAL ENQUIRIES TO GOLDHAWK ROAD ADDRESS
The Aquatic Dealer
by R. S. B. PINKS

The real dealer is the chap who gives you a pair of fish when you ask for two, and he should be carefully selected, because you will probably be together for life. It is preferable to begin the selection process when you are at school, partly because you have longer at it this way, and partly because the togetherness of the dealer and the schoolboy makes Freemasonry look like a Christmas club.

The muddy youth enters the shop with much clanking of bottles and cans containing murky and haunting liquids. Without so much as a wink the dealer takes them, decants the contents, and passes across in return a little silver or a plastic bag containing some vivd specimen from the tropics. Departs the youth, with no more than a look, which says plainly enough "Back on Saturday". Witness also the dealer with the look on his face of one who has done a big and satisfactory deal. Rates of exchange are never discussed; they never are, with experts on the job.

Goldfish from the Barrow

I suppose the earliest dealer I ever came across was the then-familiar figure in the streets of the East End of London—the old-clothes man who gave goldfish in exchange for one's left-off. It was quite surprising how easily these goldfish used to die afterwards (not that I ever got any of them, as we never had many left-offs to exchange for goldfish); I never knew of one which survived for more than a week or so. This was not entirely due to the ignorance of their keepers, as the fish they bought from Woolworths used to thrive. No doubt it was the life on the barrows which disagreed with them.

Then there was the dealer who never really was. He was a silent but handsome man who used to lurk in the shadows behind a vast tank containing a solitary jack pine. It was a magnificent spectacle, for the schoolboy, on his way home, to stop by this shop and gaze at length through the windows at the Keeper and the loaf. Our hearts were heavy when at last a luscious shop of female clothing covered the little pine from our lives—we never even found out where he went to.

The dealer who came to the school to lecture on aquaria
so scared us over the possibilities of losing our tropicals from some grisly disease that we hung on to our coldwater collections for a long time to come, but my own caution was overtaken by enthusiasm on one of my birthdays, when I was given a splendid aquarium, complete with chimney side pieces and a mirror back. It even had a plate-glass cover (curiously, even today, the height of opulence). I made the startling decision that I would keep the first British temperate guppies; it was then August, and with a little luck on my side I could acclimatise them by the onset of winter. My kindly dealer sold me a pair but warned me that I could change them for something more suitable if I later wished. That’s what I did, and I returned to dealers from an early age!

All went well for a week or so, and the female even produced a score or so of young. However, the latter weeks of September cooled things down to such an extent that even my conscience overcame me, and I decided that the guppies should have some heat after all. As we had no electricity, only gas, and there was parental opposition to the heating project as a whole, I had to turn to the simple was right-light placed below the tank suitably separated from it by a thin sheet of tin. I duly raised the tank on blocks of wood, put the tin and night-light in place, and announced to the family that all this fuss about heating was really a bit of a racket on the part of the Trade. At about 2 in the morning the glass bottom of the tank cracked with a sickening sort of noise which cannot be reproduced in print, and I spent the rest of the night mopping up and working out how many sunfish I could get into an 18 inch tank.

Back to the dealer went the guppies (the young went to the school tank), by kind arrangement with the Biology Master, with whom I was on nodding terms), and in their place was substituted a pair of paradise fish, quite the least pleasant creatures I have ever accommodated in the piscine line. They rapidly returned to the shop, to be followed by a succession of sunfish and bass which charmed us for a long time to come. The important feature of this cascade is that not a single coin changed hands between the acquisition of the guppies and the second round of bass. How this happened, I cannot quite fathom, but it goes a long way to establish the long-suffering tolerance of the dealer to the fancies and frustrations of youth.

Today’s Dealers

The dealer today is a very different being—an opulent molly whom one never sees because of the highly organised state of the industry. Doubtless, like a huge carp, he sits in a glass and chromium tank high above the metropolis growing fat on what man casts upon the waters, yet never getting caught himself. Perhaps this is a good thing for most of us, after all, for things seem to have been quite so flourishing, with all the resultant economic benefits to the amateur. I cannot think of a hobby I have ever had anything to do with in which prices have remained static over the years, and in some cases, have actually dropped. No doubt there are all sorts of sinister reasons why neon tetras should only now cost half a dollar (as compared with 10 bob, when I first started collecting), but this sort of fact tells you when you are about to try and convince your better half that it is high time you took the hobby up again.

The small dealer is, perhaps, the most changed being, when one views the phenomenon in retrospect. He is no longer a purveyor, he is an expert; he not only knows the difference between coldwater and tropical fishes, he knows all their names; he not only knows all their names, he knows the scientific ones too, and can pronounce them correctly. Furthermore, he can baffle the wretched things like better than you can, and has written papers on this and that. He gets into Print distantly regularly, and has found a number of errors in the Lecial Ediion. All this puts him in a class of his own—something awe-inspiring almost. Yet, only the other day I saw him in deadly conversation with a jam-jar-laden lad in the corner of the shop. Something changed hands, and perhaps it wasn’t altogether coincidence that, in the window the following day, there appeared those hundreds of tadpoles, priced at six for twopence!

HOUSE PLANTS FOR THE FISH HOUSE

Spider Plants

(*Chlorophyllum*)

A n easy to grow, attractive plant for the fish house is the spider plant, Chlorophyllum. As the photograph shows, the plant has long narrow strap-like leaves, striped with yellowish white and green. The name comes from its long spider-like runners which can reach several feet in length and which bear both small flowers and small seedlets. If the runner is pegged into a pot of soil at a plantation, it will root and the resulting small plant can be severed when it grows larger.

Chlorophyllum grows fairly rapidly and can be rooted on in John Innes Potting Compost no. 2, when necessary, into a larger size of pot. The plant can soon reach a larger size, the leaves reaching 17 inches or more in length. The plant likes a lot of light but not too much direct sunlight in summer. It should be watered well in summer, but only when dry in winter. Liquid feeds in summer are advisable.

A plant suspended from the roof of the fish house, in a hanging basket, makes a very exotic decoration, enhancing the fish house environment.

B. Whitehead

THE AQUARIIST
The Rosy Tetra

by H. E. R. THOMPSON

The characin family contributes perhaps a greater number of beautiful fishes to our aquaria than any other family: they are usually long-lived, are hardy and easy to maintain in good health and of a size most suited to the average aquarium, some not exceeding 3\(\frac{1}{2}\) to 4\(\frac{1}{2}\) in. at full growth. Add to this the fact that they are peaceful by nature (with few exceptions) and it is little to be wondered that they have attained such popularity. Not least among them is the beautiful rosy tetra (Hyphessobrycon rosaceus).

This fish is native to the fresh waters of British Guiana and Brazil, where it inhabits the jungle streams and rivers. In a community tank a shoal of four to six shows off to the best advantage, where they add charm and beauty with their gentle but lively disposition. The requirements of the rosy tetra (or rosacea as it is so often called) are fairly simple: soft, slightly acid water is preferred with a temperature of 74°-80°F (23°-27°C). Given these conditions the coloring of the fish is noticeably intensified; a dark background also tends to bring out the colour.

Prepared dried foods are readily accepted, but, like most of our fishes, they show an increased interest when live food such as white worms, Daphnia or mosquito larvae is introduced.

The male rosacea carries a large dorsal, which is the greatest distinguishing feature between the sexes: it is mainly black with perhaps a slight edging of white towards the tip and tends to curve, giving the appearance of a feather. His anal fin is also somewhat larger than that of the female and has a distinct hook at the tip; it has a rose hue with a milky white edging towards the tip. The tail or caudal fin carries splashes of red and the same applies to the ventral; pectorals are clear; an adipose fin is present in this species. Body coloring is of a rosy shade finished through silver, tending to become darker on the back of the fish. No shoulder bar is present as is seen in its near relative Hyphessobrycon serpens. A maximum size of 2 in. is reached by good mature male specimens; females are slightly smaller, and carry a smaller dorsal, which has a splash of white and red at the upper extremity.

Hyphessobrycon rosaceus is not classed among the more readily breed fishes of the family, but nevertheless responds to the correct conditions. The greatest difficulty appears to be in obtaining a pair that will mate. I have tried with many pairs without success, but once a "true pair" are discovered spawning is comparatively easy and can be repeated at frequent intervals. Quite a small tank will suffice for the spawning but fry would need to be moved to larger growing on quaters when approximately \(\frac{1}{2}\) in. in size. I invariably use a 24 in. by 8 in. by 8 in. angle-iron tank filled to a depth of 5 to 6 in. with soft, slightly acid water. A temperature of 80° to 82°F (27°-28°C) is maintained during breeding. Before introducing the pair to the tank a bottom layer of pea moss is added to form a dark bottom; the breeders seem to prefer this and later it supplies a hiding place for the tiny fry, which can be seen hopping about like minute fins before they reach the free-swimming stage.

The numbers of a brood will vary according to the size and condition of the breeders but the average is within the region of 80 to 100. The usual method of feeding applies, namely, Infusoria, brine shrimp, microworm, followed later by finely sifted dried foods or Grindal worms or chopped white worms. Growth is slow in the first stages, but once the babies are taking dried foods and white worms rapid progress is noted. A tank containing a brood of these attractive, perky little fishes of a size \(\frac{1}{2}\) to \(\frac{1}{4}\) in. is a wonderful sight and makes the attempt at breeding the rosy tetra worthwhile.

Stocking Your Community Tank

by JOHN GRAHAM

You've just been persuaded, after a visit to see your friend's tropical fish, to start your own community tank. You've set up the tank, aged the water, started a few plants and even had a trial couple of swordtails in the tank for a week during the last fiddling with the thermostat and they flourished—so now you're ready to get some fish. How many can you have in your tank? Look up the leaflet your friend gave you. Ah! Yes, well that's clear enough: 1 inch of fish per 24 square inches of water/air surface. Well, let's see, that's 12 inches of fish in your 24 in. by 12 in. by 15 in. tank. So you can prepare a list of the fishes you want.

Now let's look through the book with the colour plates and choose. Look—a bit here on stocking too—1 inch of fish per gallon! Let's see... that's 15 inches! Somewhere you've got another 3 inches of fish to go in already. Jolly good.

But now the doubt creeps in—one recommendation is based on water/air surface area per length of fish and the other on the water volume per length of fish. They aren't both right, can they? Look up The Aquarian—back copies from friends. Let's see... Atlantic Tropical Aquarium Quarries... 'you can afford 20 pairs of 3-5 inch fish in your 36 in. tank'. Hold on!—that's about 55 inches of fish in your size tank!

By now, of course, your book with the colour plates has persuaded you that you want to keep at least a pair of about 25 different species, while your handbook has grossly told you of the dangers of overcrowding in a community tank. What do you do? Well, I hope I've caught you in time! The answer is to read the rest of this article!

Air/Water Surface

The stocking of your community tank, apart from the obvious need for compatible fishes, depends on the ability of the fishes to obtain oxygen from that dissolved in the water and on the fact that more oxygen is dissolved, to make up this loss, at the water/air surface.

The amount of oxygen that a fish consumes is roughly proportional to its bodily size, and by this I mean volume rather than length, so that we can expect a small fish to need less oxygen than a larger one. Also we expect an inch-long neon to use less oxygen than 1 inch of a 3 inch swordtail, because of the differences in thickness of the fish in each case.

Thus our inch neon can be expected to need far less water/air surface than our 3 inch swordtail both because it is shorter and because it is thinner, and the first recommendation we came across seems wrong because we are left to ask how thick should the inch be! The second recommendation seems wrong because it has no reference to the amount of water/air surface there is, and doesn't seem to care whether we have air or an airtight lid above the tank water (although the fishes might!).

The most authoritative data available to me were those published by Axlerod et al. in Exotic Tropical Fish, and those when plotted for different sizes of fishes gave curve A in the graph. Let's see how these rules of thumb compare with the research data.

Safe Allowances

The 1 inch per 24 square inches rule is a proportional recommendation and gives the upper straight line (B). You will notice that this very much overestimates how much surface area a small fish needs, while above 5 inches in length it underestimates the amount required, by quite a large amount. The 1 inch per gallon line (C) has been plotted for a 24 in. by 12 in. by 15 in. tank and you can see that it has the same fallings as curve B. In fact we might even follow the pattern and use another rule of thumb, which says 1 inch of fish per 10 square inches of water/air surface (D), and we would still have a safety margin if we did not expect to keep fish greater than 3 inches long.

Well that's all very well... but you can't be bothered to carry a graph around with you, so is there any easy rule which is more accurate than these previous rules, but still easy to work out. Yes, we're lucky, there is...
Breeding and Keeping Daphnia in the House

by JOYCE H. PARTRIDGE

A number of articles have been published describing methods of breeding and keeping Daphnia. All of them require large drums, containers, or ponds in gardens, to which rain water and rooted vegetation or mosses are added. Many aquarists live in flats or houses with small gardens or no gardens at all. In these circumstances a means of breeding Daphnia without the use of large containers had to be devised.

I picked up a large bag of Daphnia, and from it selected the larger and plumper Daphnia, and placed about 50 of them in a plastic bucket of tap water (approximately 3 gallons) adding six drops of liquid fry food (egg layers) as a nutrient.

My husband, who is a laboratory technician, set up cultures of tap water plus various nutrients such as rooted lettuce, grass, mariner, hard-boiled egg.

At the end of the first week all of the Daphnia in my husband’s cultures were dead, but those in the fry food were doing well and breeding happily. I took about 200 newly born Daphnia and fed them to my 2-week-old penguin tetra fry. By the end of the following week the Daphnia were still healthy and producing large numbers of young. The culture is still in use 6 months later.

The method of breeding Daphnia in the house with egg layer fry food is extremely successful and it is recommended that it be carried out in this way.

Take a plastic bucket (3 gallons capacity). Fill it with tap water. Add six drops of the fry food from the tube. Place a number of Daphnia into the bucket.

The next day and each successive day add six drops of the fry food. From time to time add some green water. Every 5 or 6 weeks change about half the water in the bucket for fresh tap water. This keeps the culture from becoming fouled. It should be noted that care should be taken when changing the water not to disturb the Daphnia unduly, as they tend to die if they are agitated.

To ensure that sufficient Daphnia are available, it may be advisable to have two cultures working, especially when the aquarist has a large number of fishes to feed.

My husband and I have 170 adult fishes ranging from mosquitos to cichlids and anything up to two hundred fry in various stages of growth, and find that the Daphnia culture is indispensable to our feeding programme of a balanced diet.

Not only does the breeding of Daphnia in the house mean that a supply of live food is always available, it also saves money for the aquarist whose only source of supply is the pet shop from which a small bag of dead or dying Daphnia will cost as much as a shilling.
A Dual-Purpose Aquarium Stand

*by David Marlborough*

For one public exhibition at which the British Ichthyological Society had a display it was found necessary to make an aquarium stand supporting a 5-foot run of tanks. To keep costs down, it was also designed to be re-erected in a member's house for domestic use. These specifications demanded a stand which was: (a) capable of bearing loads in excess of 400 lb. of water and equipment; (b) rigid, especially with the public jostling around the stand on display; (c) attractive both on display and in the home; (d) made in small sections, versatile in whole and in part, capable of easy erection and dismantling. The sections had each to be small enough to transport in small vehicles.

The B.I.S. Stand Committee rejected a welded stand out of hand. A suitable one could be made in any of the proprietary slotted-angle strips, but it was felt this would give a very 'utility' appearance, despite its answering the other specifications. It was agreed finally to make the stand from elements of a proprietary laboratory tube system (Climpex by B. Harrison Co.).

The Climpex system uses proprietary clamps to fix tubes of 0.3 to 0.35 in. diameter in its constructions. The tubing used for the B.I.S. stand was 1 in. gas barrel, a standard and cheap size with an outside diameter of 0.55 in. This is recommended by the maker of Climpex.

**Erecting for Exhibition**

The stand plans called for a horizontal run of 6 feet of different sized tanks, raised 4 feet above floor level for optimum public viewing of 12-inch-high aquaria. The standard width of tanks was 12 inches, which gave an allowance of 15 inches for the width of the stand—so allow for clamps, wires, back-settings etc. To make a stand of these dimensions 85 ft. of gas barrel was needed, cut into four 6 ft. lengths, eight 4 ft. lengths, two 4 ft. 3 in. lengths and 15 lengths each 1 ft. 3 in.

The 6 ft. and 4 ft. lengths were clamped into two identical 'front elevations' (see diagram), and these skeletons were joined by the 15 in. cross-pieces. Three such cross-pieces were put along the base, and the rest along the top to support the run of tanks. With larger tanks, more cross-pieces can be used within the frame for bracing rather than along the top for load-bearing. As a final measure, the two 4 ft. 3 in. lengths were clamped diagonally between the front and rear elevations, making the whole totally rigid.

For the exhibition, the stand required only 'feet' to prevent the vertical 4 ft. elements from marking the floor, and two points on the rear elevation for screwing it into the woodwork of the display with P.K. screws.

The clamps needed for the structure were: (a) 42 fixed right-angle clamps (Climpex no. 35A); (b) four swivel right-angle clamps for attaching diagonal braces to horizontals or uprights (Climpex no. 53A); (c) six clamps with flanges and screw-holes, for use as 'feet' and for points for woodwork attachment (Climpex no. 55C).

**Erection for Domestic Use**

The principles of erecting the tubular framework are the same as before, except that space is saved by erecting it vertically. That is, it is new 6 ft. high and 4 ft. wide, and as such can stand in a convenient alcove or space, giving a front-tier construction.

All that is necessary to effect the change is to place the fixed-clamp 'feet' on the base of the new 6 ft. verticals, to clamp the 15 in. cross-braces on the 4 ft. horizontals (this making them into load-bearing shelves), and to place the diagonal braces at the sides of the construction, so that they do not interfere with access to tanks placed within the framework.

With extra gas barrel one can add as many 4 ft.-long pieces as the number of tanks requires, cross-bracers being added as needed. Wooden shelving laid on these will give

*Continued on the facing page*
Moenkhausia pittieri

by JACK HEMS

THIS 2½-3 in. member of the family Characidae, which is popularly referred to by some writers as the diamond tetra, is native to a rather restricted area of Venezuela (Lake Valencia), and has been known to a few keepers in this country and the U.S.A. for little more than a quarter of a century. That it is not more popular than it is at the present time is hard to understand; for it is a beautifully coloured, active and peaceful fish that will flourish in any roomy tank filled with soft, acid water and maintained at a temperature in the neighbourhood of 78°F (25°C) with a range of about 7°F either way.

The small-scaled body is elongated diamond-shaped, slightly compressed, and predominantly heavy yellow with green and gold reflections on the head and sides and an anterior blue to violet sheen on the basically silvery belly. A longitudinal stripe of steely blue sometimes shows quite clearly on the flanks and extends to the bifurcation of the anal fin. This fin, and the dorsal, anal and ventral fins are suffused with blue to violet that varies in intensity according to the fish's mood, and pales to white at the tips approaching some of the edges. The pectoral fins are clear. The large black eyes are surmounted with rims of metallic silver.

Taking the sexes apart is quite easy; apart from the more prominent colours and sturdier build of the female, the male of the male is extraordinarily well developed and highly over the back in a splendid scimitar-curve. The anal fin, too, is of larger-than-usual proportions.

The breeding of M. pittieri is no problem at all because it will eat dried or live food with almost equal relish. All the same, live food, or substitutes for live food, such as scraps of fish, should be provided as often as possible to maintain the fish—an essentially carnivorous species—in radiant condition. M. pittieri, like its better-known and larger relative called the Green Tiger (A. tetra), has a proclivity for certain vegetable matter, and is especially fond of nibbling at such plants as nattas, which is really a higher stage, and duckweed.

The species can be spawned without much difficulty in a well-lighted and spacious tank, but the fry are not among the easiest of baby fishes for the breeder with little experience to manage, because they are readily susceptible to changes in temperature, and for the first few days of their lives they need copious quantities of the tiniest live food (freshly cultured Infusoria). Then, as they begin to make headway, they need frequent feedings of micro worms, brine shrimps, sifted Daphnia, tiny gast larvae and the like until they develop more catholic tastes and can go on to more varied fare.

The spawning procedure is typical of the smaller characins we know well. That is to say, after some chasing around the aquarium, the pair get together in dense plant life growing at or near the bottom and there deposit some eggs. This performance may be repeated several times before the chasing eases off, whereupon the spawned-out fish should be removed from the aquarium before they get a chance to eat the eggs.

At a temperature of 78°F (25°C), the fry hatch out in a matter of 2 or 3 days, and a day or two later become free-swimming. As there are usually a lot of them (at the start, anyway), the provision of gentle artificial aeration promotes rapid growth. Young M. pittieri are more silvery than brassy in coloration, and it is not until they are a few months old that the males begin to develop their distinctive dorsal and anal fins. According to the frequency of feeding, and the quality of the food they are given, combined with the swimming space at their disposal, both sexes attain full size and colour in from 6 months to a year.

A Dual-Purpose Aquarium Stand

continued from the facing page

Measure space for accessories (guppies etc.) or books, as well as aquatic. The structure described can accommodate five 12-in-high aquaria with allowance for top space.

If one arranges the heaviest tanks near the floor, and the lightest articles on the topmost tier, the structure will be strong enough in use to obviate any attachment to the wall which is an important point in domestic situations.

The tools needed for this work are few—a steel rule, hacksaw and file for cutting and cleaning the lengths, a hammer for tightening the clamps. Thumbscrews are available on the clamps as an optional extra. B.I.S. experience has been that assembly or dismantling to either position takes two men well under an hour, given the cut lengths. Measuring and cutting takes scarcely as long even with a single pair of hands.

Gas barreled (or Clipper's own tube) can be bought in a variety of finishes, making the structure corrosion-proof and smart. For economy, unplated tubing can be painted with aluminium paint. Whatever the finish, the end result does not look out of place in exhibition hall, laboratory or domestic room.

This method of constructing aquarium stands is versatile, and is applicable to a wide variety of uses, scientific or amateur. Amateur aquarists or animal technicians may find this account might solve similar problems they experience.

I would like to thank B.I.S. members for their help in its use, Mr. B. Harrison of Clipper for his assistance in its construction and erection, and Mr. B. Harrison of Clipper for the supply of clamps and his invaluable advice. So far this stand has been to two exhibitions besides its domestic fish-house role, and its success is largely due to these gentlemen's efforts.
Towards the latter half of 1961 I was lucky enough to have some Simpson swordtails brought over for me from America. These fish had, at that time, been reported in American journals but, to the best of my knowledge, no live specimens had been seen in this country.

The specimens that I obtained were of the Turquoise variety, with red bodies and black finnage. There were two females and one male. The overall size was 1-1/4 inches body length, which for adults was on the small side. Its coloration, although appearing black, was not the rich dense black one usually associates with the black-tinted varieties of swordtail.

My first thought on obtaining these specimens was to increase my stock by breeding. A glance at the females suggested that very small broods would be obtained and it was decided to mate the male with a large virgin all-red female of the common swordtail variety. This latter strain of fish had been in my collection for some time and members of this strain had collected many cards in club and open shows. By adopting this line of breeding it was hoped that large broods would be obtained and also some body size would be bred into the progeny. A more detailed account of the breeding experiments will be given later.

Before concluding I would like to point out that the only outward difference of a Simpson swordtail lies in the extension in the rays of the dorsal fin. Ray counts have shown that on average the actual number of rays in the dorsal is the same as in the common swordtail but that certain of the rays are extended. An actual ray count, with the length of the extended rays given in multiples of the shortest ray, is given in Table 1. This structure of rays produces the long flowing dorsal which can extend the fin to well beyond the caudal peduncle in the raised position.

<table>
<thead>
<tr>
<th>Ray number</th>
<th>Length</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3.8</td>
<td>B</td>
</tr>
<tr>
<td>5</td>
<td>4.4</td>
<td>B</td>
</tr>
<tr>
<td>6</td>
<td>3.8</td>
<td>B</td>
</tr>
<tr>
<td>7</td>
<td>3.8</td>
<td>B</td>
</tr>
<tr>
<td>8</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3.8</td>
<td>B</td>
</tr>
<tr>
<td>10</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>3.8</td>
<td>B</td>
</tr>
<tr>
<td>12</td>
<td>2.8</td>
<td></td>
</tr>
</tbody>
</table>

*B denotes branching

Reverting for one moment to the coloration of the dorsal fin; the results of the breeding produced some Simpson swordtails with red finnage and here again the coloration was not as dense as in the common all-red swordtail. My argument for this lack of intensity of color is as follows. The dorsal fin in the Simpson swordtail has a surface area several times greater than the dorsal of a common swordtail. Assume that the number of pigment cells in the dorsal fins of both types of fish is the same. Then it follows that in the Simpson swordtail there must be a dilution of colour in the dorsal as the pigment cells will be spread over a much wider area and will therefore not show as intensely as in the smaller dorsal of the common swordtail. It must be stated that all the other fins were comparable in coloration with those of the common swordtail.

Breeding was carried out as systematically as possible and careful notes were taken of the broods obtained and the various cross-breeding subsequently carried out. Before it was possible to breed from the original females both had died, although they were in the presence of the male for at least 3 months in my tanks. This led me to believe that the female of the species was sterile, although later breeding experiences did not support this idea. The only existing breeding records are therefore based on the cross between the original male Simpson swordtail and the common-type all-red female, remembering that the male had black finnage.

The first brood was born on the 9th January, 1962, and 51 fry were obtained. Two months later it was possible to select the various types and colours of fry and to divide them into separate tanks. Four types of fish were obtained as detailed in Table 2.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Number in brood</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>High dorsal and black finnage</td>
<td>11</td>
</tr>
<tr>
<td>B</td>
<td>High dorsal and red finnage</td>
<td>17</td>
</tr>
<tr>
<td>C</td>
<td>Common dorsal and black finnage</td>
<td>12</td>
</tr>
<tr>
<td>D</td>
<td>Common dorsal and red finnage</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Total in brood</td>
<td>51</td>
</tr>
</tbody>
</table>

From this first brood it can be assumed that the high dorsal character of the male is not dominant to the common dorsal, there being roughly equal numbers of fish with high darsals and those without. Secondly, the colour characteristic of the male was not dominant to that of the females as, once again, there are roughly equal numbers with black finnage and with red finnage.

It was now possible to select several pairs from the first brood for further breeding. Care was taken to separate the males from the females as soon as they were sexual and eventually to select only the best specimens.

The second series of selective breeding was aimed at confirming the initial conclusion about the lack of dominance of the high fin character. This was carried out in two distinct crosses: (1) a male with two females from the first brood with like character, i.e. that of the original male with black finnage and high dorsal; (2) a male and a female of the first brood with all-red finnage and high dorsal.

Results of these breeding experiments are given in Table 4 for the cross involving all-black finnage and in Table 4 for the fish with all-red finnage.

The Aquarist
Table 3

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Number in brood</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>See Table 2</td>
<td>20</td>
</tr>
<tr>
<td>B</td>
<td>Green body, high dorsal and black finnage</td>
<td>14</td>
</tr>
<tr>
<td>C</td>
<td>Green body, high dorsal and green finnage</td>
<td>8</td>
</tr>
<tr>
<td>D</td>
<td>Green body, common dorsal and black finnage</td>
<td>6</td>
</tr>
<tr>
<td>E</td>
<td>Yellow body and finnage with common dorsal</td>
<td>3</td>
</tr>
</tbody>
</table>

Total in brood 63

Table 3 shows a ratio of 2:1 for high dorsal to common dorsal, and, as far as coloration is concerned, roughly equal numbers having the original male's black finnage and with self-coloured finnage. Thus a ratio of only 2:1 for the high fins does further suggest that this character is not dominant, as if it were the ratio should have been in the order of 3:1. The advent of the green and yellow coloration was discontinued in further breeding experiments.

Table 4 gives a ratio of 2:1 for high dorsal to common dorsal. Coloration gives a ratio of 2:1 for self-coloured finnage to black finnage. It must be remembered that the parents of this brood had all-red finnage and so this coloration might have a slight dominance in the fry.

Further breeding gave similar results to the foregoing and it was never possible to obtain a ratio higher than 2:1 for the high-finned fish. From these results it would seem that the high-fin character has never been a dominant feature in the make-up of these fish and one has to be content with breeding only 60 per cent of high fins in every brood.

Reverting to the general standard of the fish breed; the largest fish that I obtained from these broods was an all-red high-fin female which attained a body size of approximately 2 inches. The males never developed any appreciable size and were rather poorly shaped swordtails. From the point of view of colour, apart from the lack of colour in the dorsal, most fish carried a major fault in coloration—that of a silvery underside.

As show fish it would appear that the Simpson swordtail has little to offer over the common varieties. The only success I had in shows with these fish was a first award in an open show in May 1962, in the livebearer breeders' class. Single entry fish in a swordtail class never achieve high honours and I do not think that many do get into the cards, mainly because of small body size, silvery underside and lack of colour in the dorsal fin.

Table 4

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Number in brood</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>See Table 2</td>
<td>20</td>
</tr>
<tr>
<td>E</td>
<td>See Table 3</td>
<td>10</td>
</tr>
<tr>
<td>G</td>
<td>Yellow body and finnage with high dorsal</td>
<td>7</td>
</tr>
</tbody>
</table>

Total in brood 48

Shedding some Light on Aquarium Plants

by K. N. PULESTON

Much has been written and discussed in recent years on the effects of various types of artificial lighting on aquarium plants. The following account of experiments are the author's personal conclusions, and whilst the results may not be accurate for all aquarists and conditions, they were undertaken with standard equipment, using matured London tap water, and plants purchased from various shops in the area.

In the first instance, a small 24 in. by 12 in. by 12 in. tank was set up, using well-washed lime-free gravel only, no peat or other compost being used during all the experiments. An undergravel filter was installed at the same time, and a standard all-over hood fitted with two 40 watt lamps was incorporated to supply the lighting. The tank was then liberally planted with a good selection of readily available plants, and later the fishes were introduced. All went well for several months, and although the fishes thrived and multiplied, the plants gradually lost that fresh green look, and growth slowed down. Following the advice of
several different aquarium publications, and noting that no signs of any quantity had formed, the lamps were exchanged for two 60 watt bulbs.

Little change was apparent in the effect on the plants, but another problem arose. As the tank was situated some distance from any daylight, it was necessary to leave the lamps on for 7 hours each day. It was found that, during summer time, the heat from the lamps raised the temperature of the water to 85°F (29°C), and during the night, the temperature fell to 77°F (25°C) before the thermostat was in. Although no fishes were lost during this time, the black mollies looked decidedly uncomfortable, and it was then decided to try fluorescent tubes—which give a far higher light output to heat ratio than normal household tungsten lamps.

If anyone considering the installation of fluorescent lighting, several problems arise that can be overcome with a little patience. Firstly, the initial cost of the choke unit and tube is much higher than tungsten lamps. However, considering that once installed and used over many years, the saving in electricity and light bulbs can split even, it is worthwhile if not in the long run. The next problem is the design of modern fluorescent units. These are now available from several manufacturers in ideal sizes for use in aquariums. One particular maker supplies tubes and units down to 6 inches in length, but 8, 12, 15 and 18 inch sizes can all be used, depending on the size and depth of the tank. However, in every case, the tube is held in a metal casing, which also houses the choke unit and starters, and as a fair amount of heat is given out by this component (and as it would be very uneconomic to fit this into the lamp and humid conditions of the tank hood) some way of remote fitting must be found.

I found that by purchasing a length of eight-core cable, a neat method of outside fitting can be constructed. With this method, the metal case of the unit should be opened, and all the component removed except the lamp-holders. These components must be mounted on a piece of wood or plastic, and the cables from the various parts rewired by using the color code. Each wire in the eight-core cable. Most units will require only seven of the conductors, and the eighth can and should be used to earth the tank. The empty metal housing can then be mounted into the tank hood, and the tube fitted into the lamp holders. Consult an electrician if you are not absolutely sure that your connection is correct, as faulty wiring can cause serious destruction of the choke unit, as well as providing an electrocuted aquarium.

The tank was allowed 3 months with the fluorescent tube providing the sole light source. New plants were introduced to replace those which had died, and they were occasionally fed with a tablet form of plant food made specially for aquarium use. The plants, however, began to deteriorate rapidly, and when the tube was exchanged for a "de-luxe warm-white" type only slight improvement was apparent. It appeared from this that the plants missed the reddish light and infra-red radiation that tungsten lamps supplied, which fluorescent lighting almost completely lacks. The "de-luxe warm-white" type of lamp contains the most red radiation of normal fluorescent tubes, and closely resembles the warm light of domestic lamps, but still it did not contain sufficient to maintain healthy growth.

At this time, a new type of tube became available called the Gro-Lux tube. One of these was obtained, and the results can only be described as startling. Nearly all the plants began to grow extremely quickly, even the dwarf Cryptocoryne sending out new leaves and shoots in abundance. However, green algae developed just as rapidly, and frequent removal was necessary to prevent the choking of the plants. Leaves of the plants, although appearing larger, became a little distorted and malformed. The coloring of these tubes is of pinkish-violet hue, and transforms the colors of some fishes, so that although the renderings are not accurate, they are certainly very beautiful.

I am of the opinion that the Gro-Lux tubes, although fulfilling their advertised virtues, do their job rather too well. Algae become the main problem after a very short time, and probably the average aquarist will not like the idea of disturbing the plants at least once a week. Perhaps the tube would be of better design if the light output were not so powerful, and it was found that far better and undistorted growth resulted from using an 18 inch Gro-Lux tube together with a 60 watt tungsten strip-light. The latter combination is one of two arrangements that can be recommended from the experiments.

Because of the algae problem, the Gro-Lux tube was discarded, and the tank was then fitted with one 20 watt fluorescent tube, and a 30 watt tungsten strip light. This combination has proved the most successful out of all installations, remembering, of course, that the water, gravel and plants have remained of the same quality and type during each period. The plants are growing with such energy and lusthiness that, for the first time in keeping fishes, it has been necessary to thin out and remove plants to prevent overcrowding. Algae are only produced in small amounts on the glass, and are of the soft types which the fishes devour when scraped off.

In conclusion, there are a few points of interest that have been discovered as by-products of the above experiments, which may be of interest to aquarists interested in growing plants in abundance.

One tank developed an outbreak of white-spot disease which was rapidly cured with a well-known aquarium remedy in the form of a powder. Several weeks later, a blue-green algae developed, but the tank was not so rapidly affected by a tablet form algae killer. It appeared that the residual chemicals left from both applications combined to form a solution that malfunctions the growth of many plants, producing very small leaves of a very insipid green color, finally almost completely killing the host plant. It did kill, however, a splendid and healthy backdrop of twisted Valisneria, but had no effect on other plants.

Another by-product concerning Elodea became apparent. When the water was reasonably new, Elodea grew and thrived faster than any other plant. As the water matured, the Elodea began to deteriorate, becoming thin and spindly. It appeared that whilst the water contained salts and was termed 'hard', the plant grew well, but that the 'hardness' was quickly absorbed by the Elodea, and then re-used. Since the hardness of the water actually has some bearing on the growth rate of Elodea is something that these experiments did not prove—but the results described certainly suggest this may be the case. For those aquarists who grow Elodea, a small quantity of water changed occasionally may increase the density and growth rate if at present the plant looks unhealthy.

Lastly, the effect of the undergravel filter during the experiments. I now operate the filter only during the dark or night hours. If the filter was run continuously, the plants tended to 'lag' a little, and if not run the accidental accumulation of 'mud' had to be skimmed away. The happy medium seems rather Wispy running only for best results.

Again, it should be noted that the results and conclusions described as the most effective in the above account apply only to my set-up (which is relatively 'standard'), but at least may be of some guidance to enterprising aquarists who are not being very successful with their aquarium vegetation, and would like to alter the situation by varying lighting conditions.

THE AQUARIIST
Facing the Big Freeze-up

by H. J. GILBERT

FROM the time I built my first pond I have suffered, in the company of all other pond-keepers, the annual onslaught each autumn of all the well-meaning people in aquaria journals, gardening periodicals, women's weeklies as well as do-it-yourself books on what to do with your pond now that winter is around the corner. We are exhorted to remove all the dead and dying vegetation, if possible drain and clean out the pool (in one case check-weigh the fish) and feed only live food sparingly afterwards. Then, arming ourselves with pieces of timber, rubber balls, trace and bits, care to contain boiling water etc., we can sit back ready to take action to prevent disaster when the pool freezes over. This is all very well, but I never see my pond in daylight in winter except at weekends.

On the subject of pools icing over there hasn't been any original thinking for years, at least not until an article appeared in The Aquarist of July, 1964, on how the local people are beating the "winter kill" in a lake in British Columbia and also in Russia, by causing the warmer and lower levels of water to circulate by means of compressed air and so melt holes in the covering of ice. I have since read that the experiment has been repeated with some success in the Arctic Sea ice. I realize, of course, that their problems are not ours, but it did seem to me to hold the germ of an idea with regard to our pond problems in winter.

Naturally I looked into the idea with my own set-up in mind. This is an irregular shaped pond, roughly 13 ft. by 9 ft. by 2 ft. deep, with sloping sides, an outlet pipe to a pump beneath the rockery feeding a fountain and small pond on top, which in turn feeds a series of "fals" descending to the larger pond once again.

Although every year I set out to carry out the advice of the experts I always come unstuck somewhere, usually because of the time and weather factor. Always the pond was frozen over to an extent that necessitated drastic treatment to relieve it.

Circulating Pump

It seemed to me that this idea of compressed air circulating the water would do the trick. Naturally I did not want the complications in the British Columbia experiments of a windmill-driven compressor, or indeed the quantity of air they required.

As the small pump house under the rockery is permanently wired for electricity the logical idea was to use a small spare aerator of the vibrato type normally used in my fish house for the 'tropicals'. A spare shelf over the permanent water pump mounting was a suitable position and it was an easy job to provide a suitable point for a plug.

Ordinary aerator tubing was used to run from the aerator through a hole drilled in the door post (so that the door could remain closed and frostproof), along the path, round the rockery and into the pond, terminating in an ordinary diffuser stone. The stone had to be weighted to keep it on the bottom of the pond and in position. To operation a terrific stream of bubbles resulted, causing too much disturbance to the water, so branch lines and two further diffusers were incorporated. A certain amount of difficulty was experienced in equalising the flow of each diffuser as the relative depth of each one had to be taken into account. Eventually, an additional load weight was attached to each diffuser stone to ensure that it was kept in the correct position. Weights also proved necessary to keep the line submerged through the length of the pond.

A prolonged test of several days at this stage proved that the bubbles from the diffusers were too line and were indeed liable to be interrupted by the plants and other obstructions. Therefore the diffusers were removed and ordinary aerator tubing clamps fixed near the end of the tube and then adjusted until equal streams of comparatively large bubbles were obtained from each outlet. The importance and advantages of multiple outlets was proved at this stage; if one or more becomes inoperative for any reason it will result in an increased air flow at the other outlets.

A fairly long spell of cold weather at this stage exposed another snag. After a period of continuous operation a certain amount of condensation formed in the tube where it lay on the concrete path. It froze and the whole experiment failed. An attempt to provide some insulation was made by running the air tube through a length of plastic garden hose. This was only partially successful so I looked round for something else. Eventually I hit on the idea which has proved completely successful up to date. It has always been my practice to disconnect and remove...
the water pump each winter for cleaning and general servicing. The water-inlet pipe from the pond has to be disconnected and the end raised above pond water level to prevent the pump-house being flooded. The fitting of a tap or cock would have rendered all this unnecessary but I have never got around to fitting one, and this omission was now an advantage.

Having first removed the filter from the pond end of the line I was able to thread the aerator tubing through it into the pump house. Naturally it was necessary to plug the end of the tubing to prevent it filling with water. This plug was shaped so that its projecting end acted as a nose-piece whilst the tubing being pushed through the water pipe. Once the connection was made to the aerator the whole system was below ground and therefore frost-proof. It has worked very well ever since, keeping reasonable areas of the pond ice-free in the most extrême weather. I made one further modification by the installation of a car sump heater in the pump house so that the air forced through to the pond was slightly warm.

This experiment does not seem to have adversely affected the fish or plants. Indeed they all survived the winter in a very healthy condition. As the pond was not thoroughly cleaned of dead and decaying vegetation in the autumn it is probable there would have been a few "baby" casualties by the end of the winter because of the big freeze-up.

No doubt a lot of pond owners will say this experiment is not worth the trouble, but quite apart from the original idea of preventing 'icing up' the agitation in the water caused by the air bubbles gives the impression of a spring

During a period of prolonged frost and snow the pond surface was kept open at one corner by the use of the pump


Corydoras pauleatus

by LEBISTES

For quite a while this engaging cichlid seemed to vanish from the market, so taken up were hobbyists with the newer and more attractively marked and/or coloured members of its genus. But now the pauleatus or peppered cichlid, or peppered corydoras, is around again. And a good thing this is, too, for very few tropicals we keep in our tanks have such a plethora of desirable qualities.

For breathing, it will live for many years and never bother any other species, even guppy fry. For another thing, it will endure a gradual drop in the temperature to the low sixties (’F) without going off its food or falling prey to disease. Furthermore, it can live in quite hard water for a time, or even survive out of water for a time (provided its body is kept moist), without showing any signs of discomfort. This is because its internal construction is especially adapted for taking in oxygen from the atmosphere. In fact, even in well-aerated water, the fish often buries to the surface for a gulp of air. The male attains about 2½ inches in length, the female slightly longer. She is also the rounder and fuller-sided of the two.

The species is native to south-eastern Brazil and La Plata. The body is almost covered by overlapping bony plates. The general coloration is a sort of muddled marbling of black, brown, blue-green and beige on a yellowish green ground overlaid in parts with silver and touches of gold. In addition there are numerous black spots. These adorns both the body and the fins. The eyes are like polished jet rimmed with shining gold. As the eyes can be rolled or turned downwards in their sockets, the fish often seems to be giving a sly wink.

C. pauleatus should never be expected to live on leafy food alone, because in a well-populated community tank very little food reaches the bottom. The proper thing to do is to introduce tiny pieces of lean meat, whiteworms, nauplii, or dried food into the tank just before the moon in which it stands is left in darkness. For then C. pauleatus will not go hungry. It searches the compost painstakingly for edible matter after dark. Although C. pauleatus is so active at night, it does not hide itself away for long during the day. Every now and again it will emerge from its hiding place among the plants and shuffle about the floor like some aquatic hedgehog.

It has been bred in captivity times without number since it was first spawned in France nearly a hundred years ago. But breeding is not a performance that it indulges in regularly in captivity. The water must be of the right quality; rather hard and alkaline. The temperature just right—in the neighbourhood of 65°F (18°C); the bottom of the tank should be carpeted with rich brown mulm. The female deposits her sticky eggs on the sides of the aquarium, on broad-leaved plants, or on rockwork, or all three, if they are available, at a single spawning. Before egg-laying begins, the spawning grounds are smoothed over (cleaned) by both sexes. After spawning is over, it is best to remove the parent fish to another tank in case they eat any of the eggs they come across in their nocturnal rambles. The fry emerge in about 4 to 5 days, make straight for the mulm, and there start to feed almost right away on micro worms, minute particles of dried food, or anything else they can find.

THE AQUARIIST
**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.

**Home Breeding in Moderation is Fun**

_What_ a dismal and depressing picture A. Burch, (The Aquarist, September), painted for the fishkeeper who breeds some young fish at home. I, purely as an amateur, have been happily engaged all the summer in allowing pairs of fish to breed if they seemed so inclined. I have not bred indiscriminately but have just watched and disposed of the young fish at a convenient time. All the young fish are now gone, and I can say that I have derived a great deal of pleasure from watching the development of the young fish.

_I have_ not turned my attention to breeding fish, but I have been watching and disposing of the young fish at a convenient time. All the young fish are now gone, and I can say that I have derived a great deal of pleasure from watching the development of the young fish.

**Quartz Rocks**

While breeding fish, I have been watching and disposing of the young fish at a convenient time. All the young fish are now gone, and I can say that I have derived a great deal of pleasure from watching the development of the young fish.

**Ponds in Winter**

Having three ponds in my garden for over 30 years, I have found that the water turns much more quickly when it is deprived of sunlight. C. Harris, Featherstone, Yorks.

**Correspondence Invited**

I am a reader of your magazine. My hobby is aquaria, but unfortunately here in Greece it is very difficult to buy and find fish, and also to find other hobbyists to change tropical fishes with them. Collecting tropical fishes is my beloved hobby and I am obliged in order to get them to wait for somebody coming from America, or from Africa. So I decided to write to your magazine, because I thought that you would know a lot of hobbyists who would like to get in touch with others in other

---

*(Address letters to The Editor, The Aquarist, The Baths, Half Acre, Brentford, Middlesex, London, S.W.15.)*

*(Mrs.) V.K. Sanders,*

*(Quartz Rocks)*

*WHILE reading the Aquarist's Notebook (The Aquarist, December), I came across this completely false sentence: "Marble, quartz and similar calcium carbonate rocks are highly unsuitable etc." Marble is calcium carbonate and is undesirable in aquaria, but quartz is a form of silica (silicon dioxide), the most common form of which is sand, and is suitable for aquaria.*

*W. T. Ballon,*

*W. T. Ballon,*

*Hemel Hempstead, Herts.*

*(Ponds in Winter)*

*HAVING had three ponds in my garden for over 30 years, may I add one or two points to Mr. Burch's valuable article in the November issue?*"}

*While I remove as much under-water foliage as possible from oxygenating plants, in addition to water-lily leaves, I do not cut down the dead rushes and other pondside plants until spring. In one corner I bend them over the water and cover them with a sack. It has to be a very severe frost before the water at this corner freezes. I also find the heaters mentioned by Mr. Burch very effective. No matter how keen the frost, they always keep a small area about as big as a saucer clear of ice, thus preventing the ponds from cracking. Whenever it snows on top of the ice I remove the snow as soon as possible, so I find that the water turns much more quickly when it is deprived of sunlight.*

*C. Harris,*

*Featherstone, Yorks.*

*(Correspondence Invited)*

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countries. If it is possible I would like to find someone who wants to correspond or change fishes with me.

**Paul, Aetos, Alexander, Spondylus, T. T. 786**
Nepal, Gretna.

**Dangers of Display**
AQUARISTS sometimes query why the lay-out of equipment and new lines in pet shops and shops devoted to the hobby is often so poor. They complain that goods are crowded together and cannot be inspected at leisure. I can tell them why! In a fairly newly opened shop special attention was paid to display and full use made of shelving. Every item for sale was clearly visible and goods could be examined freely. More experienced fellow shopkeepers viewed the new arrangements somewhat cynically. "You'll lose the lot," they said. But we hoped. Then the petty pilfering started—small tubs of goldfish food, ornament, live terrapins—mostly we thought due to small boys, some of whom were caught red-handed. But small boys can only reach the lower shelves, where the lower priced goods are kept. A long list of more expensive missing articles and books has culminated this week in the disappearance from a 6 ft.-high shelf of a piston pump costing over £5! We are awaiting the moment when a 3 ft. bow front set-up disappears from the shop. It will surely happen soon. A nation of shopkeepers or a nation of shoplifters?

**Dealer (name and address supplied), London.**

**Keeping Tubifex**
THERE has always been a lot of argument concerning the keeping of Tubifex. Some say they can only keep the worms for 3 days, others say only 1 day, but I have found a very easy way of keeping them fresh and in good condition for as long as 6 weeks, which was when my stock ran out, and it would have still been alive had I had sufficient to last.

My method is to empty the Tubifex from its container in which I bought it from the pet shop, and give it a really good rinsing. This is done by using a flat plastic tray, approximately 10 ins. by 8 ins. by 1 1/2 ins., of a type sometimes used by photographers for developing prints. I always rinse the worms three or four times in cold water before leaving them to settle down in a cool place. Then for about 3 days I rinse them night and morning, and from then on, rinse them only once a day. The Tubifex will then be found to be perfectly clean with no unpleasant smell at all, as can be ascertained from the fact that I am allowed to keep my Tubifex on the pantry floor (it has to be free from smell for me to be allowed to keep it in my wife's special domain!).

In my opinion the most important item is the clear plastic tray, which must be no more than 1 1/2 to 2 ins. deep, as the more air you get to the Tubifex the longer they live.

**J. G. FAULKNER, Bingley, Yorks.**

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**The AQUARIST Crossword**
Compiled by L. BRADLEY

**Clues Across**
6. Arrow Worm (10).
8. Must easily be produced with a pin (6).
9. This fish is Abrohlostoma roebelii (9).
11. Rats appear to the pondside (4).
12. Historical period (6).
16. Not suitable for tropical fish (4, 5).
19. Position where one can sit facing east (6).
20. It is unimportant to the Betta (17).
22. Wading Bird (6).
23. Double coat of Pepper (6).
25. Did he not read when the clock struck (5).
27. Dead man—perhaps known in this valley (8).
29. Message of the Gods by the pondside (9).
30. Mytilus edulis mussel (5, 5).

**Clues Down**
2. So I and fifty others are inside a stovepipe (4).
4. The ship whose destiny runs around its funnel-base (5).
5. Stinks (5, 5).
6. Last entry (14, 3, 5).
7. Aspiration was (10).
8. Spar with a 16 inches to give unwelcome aquarium visitors (10).
12. Caduceus (9, 4).
14. Stoat (3).
15. Score in quick (3).
18. Carried a spear on board the sailing ship (4).

*Solution on page 195*
Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 15th of the month preceding the month of publication.

The first annual general meeting of the Worthing Tropical Fish Club was held in December. Reports from Chairman, Vice-Chairman, Secretary, and Treasurer were read. The Chairman announced that the position of the Club has strengthened remarkably during the year and the membership has now grown to over 100. The Chairman then outlined the progress made during the year. He expressed thanks to all members for their support and hard work. The Secretary gave a detailed report on the progress of the Club throughout the year. The Treasurer presented the accounts for the year ended 31st December 1966, which showed a small surplus. All matters were passed and the AGM adjourned.

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THE annual general meeting of Accrington and District A.S. was held on the 9th December and the officers elected were as follows: Chairman, Mr. T. H. Bannister; vice-chairman, Mr. F. W. Bannister (transact); Mr. W. M. Smith; hon. secretary, Mr. Brian Tatterton, 43, Hadley Road, Accrington; hon. treasurer and press secretary, Mr. G. H. Whittaker, 43, Rosedale Road, Accrington, Mr. H. Smith and Mr. C. H. Whittaker.

This year's results were presented at the prize-giving meeting at the Fennes Hotel in Accrington. The meetings were held on the Sunday morning of the Chairman, Mr. E. Mortimer, vice-chairman, Mr. D. Bannister (transact); Mr. C. F. Taylor, secretary; Mr. D. Coburn, vice-chairman; Mr. D. B. Taylor, treasurer; Mr. G. H. Whittaker (transact); Mr. T. Walker, secretary; Mr. D. Coburn, vice-chairman and Mr. T. Walker (transact).

The society enjoyed a good year both socially and financially. The society is now in a position to arrange more meetings and to hold the society's annual general meeting on the first Sunday of the month.

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OBITUARY

It is with deep regret we announce the death of Mr. E. B. Blunden, a founder member of the Bristol Aquarium Society, which was founded in 1928. Mr. Blunden, who passed away in Christmas, was 87. He was also one of the West Country’s best known ecologist of ruff dogs.

THE Erith and District A.S. announce that they have more than doubled their membership during 1965, and as a result, have planned a more ambitious programme for the year. A publicity campaign of fish is anticipated in the spring, and some other exciting ideas are in hand. The society meets on the first and third Wednesdays in each month at the Congregational Church, Beacon Heath, at 6 p.m., and prospective members will be very welcome. Donations may be made to the secretary, Mr. A. Carter, 91, Lynes Road, Erith, Kent.

THE Mersey Study A.S. will welcome any interest expressed in the study of both marine and tropical marine and brackish water fishes. The five-day meeting of the society has been split into several regional clubs and a great deal of interest has been shown in these topics. Officers for the first year are: Chairman, Mr. J. C. V. Morris, vice-chairman, Mr. A. Emerson; secretary, Mr. G. H. Jennings, 5, Outwood Road, London, N.16. The society has already received enthusiastic support, and hopes to be able to obtain facilities for these regions shortly.

THE third annual dinner and presentation evening of the Newport A.S. was held in December. Due to the unfortunate death of its founder, Mr. Ralph Harris, president of the society, the presentation of awards was made by Mr. Leslie Johnson, chief staff reporter of the South Wales Argus, a local newspaper that has done much to foster interest in aquarium keeping throughout the area.

Award winners were as follows: South Wales Argus Cup for highest agamic points in Newport open show 1966, Society Cup for best prepared aquaria (those over 3 feet in length); Prize Challenge Shield, Breeder’s Trophy—Mr. Ralph Harris. Cole Cup for meritorious services to the society—Mr. Ivo Phillips. Prepared aquaria (fished or not)—Mrs. M. H. Maguire. Prepared aquaria (tank under 2 feet)—Master Nigel John. Junior Trophy—Miss Cities Pemberton. Awards were also won during 1965 by two members of the Tewkesbury and District A.S.—Mr. D. Harvey (tank in show and best aquaria in show); and Mr. J. R. Whelton (bestisher in show).

Crossword Solution

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Price 3s. per packet, or 3s. 4d. by post.
Breeder's Packs of the above, 7s.; by post 8--

Member of the P.T.A.

The Coventry Aquarist,
43 Melbourne Road, Coventry

Telephone
Coventry 72772

January, 1966
<table>
<thead>
<tr>
<th>Plant Species</th>
<th>Price</th>
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<tbody>
<tr>
<td>B. brevis</td>
<td>2/3</td>
</tr>
<tr>
<td>B. longicauda</td>
<td>2/3</td>
</tr>
<tr>
<td>B. nigrofasciata</td>
<td>2/3</td>
</tr>
<tr>
<td>B. parvula</td>
<td>2/3</td>
</tr>
</tbody>
</table>

Excellent selection of plants always in stock

**Sorry!** Fish only to personal shoppers for the time being

---

**DRIED TUBIFEX**

**THIS WONDERFUL NATURAL FOOD**

**FOR ALL FISH NOW AVAILABLE AT ALL GOOD PET STORES**

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EGGLAYING TOOTHCARPS, including BLUE GULARIS
Open every day (Including Sunday) 10 a.m. to 6 p.m.

**PLANTS IN STOCK**

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Aponogeton crispus</td>
<td>3/6</td>
</tr>
<tr>
<td>Aponogeton Undulatum</td>
<td>2/6</td>
</tr>
<tr>
<td>Amazon Chain Sword</td>
<td>2/6</td>
</tr>
<tr>
<td>Cabomba</td>
<td>6d.</td>
</tr>
<tr>
<td>Ludwigia</td>
<td>6d.</td>
</tr>
<tr>
<td>Mysriophyllum</td>
<td>6d.</td>
</tr>
<tr>
<td>Cape Fear Spatterdock</td>
<td>6/6</td>
</tr>
<tr>
<td>Sagittaria Natans</td>
<td>6d.</td>
</tr>
<tr>
<td>Sagittaria Microfolia</td>
<td>4d.</td>
</tr>
<tr>
<td>Elodia Densa</td>
<td>4d.</td>
</tr>
<tr>
<td>Hygrophilla</td>
<td>6d.</td>
</tr>
<tr>
<td>Twisted Vallis</td>
<td>6d.</td>
</tr>
<tr>
<td>Portuguese Vallis</td>
<td>6d.</td>
</tr>
<tr>
<td>Wisteria</td>
<td>2/-</td>
</tr>
<tr>
<td>Crypt. Ciliata</td>
<td>3/6</td>
</tr>
<tr>
<td>&quot; Harteliana</td>
<td>2/6</td>
</tr>
<tr>
<td>Banana Plant</td>
<td>4/6</td>
</tr>
<tr>
<td>Broad Leaf Sword</td>
<td>5/6</td>
</tr>
<tr>
<td>Radicans</td>
<td>10/6 &amp; 12/6</td>
</tr>
<tr>
<td>Water Orchid</td>
<td>4/6</td>
</tr>
</tbody>
</table>

31 Plants for 10/-
12 Portuguese Vallis
6 Twisted Vallis
6 Cabomba
6 Hygrophilla
1 Aponogeton

40 Plants for 20/-
12 Portuguese Vallis
6 Twisted Vallis
5 Cabomba
5 Hygrophilla
5 Myriophillium
5 Elodia Densa
1 Cryptocoryne
1 Cape Fear Spatterdock

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12 Portuguese Vallis
12 Twisted Vallis
6 Cabomba
6 Elodia Densa
6 Myriophillium
5 Ludwigia
1 Aponogeton
1 Cryptocoryne
1 Cape Fear Spatterdock

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Please address all correspondence as address above

January, 1966
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- MICRO FOOD
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- GRINDAL COMPOST
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- WHITE WORMS COMPOST

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2: For Freshwater
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2: Finely ground with organic base
3: With complete instructions
20: Mark your cultures in wooden boxes
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ADSHEAD RATCLIFFE & CO. LTD.
BELPER - DERBY - Tel: Belper 2491 (3 lines)

January, 1966
### Feeding Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>Woodland Feeding Kits</td>
<td>For Tropical Fish</td>
<td>£1.25</td>
</tr>
<tr>
<td>Woodland Live Food</td>
<td>For Tropical Fish</td>
<td>£1.25</td>
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<tr>
<td>Woodland Live Food, W.R.</td>
<td>For Tropical Fish</td>
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<tr>
<td>Small Fish Bowl</td>
<td>For Tropical Fish</td>
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<tr>
<td>Large Fish Bowl</td>
<td>For Tropical Fish</td>
<td>£1.25</td>
</tr>
<tr>
<td>Small Systrene Fish Bowl</td>
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<tr>
<td>Large Systrene Fish Bowl</td>
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<td>£1.25</td>
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<tr>
<td>Brine Shrimp Bowl</td>
<td>For Tropical Fish</td>
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<tr>
<td>Brine Shrimp Bowl, 500 g</td>
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<tr>
<td>Brine Shrimp Bowl, 1 kg</td>
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### Fish Foods

<table>
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<tr>
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<tbody>
<tr>
<td>Brine Tropical Fish Food</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
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<tr>
<td>Brine Brine-Yolk</td>
<td>Nutrition for Fish</td>
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<tr>
<td>Brine Blooded Fish Food</td>
<td>Nutrition for Fish</td>
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<tr>
<td>Brine Fish Food</td>
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<tr>
<td>Micronut Tropical Fish Food</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
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<tr>
<td>Sangroval</td>
<td>Nutrition for Fish</td>
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<tr>
<td>Diamon Dried Dietin</td>
<td>Nutrition for Fish</td>
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<tr>
<td>Diamon Brine</td>
<td>Nutrition for Fish</td>
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</tr>
<tr>
<td>Diamon Anti-Egg</td>
<td>Nutrition for Fish</td>
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</tr>
<tr>
<td>Diamon Fish Food</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
</tr>
<tr>
<td>Micro-Flakes</td>
<td>Nutrition for Fish</td>
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<tr>
<td>Grapeniv stocks</td>
<td>Nutrition for Fish</td>
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<tr>
<td>Micro-Flakes, 500 g</td>
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<tr>
<td>Micro-Flakes, 1 kg</td>
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<td>Graftonin</td>
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<td>Diamon Blood</td>
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### Remedies

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<td>Nutrition for Fish</td>
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<td>Natrium</td>
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<td>Vitamin Tablets</td>
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<tr>
<td>Anti-Chlorine Tablets</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
</tr>
<tr>
<td>Antitoxin</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
</tr>
<tr>
<td>Antitoxin, 500 g</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
</tr>
<tr>
<td>Turquoise Block Neutraлизator</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
</tr>
<tr>
<td>Ph. Test Kit</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
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### Tetramin Fish Foods

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<th>Item</th>
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<tr>
<td>Tetramin Staple Foods (for Tropics)</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
</tr>
<tr>
<td>Tetramin Staple Foods (for Marine Fish)</td>
<td>Nutrition for Fish</td>
<td>£1.25</td>
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</table>

### Other Books

- **Tachbrook Aquatic Books**
- **Tropical Fish Books**
- **Feeding Books**
- **Aqua-Chemical Books**
- **Aquarium Books**
- **Naturae Books**
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