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Comments and Quotes

- Shortage of qualified professionals
- Summer aqua-holidays
- Change in fish-by-rail service

Where are the Experts?

In a thoughtful and fact-providing article entitled ‘The Aquarium Fish Industry—1971’, the editor of tropical fish hobbyist, Dr Herbert R. Axeld, has drawn attention to the rather surprising lack of co-operation from technical bodies that the aquarium fish trade so sorely needs. There are almost no academic courses in aquarium fish culture or aquarium fish diseases in the U.S.A., and very little research in these matters and apparently very few professionals who would be qualified to start such courses. This is probably true of every country in the world, not excluding the U.K., but what makes it so surprising that this situation holds in the States is that the U.S.A. is estimated to represent about 50% of the world market for the aquarium industry.

As Dr Axeld writes: ‘There is not one single dealer, importer or hobbyist who has not suffered losses in his livestock due to “unknown” causes...’ I estimate that 1980 trained veterinarians could be kept busy, profitably, if they would take a few additional courses while in veterinary school and advise their local pet shops and fish wholesalers that their services were available.

This, remember, refers to a trade estimated as having a $2 billion annual retail turnover.

However, there are aspects other than the one of a profitable trade in need of help to run even more profitably. Uncontrolled capture of fishes in tropical countries by native collectors who are supplying the world’s markets, together with the risks to fishes from water pollution, can mean extinction of some fish species in certain areas. Culture of such species on fish farms could enable the aquarium trade’s demands for fish supplies to be met—but who is to organise it and who has the know-how?

Scientists who do research or other work in fields that impinge on the aquarium-keeper’s interests—aquatic microbiology, parasitology, lower vertebrate pathology, genetics, water chemistry—and who may have an interest in the amateur’s problems are woefully few in Britain—in fact they are almost non-existent. From a perusal of aquarium journals from all over the world we would say that the U.K. certainly has the fewest scientifically qualified aquarists of any country. It has been this way for years and although with the growth in numbers of both scientists and aquarists one has lived in hope of the emergence of some technical people whose interest would have been caught (to the benefit of the hobby), this has not happened. (Two we can think of who were active in the hobby here some years ago have both emigrated.)

The impression gained is that as far as British ichthyologists (admittedly a very small band) are concerned the only people outside laboratories with interests in fishes are anglers and chip-shop habitués. This is a great shame; we think that in many ways great mutual benefits could accrue with more cooperation.
Holidays in the Seventies

THE wreck of the Ronceletau, which sank in 1791, is a diver's paradise. Fanning away the silt uncovers old bivalve, pieces of tile, nails and spikes dating back to the French Revolution. Also on the site of the wreck are numerous Beau Gregories. These tiny blue and yellow fish make amusing subjects for underwater movies as they rush in and attack the wreck diggers. Their bite (in case you were curious) is less annoying than a mosquito bite.

Come down to stay at Drake's Anthonaye, a sandy, sunny, unspoiled little island near Virgin Goada. Skindiver Bert Kilbride will take you out to explore the Ronceletau and many other wrecks in the area—the Rhone, the Lusitania, the West End wreck. (From an advertisement in a U.S.A. skin-diving magazine.) It should make a change from bream from sand flies on the Costa Blanca and those gurus in North Wales.

Fish by Rail

FISH and other livestock orders for delivery by rail carriage paid are no longer being delivered at addresses by British Rail but only sent to 'be called for' at consignee's local railway station. To avoid delays it is important to tell whether a local station is equipped to handle parcels; livestock will otherwise have to be sent to the nearest station where equipment is available.

LETTERS

Tank Heating

THE letter by Mr R. Trippas (PFM, December) regarding my article 'A Pigeon for the Fish House Owner' rather surprised me, because he assumed that I was writing about commercial establishments, which was not the case. As an ex-commercial executive with an Electricity Supply District, I am fully conversant with the applications and costs of electricity for such premises. However, I was considering the normal type of establishment kept by my friends and myself wherein the tank space will be equivalent to from nine to thirty or so 2 ft. tanks, and where the temperatures of individual tanks need to be flexible to accommodate and breed some of the more interesting types of fishes. A throughput of 50 fish per week would not be possible under these conditions, and the fact is that although hundreds may be spawned it is not profitable to keep them, and usually only two or three dozen will be reared.

Most people are not interested in commercial fish breeding, and are more concerned with exhibition work, but even there a market for their surplus stock would be a help to them.

I was very interested in the remarks made in Comments and Quotes in PFM (December) regarding electrical safety, and it is one of the few knowledgeable comments made on this subject in aquarist circles. Most aquarists, however, have no conception of what an 'earth-free situation' is, and personally I would like to see all tanks fitted with both external thermostats and external heaters to make them safer. Some installations I have seen on damp stone or concrete floors are positive lethal, and a good thick rubber mat to stand on is necessary in those situations, even when wiring is of a high standard—which it usually is not.

Bingley, Yorkshire

F. W. OC

Aggressive Zebras

HAVING read Jim Kelly's comments regarding fin-nipping in a community tank by a zebrafish (PFM, December), and noted his apparent reluctance to discuss the subject, it is of interest to note that I have observed similar aggressive behaviour patterns in two male zebrafish. In one community tank containing mails, mollies, guppies and barbels, a male zebrafish persistently bullied the other occupants, sometin

Continued on page
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LETTERS

Continued from page 446

tank appeared to have quelled the exuberance of the offender. However, after 3 days of impeccable behaviour our delinquent resumed his bullying activities and was thus subsequently removed to a chiled community tank where he is now a reformed character.

Another instance of zebra aggression occurred last week after the introduction of a young 1½ in. giant danio to another community tank. Immediately, one of the resident male zebras chased and persistently fought with the newcomer. Although a partial truce has now been declared, the occasional skirmish results if the two fish pass within a few inches of each other. Could it be that our cold-blooded zebra friends possess an element of bun-blooded behaviour?

Hounslow, Middlesex

COLIN V. WADE

Catfish Defy Book’s Advice

My husband and I are interested in catfish and usually buy two or three of one species in the hope that one day we shall spawn them. About a year ago we bought three Corydoras paleatus and were very excited when two of these cats spawned. The eggs developed fungus. We have read everything we can on spawning catfish. The books tell us that Corydoras should be about 2 years old and place their eggs on broad-leaved plants. Our fish were very tiny when bought and can’t be much more than 12 months old, and their eggs were placed on the aquarium glass although plants are in the tank. They have spawned three times in 2 weeks and each spawning has been lost.

Can anybody help please? We should be pleased to hear from anyone who can give us advice.

Also have any readers ever spawned the following:

Loricaria siamensis (bumble-bee cat), Loricaria parens (whiptail cat), Pimelodus clarias and Pimelodella parvus?

Parson, Featherstone, Yorks.

(MRS) F. GATES

Heating for Big Fishes

One of the fish house owner’s requirements that was not mentioned by P. W. Coles in his article referred to in PFM Letters (January) is heating equipment for the larger tank. Anyone keeping the bigger fish, which seem to be becoming more and more popular, like the snakeheads, fire eels, giant parrots, arowanas, has a problem about tank heating. Ordinary glass-tubed heaters and thermostats are not really suitable for the rough treatment these big boys can give them and in any case are not the answer for heating the 48 in. or larger aquarium. We need a strong, safe large tank heater giving a good spread of heat, preferably external to the tank.

Coventry, Warks.

P. SLOANE

Show Decoration

It was very satisfying to find that our efforts into the world of paper sculpture with which we decorated the PFM stand at the AQUARIUM SHOW last year were appreciated.

Seeing the possibilities presented by this inexpensive and simple-to-do art form to enhance their next club show, many fishkeepers asked where they could obtain more information and I promised to give the name of a suitable book on the subject.

To honour that promise, the book I recommend and from which most of our sculpture derived is Arthur Sadler’s PAPER SCULPTURE (Blandford Press, London). I’m sure any local lending library will obtain a copy for readers.

Manchester

J. KELLY

Variation in Guppies

I am sorry that Mr M. Treasure (Letters; PFM, January) was disappointed with my article ‘Variation in Guppies’ but I take consolation from the fact that any article of mine which brings forth any comment at all is not disappointing to me. I welcome his criticism but feel that he is far more guilty of misreading than I am of misleading. He appears to have missed the main purpose of the article and dwells at great length on what I consider to be an incidental aspect of it.

I certainly wasn’t discussing on ethology—I didn’t even know the meaning of the word and it was only when I looked it up that I realised Mr Treasure was looking for something more erudite than the article was intended to convey.

Bury, Lancs.

F. CAMPBELL

Coloured Gravel

By writing this letter to you I hope it can be a warning to future aquarists. I decided to take up tropical fishkeeping last October and after buying my tank, hood and stand I decided to buy my grit at the same shop. I asked the assistant his opinion on coloured grit and he said it was not detrimental so I purchased £35.00 worth of orange grit. I was told the dye would not come out. On reaching home my father and I decided to start right away with getting set up. On washing this
grit the bowl in which I washed it turned bright orange, so did my hands and arms and so did the water the grit was in. My father’s hands were also orange. After getting set up, with the filter working for 2 days, the filter wool was bright orange. The dye stopped coming out after the filter had been working for 4 days, but since purchasing fish I have had a lot die. A neighbour who breeds and keeps fish had a look at some of these fish after they were dead and said their insides were brilliant orange. I am now going to get rid of this grit and purchase some natural stone grit, but I would like to know if anybody else has had this problem.

Amersham, Bucks.

(Mrs) M. Hopwood

Some coloured gravels sold for aquaria appear to release fine coloured particles on first washing. However, continued release of dye should not take place subsequently to washing these fine particles, and a ‘non-fast’ product would not be suitable for aquaria use.—EDITOR.

Book Review


The writer convincingly advance the cause of the system of marine aquaria in consequence of the system of aquaria which has developed so successfully in Dijkstra by Lec Chin Eng, and those lucky enough to be in a position to race to the reef with a bucket and scoop out their own sea water, coral and clams will find much to attract them and to fascinate them in what Mr Risley has recorded. There is plenty of invaluable practical material here from choosing the right tank to the right kind of boat from which to conduct your collecting expeditions. Those of us in less kindly climates will note with proportional gloom our chances of success with live coral, for example, depend to a large extent on our ability to maintain tropical sunlight standards throughout much of the year. Since it was written in Singapore the book, not surprisingly, omits consideration of the immense costs to the aquarist in this country who is contemplating a natural tropical marine aquarium on the scale large enough to make it anything of a success.

There is a unique contribution in the chapter on spawning and breeding of clams and Dascyllus, supported by excellent photographs, and on the whole this is a very readable work. It is not scholarly enough by far for the money, however, and there is a sketchiness, particularly in the section devoted to species of fishes, that will prove disappointing to many readers. References to so many creatures are either unsupported by photographs or by sketches, and thus the uninitiated are really on their own when rubbing shoulders with tunics, sea squirts, zoanthids, crustaceans, echinoderms, univalves, bivalves, segmented worms and sponges. On all of these much more by way of illustrated introductions would have been well worthwhile. Whilst the tropical marine enthusiast in the United Kingdom will want to read this account and will undoubtedly not be overwhelmed in it, I hardly think that the beginner will derive much real assistance from it. In fact he may well conclude that the whole subject is beyond him; even if he overcomes this he may find the notes on Ophiura are enough to daunt the bravest and this may prove to be the final blow.

A book for the connoisseur, then. Even so it is too expensive for what it contains: one surely expects something more encyclopaedic for this sort of money. This is not a book which will be well thumbed, I fancy, but it distinguishes itself for its high standard of proof reading and general clarity. For such good manners on the part of all concerned we must be truly thankful, such is the poor state of the art elsewhere in the case of recent publications of tropical marine aquaria.

ROY PINKS

Meetings and Changes of Officers

BELLE VUE A.S. President, Mr R. E. Legge; vice-president, Mr S. Taylor; chairman, Mr S. Hemp; vice-chairman, Mr H. M. Kemm; secretary, Mr D. Davies (11 Weatherby Street, Higher Oakenhaw Manchester 11, I.W.); treasurer, Mrs M. E. Cole; show secretary, Mr C. T. Thatcher (3 Rotherham Road, Withington, Manchester 20).

BETHEL GREEN A.S. Chairman, Mr M. J. Gower; secretary, Mr R. Arnold (24 Rawson House, Slipworth Road, Hulme, Manchester); show secretary, Mr C. D. Bundy (19 Eversham House, Old Ford Road, Bethnal Green, E4). Meetings: Every Tuesday, 7.45 p.m., Bethnal Green Institute, 220 Bethnal Green Road, London, E2.

CHESTERFIELD & D.A.S. New Society. Chairman, Mr T. Silvers; vice-chairman, Mr B. B. Owen; secretary, Mr M. Murfin (22 c. Bawston Hill, Chesterfield); treasurer, Mrs B. Gabe; show secretary, Mr B. Key; Mr D. Stone (517, North Wingfield Road, Grassmoor, nr. Chesterfield, Derbyshire). Meetings: Red Lion, Vicker Lane, Chesterfield, 7.30 p.m. first Thursday of month.

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HORSFORTH A.S. Meetings. First Monday of month, McDonald Institute, Tewin Street, Horsforth. For details, secretary, Mrs R. M. Hold (19 Wellington Road, New Wyley, Leeds 12; Leeds 210225).

RUSHDEN FISHERKERS ASSOCIATION. Joint presidents, Mr and Mrs Bert F. Gibson; vice-chairman, Mr D. Patterson; secretary, Mr C. M. Evans (81 Trafford Road, Rushden, Northants); treasurer, Mrs Jean Gibson. Meetings: first and third Wednesdays of month, 7.45 p.m. at Holley’s Social Club, 31 Toulon Street, Rushden, Northants.

WARWICK COUNTY FIRE BRIGADE A.S. (W.K.F.B.A.S.). Secretary: Mr R. J. Healey (2 Laslett Close, Coleshill, Birmingham); show secretary, Mr R. J. Totton (173 Marshall Road, Kingshurst, Birmingham; phone 021-789-7426).

YATE & D.A.S. Chairman, Mr D. Walsh; secretary, Mr T. J. Green (18 Station Road, Kingswood, Bristol); treasurer, Mr B. Niel; show secretary, Mr M. Emery (114 Sandridge Park, Yate, nr. Bristol); show manager, Mr R. Bennett; programme officer, Mr F. Wright; reporting officer, Mr M. E. Ridge.

 YORK & D.A.S. Chairman, Mr G. Harwood; vice-chairman, Mr P. Casey; secretary, Mrs J. Anthony (13 Peter Hill Drive, Clifford); treasurer, Mrs Taylor P.R.O.; show secretary, Mr F. B. Booth (10 Saxxton Place, Heworth); meetings: Second Tuesday of month, 7.30 p.m., Railway Working Men’s Club, Blenheim Street, York.
The Lemon Tetra

(Hyphessobrycon pulchripinnis)

By R. ZUKAL

Photographs by the author

Translation by F. MARSH

The lemon tetra has a body outline that is a

drawn-out oval, and the fish is flattened at the

sides. Although the transparent body is only

laidly lemon yellow in colour, I am describing

here one of the most beautiful of the small characins

kept in our tanks. The back is a brownish, greenish

colour; at the sides the lower part of the body is

silvery. Because of the background colour German

and British aquarists know the fish as the 'lemon

tetra'. To Czech aquarists, however, it is known as

the 'Austrian' tetra. The anal fin is yellowish,

the first fin rays being a rich yellow colour and the

following rays a deep black that continues along

the edge of the anal fin. The dorsal fin is black and

yellow, also with a black point at the apex of the

fin. The eyes are large with the upper iris coloured

bright red.

All delicately and brightly coloured fish look

better if they are kept in tanks that are not too

largely lit and in which the base is dark-coloured.

These tetras are no exception. They are shoaling

fish, peace-loving and companionable and they can

be kept in company with other, smaller, tetras that

are also peaceable. They do well at the lower end

of the temperature range and 68°F (20°C) is not

too low for them. Sex differences are easy to

recognise in the adult fish, which reach a size of

about 1 1/2 in. The male is the larger fish, rather

slimmer, with his anal fin deeply bordered with

black. The female is fuller in the belly, not as

intensively coloured and deeper bodied. In spite of

its being an undemanding fish, it does not take

kindly to being moved and great care should be

taken if it is being netted. Live food is preferred.

The lemon tetra was imported into Europe for

the first time in 1932 from the Pará region of
Brazil but, in spite of the fact that in my experience its breeding presents no particular problems, it is not found all that frequently in aquaria. I believe myself that the main reason for this is that the fish are often kept in an aquarium not suitably furnished to display them correctly—in an aquarium lit too brightly and set with a light-coloured bottom the fish are practically indistinguishable. Similarly, they do not show well in the breeding tank, where they lose their colour.

They are similar to *Pristella riddiei*, *Hypseobostrycon scholzei*, *Homogrammus aequilir"* and so on in this. So, to get the best effect with brightly coloured tetras, and this includes neon tetras, I would advocate placing reddish-brown coloured roots over the bottom of the tank, over which Java moss (*Vesicularia dubyana*) and *Alternanthera* can be grown. Both the background, and the foreground too as it is not necessary to leave a large open space in the front, can be planted with *Cryptocoryne wendii* and *Echinodorus tenellus*. Against a carpet of plants such as these, the colours of the lemon tetra and other brightly coloured fish stand out well.

It is usually asserted that it is not easy to breed these fish because of the difficulty in bringing the female into spawning condition. I do not myself support this point of view. It is my experience that if the fish are offered good and varied nourishment it is possible to propagate them without trouble and regularly. I believe this to be true for all fish and in my opinion the most important factor is finding a suitable male. So I watch the fish in the community tank and pick out a suitable pair with an obvious interest in each other.

When I took the photographs of this spawning it was at the end of March and there had been a sudden change in the atmospheric pressure. I looked to see what my 13 lemon tetras were doing (I never keep less than 13 specimens of any kind of tetra). Three males had taken up their position
at the back of the tank by the large plants and were enticing the females with their display. A female approached them, spawning took place as quick as lightning, and the males waited again. I did not! I immediately prepared a photographic tank with soft water acidified to pH 6.2–6.4 by the use of peat and heated to a temperature of 77°F (25°C). I first put in two males, as when I watched them in the community tank I could not be certain which of the two was the more agile. So when the female approached them a 'duel' broke out and after about 10 minutes I could put the weaker male back into the community tank and await further developments with my camera.

The spawning play lasted about 3 hours and at the end of it the tiny, slightly yellowish eggs amounted to about 200. The parents were removed after the spawning as they are egg-eaters. The fry hang on for 24 hours after hatching and are free-swimming after 6 or 7 days. They require fine food.

CUTTING FISH HOUSE COSTS

Daylight and Duckweed

I have been said that 'The best things in life are free', an assertion that might be refuted by those inclined to substitute 'fish-keeping' for 'life'. Who cares? In this age of affluence the more expensive aids to our hobby are generally considered to be the best and anything of a utilitarian nature is often frowned upon. This is all very well provided that the outlay is justified by ultimate satisfaction, a state of affairs which is rarely fully experienced. If on the other hand success can be obtained from methods that cost nothing to put into practice the results can be far more rewarding.

Take lighting for instance. Nobody likes the idea of having the living daylights knocked out of them, and not surprisingly, because daylight is the most valuable and yet the least expensive of all the commodities available to the aquarist. It is there in abundance, coming through to us in varying degrees of brightness, in unbroken periods of from 8 to 18 hours depending on the time of the year. It needs to be controlled, of course, and the best aid to this end, in my own experience, is the humble and often despised duckweed. By dint of patience and judicious application it will contribute to the needs of any particular fish house designed to make full use of daylight. Once a balance has been achieved the benefits resulting from the life-giving rays will be manifest in the vigorous condition and enhanced coloration of the fishes whilst plants will respond with a luxuriance of growth not always apparent in those planted under artificial light.

To obtain the maximum benefit from daylight it should come directly from above the aquarium and this is where I slipped up when I erected my original fish house. It had 18 inch-deep windows running around three sides and, although it served me well for some 10 years, I always thought it could be improved upon. So now I have a solid timber structure with a 100% translucent roof which I find entirely suitable. It was set up in the height of summer and my initial problem was overheating. This I remedied by blocking out rather less than two-thirds of the roof with polystyrene, a procedure that has proved equal to all eventualities and no further adjustments have been necessary. I did get green water, but being a guppy fancier this did not worry me unduly and I did not take any steps to eradicate it.

I had a feeling that, although all my tanks had been emptied, cleaned and newly set up, duckweed would eventually establish itself, and it did. There are many varieties of duckweed. All belong to the plant group lemnaeae and all grow floating on the surface with their roots hanging in the water and do not root in compost. The kind most likely to be found in aquaria is Lemna minor or lesser duckweed but please don’t ask me how it gets there. I have never wittingly introduced it into my tanks but have always had it and having learned to tolerate it clinging to my arms up to the elbows I gladly take advantage of its threefold offering. It nullifies any excess of daylight, my guppies can feed upon it if they are hungry (and they always seem to be), and its hanging roots provide shelter for any unexpected fry.

Nature has provided all the duckweeds with a unique stabilising device. The roots terminate in a swelling which has a specific gravity greater than the rest of the plant, thus maintaining it in an upright position. This appendage gets nibbled off by the fish and very often the affected plant becomes inverted, in which position it withers and dies. Although some slowing down in propagation must result from this it is scarcely noticeable and a green carpet is very quickly formed on the surface of a tank. Frequent thinning is necessary but even then the surplus is not wasted. I have a friend who assures me that his goldfish gobble it up in no time. (Strangely enough my own goldfish ignore it.)

To any who have recently embarked on the aquatic hobby and who may consider that the cost is becoming prohibitive, I commend these two commodities, each dependent on the other for their part in supporting a successful aquarium, and each costing precisely nothing.
Control of Parasites by Filtration

A GREAT many of the ailments that cause trouble in newly acquired aquarium fishes arise from the presence of various types of microscopic parasites. These are almost always with the fishes in their natural waters but there they do not usually cause discernible harm. After all, there’s not much point in getting your board and dodging off somewhere else, as parasites do, if you are going to destroy the source of this benefaction.

As is well known, it is after the fishes have been caught, boxed, with their parasites in the catcher’s case, the exporter’s holding drums and the shipment bags, and then arrive at the wholesale houses here that the presence of the parasites becomes more than the weakened fishes can cope with. In these crowded conditions the population explosion of rapidly reproducing parasites proves their own undoing—thor conditions demand too much and their overloaded hosts suffer and many die. Unless the wholesaler’s policy is one of passing his stock on quickly (in which case the problem then comes to rest with the retailer), his task is to restore the fish to health and eliminate or drastically limit the parasitisation.

This problem is usually dealt with by use of one or more of the following procedures: (1) Control by chemicals (substances lethal to the parasites are dissolved in the water), which is the most often used and when applied selectively and with care is highly efficient because the organisms are being dealt with both on the fish and in the water. The use of ozone is included in this category. (2) Control by flushing (by keeping the fish in running water the parasites are washed away as they leave their hosts and their numbers are greatly reduced), a procedure quite often used with coldwater fishes but uneconomical with tropical stocks. (3) Control by ultraviolet light (a u.v. source is employed to irradiate the water to kill free-swimming parasites). (4) Control by filtration (the water is circulated through a filter that removes the free-swimming parasites with or without killing them).

It is the last-named procedure that I am discussing in more detail here as it has been given rather less attention in the past. Its attractions are obvious—the well-known advantages of an aquarium filtration system are gained in addition to parasitic control by a method that presents no hazards to the fish (as chemical or radiation procedures can do).

What kind of filter medium can do this work? There are two types. One has in itself a chemically sterilising influence on the water (probably killing bacteria as well as the parasites, such as the white spot organism, that we are primarily concerned with at present), which does not dissolve in the water and so cannot come into contact with the fish. A minor disadvantage with this type of medium is that it is exhausitive—its efficiency diminishes with time and its user has to be on the ball to keep it renewed or its value will be lost. Granules of activated silver preparations have been marketed for aquarium filter use as a sterilant.

The second type of medium is one that physically traps microorganisms and so literally filters them out of the water. Such a medium cannot be used in ordinary aquarium filters because of the difficulty of moving water at a high rate of flow through the microscopic channels that such a filtering substance must possess. Obviously it, like the first type, can ultimately cease to act as the channels become blocked so that it is no longer filtering, but since well before this stage the flow of water begins to slow up adequate warning is given that loss of parasite control is occurring.

‘Diatomaceous earth’ provides a readily available form of the second type of medium. It is a very fine powder produced from natural deposits of the silica skeletons of the algae known as diatoms, the masses of tiny diatom ‘shells’ having the very small holes in them that will make the filtering channels when the earth is compacted into a layer. This material (as ‘kieselguhr’ or ‘fossil flour’) has long been used in laboratory work to produce cell-free solutions and in, for example, brewing to remove yeasts and yield filtrates of sparkling clarity. It is apparent that aquarium water will have an exceptional degree of clarity when such very small particles are removed by this type of filter medium, whether or not the medium is being used for parasite control.

There is only one aquarium filter adapted for this medium that I know of, produced in the U.S.A. and called, appropriately enough, the Diatom filter. It is now being marketed in Britain and I have recently been able to use one. An impeller pump (1500 rev./min.) pulls water through a polyester membrane, which is the support for a layer of the diatom filter medium, at the fully operational rate of about 700 U.S. gallons/hour. It is certainly a highly efficient filter and with its special attribute of parasite removal should be of special interest to people dealing with large numbers of fishes. The makers (Vertex Inter-space Products) suggest that parasitic diseases are eliminated by the use of the Diatom filter. I have purposely used the phrase ‘parasitic control’ above, rather than words such as ‘elimination’ or ‘destruction’, because I am not yet convinced that there can be complete elimination of all types of parasites having free-swimming forms by this procedure; but there is no doubt that diatom filtration will control the parasite population so that even in
an overcrowded tank there would be few visible signs on the fish that parasites are there at all. Such a situation would then resemble that occurring in natural conditions as mentioned at the beginning of this article.

With this type of filter, used for parasitic control, it has to be remembered that the old medium is probably carrying viable parasites potentially capable of attacking fishes, and therefore the 'backflushing' procedure that the makers of the filter have devised when the filter medium is being replaced includes flushing with hot water to kill such organisms, an essential operation.

Bacterial and viruses, of course, as well as the parasites of the (mostly) unicellular types cause fish 'diseases', but they, being of smaller size than the last-named parasites, will not be entirely removed by the filtration system employing diatomaceous earth. However, much thicker 'candles' of this material, or colloidion membranes, that will filter out bacteria are used in laboratories with the application of pressure to force the fluids through, so perhaps one day we may see high-pressure filtration systems guaranteed to keep aquarium water 'quite bug-free'. Whether this would be a totally desirable state of affairs is another story.

Readers' Queries Answered

Glass Fish

Please can you give me information about the glass fish?

This fish, Chanda range, is a most delicate-looking fish, but in fact it is not particularly so. It is certainly a very beautiful fish—the female, as so often, is the planter with a greenish golden tinge, but the adult male displays an orange tinge and the outer, hindmost edges of his dorsal and anal fins are bordered with a striking bluish white colour. The fish is deep-bodied with large eyes. A well-planted, well-lit tank kept at a temperature of 72-75°F (22-24°C) will suit it very well with peaceful companions of a similar size (about 1½ in. or so) but two specific factors have to be remembered when considering its well-being. One is that it prefers alkaline water, and a teaspoonful of common salt should also be mixed per gallon of water when preparing a tank for it. Also the fish does require live food, of a suitable size such as white worms and daphnia, to keep it happy and healthy. If not a ready spawner, Chanda range presents no particular difficulties in producing eggs; there is a problem, however, in feeding the fry. The young are unusual in that they make no effort to go after food but wait until it swims past their paws, so they require very large quantities of large Infusoria and other tiny live food such as cyclops nauplii.

Peat and Plants

I have just laid the bottom of my 3 ft. tank with peat compost. The layer of peat is ½ in. deep covered by a 2 in. layer of gravel. I did this hoping my Amazon scinders and cryptocorynes would grow better. I have about 12 young Amazon scinders from my largest plant but they do not seem to grow well. I would like to know if this peat compost will help the growth of my plants and whether it will harm my fish.

You do not give the names of the species of fishes in your tank but it is possible that some may not be suited by the change in water pH (to acid) that will result from introducing peat into the aquarium in this way. If you want to give your plants special rooting medium it is better to place the new plants in a small pot filled with a medium of rich loam or clay mixed with peat although there is probably little to be gained by this. The pot can then be buried in the gravel to the required depth, though care should be taken to see that the gravel covers the loam well at the top of the pot to prevent clouding the water. More practically, ensure that young Amazon plants are not taken from the parent plant too soon. The stem bearing the plantlets should be weighted down with gravel (the small pots can be placed under each plantlet) so that the new growths become well rooted before they are separated from the parent plant.

Reluctant Rosys

I have spawned dwarf gouramis, three-spots, opalines, danios and some types of killies but I cannot get my pair of rosy barbs to spawn. The female is quite full of roe and the male seems keen but no luck. Yet I am told that these are the easiest of barbs to breed. Can you give me some tips on spawning them as I am very keen to have a brood of rosy barbs.

Your main problem could be that you have only one pair of fish to work with. Rosy barbs are easy to breed but it is always possible that a pair of fish will not spawn and then it is necessary to replace either the male or to produce another partnership. If spawning has not taken place within 2 days it is better to try another male, but it is most likely that you will have to try again with two more fish. However, it is worth checking your breeding procedure. Successful spawnings can be achieved in a variety of tank furnishings—from bare tanks with fine-leaved plants floating on the surface and little attention paid to water pH or softness to well-planted tanks with a fine-sand base and filled with two-thirds rainwater to one-third tap water. More important is the pre-conditioning. The fish should have been kept apart for 19-14 days previously and fed on a rich, varied diet that includes some live food.

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Why Not Try the Dwarf Cichlids?

A pair of Nannacara anomala, the dwarf cichlid species whose breeding is described in detail in the article. This pair (male, right) are using the flat stone as a receiving surface for their eggs. (Photograph by R. Zakal)
ALTHOUGH many of the cichlid family are really pugnacious and will, if mixed with other fishes, soon deplete a tank's stock, it is so difficult to resist keeping and breeding them. One just has to succumb and install larger tanks!

In my experience, dwarf cichlids are a lot easier to control than the larger ones and some of them are perfectly peaceful with other species. They are also very hardy fishes. I have kept them at temperatures as low as 63°F and even lower, although at this point their colour did begin to fade. They have also been way up in the nineties—not by design, of course, but because of a thermostat sticking—and although one or two were gasping at the surface, once the thermostat had been corrected and normal temperature regained, the fish displayed no ill-effects and seemed to take it in their stride.

Many of the large cichlids are similar to discuss in the way their colours change and fade and then quickly return to the fish's normal gorgeous cast of many colours. This makes it difficult to describe the colours, but when it comes to patterns—squares, stripes, bands, splashes, dots, chequered markings—you name it and one or other of the cichlids has it.

Although noted for their vicious nature cichlids are excellent parents unless disturbed, when they are apt to devour their eggs and eat their young. Their constant guard over their young is persistent and never wavers—they are always ready to attack and protect them. I've put my finger into a tank at times only to be attacked in a savage dash from both male and female.

A fascinating sight with these fishes is the way in which the male (sometimes the female) swims in front of the fry and the female comes behind, herding the youngsters around the tank. Then there is that other extraordinary sight whilst incubation is in progress when the parents keep moving the eggs around the tank from stones to slate or flower pots, even making depressions in the gravel or sand. When looking into these depressions in the compost it looks as though a wheel of fine dark daphnia is spinning around and is indeed wonderful to see.

However, breeding behaviour in the cichlid 'dwarfs' that I have had success with—Nannacara anomala, Egyptian mouthbreeders, agassizii, P. hirundo, A. ramirezi, A. reidii and jewel—is certainly not to a fixed pattern. Although these spawn in a similar manner, on stones, slate or flower pots, my 'rams' (A. ramirezi) would never spawn in a flower pot—always on stones or slate or, on occasions, on the glass sides of the aquarium. Unlike the larger cichlids, the dwarfs are liable to vary their breeding procedure in a bizarre fashion, as when my pair of agassizii decided to spawn on a diffuser stone while aeration was in progress! This was a rare sight—numbers of small reddish-coloured eggs clinging to the stone. On another occasion a pair of reidii decided their place was on the bottom of a corner filter, and once the Nannacara anomala laid their eggs on a plastic feeding ring that had been weighted close to the bottom with a lead strip to stop worms from travelling too far round the tank. As an illustration of dwarf cichlid breeding I will describe spawning of the last-named fish in detail.

With Nannacara anomala the differences between male and female are very easily identifiable. The male in this species grows slightly larger than the female—round about 2½ in. to the 2 in. or so of the female. The patterns and mottled or chequered markings appearing on the sides of the fish show a warm brown and pale shades of brown seem to come and go at will. Also sometimes in the males a faint trace of green appears. The female's dorsal is the smaller and rounder, whereas the male has a beautiful long pointed dorsal that stretches nearly the full length of his back.

My breeding pair were well fed on white worms, tubifics, earthworms, ghost larvae and large red daphnia until the female started to bulge with eggs. The tank used for breeding was an angle-iron one, 18 in. by 12 in. by 12 in., well washed out and filled to a depth of 8 in. with mixed tap and old matured water, filtered and allowed to stand for a day or two. The temperature was 78°F, and on the bottom was well-washed large compost or gravel. No plants were present, but at one end a small clump of willow roots served as a refuge—and, as I was soon to find out, with this species it is the males who need the protection since on occasion the female can get vicious with her partner.

When spawning took place a complete change was very noticeable in the female. She became as black as coal with a light, all-over chequered pattern. A completely different colour from that of her mate, who had a light, pale brown, appearance—indeed at this stage he looked quite drab in comparison with her.

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such as white worms and daphnia. The breeding tank temperature should be raised to 80°F (26°C) and the fish introduced into it in the early evening. Spawning should then take place next morning.

Dogfish

A short while ago I purchased a single freshwater fish which I was told was a dogfish. It is about ½ inches long. I was told it would live in cold water, was rather aggressive and would not grow much bigger. I cannot find any mention of this fish in my books and wonder if you can help me in the caring and feeding of this species.

‘Dogfish’ is the name usually given to members of the freshwater fish family Umbridae, and the fish that you have is likely to be one or other of two species most often imported into this country. These are Umbra kraneri from the middle and lower Danube (the females of this species can grow to a length of about 5 inches) and Umbra limi from the Great Lakes of America (this one is known also as the mud trout or mud minnow), which is a smaller fish though this can also reach 3–3½ inches. It is not particularly aggressive, though there is always likely to be the exception to this rule, and they can show aggression to their own kind. It is not an active fish and hangs immobile in the water for long periods, but in spite of this it would be preferable not to keep it with fancy goldfish, although single-tailed goldfish are suitable companions. The tank can be prepared with gravel and well planted; and it must be kept covered as the dogfish is a very skilled jumper and can in fact, because it is easily tamed, be trained to jump up for its food. This should be of the meaty variety—sliced earthworms, white worms, tubifex worms, scrapings of raw meat and, when available, water crustaceans and insect larvae.

Water Fern

I wish to purchase some Microsorum pteropus, but I see that it is listed as a ‘rare’ plant so would like some hints on the best conditions under which to grow it.

Its ‘rarity’ lies in the fact that it is only imported in comparatively small quantities as yet, but it is an attractive plant with medium green lanceolate leaves, sharply pointed at the top, attached by a short leaf stalk to the creeping green rootstock at intervals of about ⅛ in. It does prefer softish, slightly acid water but it is quite undemanding as to temperature (from 65° to 80°F (18–26°C) is tolerated) and has no special lighting requirements. It is an interesting plant in several ways. It is one of the few true ferns (it produces no flowers) that will grow submerged (in its natural habitat in south-east Asia it grows along the water bank where it is likely to be covered by flood waters at periods).

The rootstock produces long roots but the plant must not be pushed into the gravel. Instead it can be weighted down with lead along the surface of the gravel or attached by a thread to reedwork, cork bark or decorative petrified wood, to which the roots will attach themselves and spread out to find nourishment. The leaves can grow to 5 or 6 in. but the plant is not a fast grower. When first put into the aquarium it may take 2–3 months before giving any sign of growth. Rather like Indian fern, new plantlets are produced from the leaf fronds themselves.

CORRECTION

IN the article on the silver scat on page 368 of our December issue the generic name of the fish was given as Selenotoca, erroneously for Selenota. We are grateful to Mr A. Fraser-Brunner for pointing this out to us. With regard to the same article, he writes: Scatophagus “rubrifrons” is not a colour variety of S. argus but a distinct species, Scatophagus ornatus Cuv. & Val. 1831. It is distinguishable by the straight frontal profile, the shape of the spinous dorsal, the absence of black markings on the soft dorsal, anal and caudal fins and other small details. I have collected both species in the wild state and never found them together. S. ornatus does not grow as large as S. argus.
First Steps with Tropical Marines

The first difficulty about starting with marines is trying to sort out from the welter of conflicting advice what technique is likely to prove both safe and economical. Scarcely any of the books on the subject seem able to consider anything less than oceans, power tanks, and large, complicated plants. Any of these is anathema to the timid and is likely to put off the average amateur for life. The highly entertaining series of articles in *Fry* by Ian Turnbull gave me much encouragement but I was still wary on account of the failures by many professionals to keep even show tanks in presentable condition, and the losses they must have suffered hardly bore thinking about. Therefore I decided to look at professional displays within sailing distance of my own home (no-one seems to travel long distances with tropical marines) and take advice from whoever seemed to have mastered reasonably cheap techniques. Maurice Smith, who trades in my area as Bishop's Cleeve, Cheltenham, kindly came to my assistance and I must acknowledge at the outset of these articles how very grateful I am for the unerring help he has given me. Had I followed his advice to the letter I am quite certain that I would simply have landed into tropical fishkeeping wondering just what all the fuss had been about. In the event, I adopted his basic advice and made some improvisations on the main theme, some of which came off others were complete disasters. The overall effect, however, was that the various techniques came more clearly into focus and I shall attempt to outline the changes which emerged.

The traditional approach to the tropical marine system has been one in which seemingly complicated equipment and methods have been combined with the objective of reducing the water free of any contamination whatever. Every speck of unwanted food has been removed somehow, every bag, both good and bad, has had to be eliminated at birth, and both keeper and kept have coexisted in an atmosphere of ultra-caution and unrealism. I long ago decided that if this was what tropical marines meant I would turn to other and simpler things. At the other end of the scale is the Natural System pioneered by Lee Chin Eng in the Far East. It is exactly what its name suggests—an amalgam of compatible creatures in natural seawater in a tank, with no filtration and very little more aeration than one would provide in a freshwater aquarium. This is an ideal and worthwhile concept for those situated in or near to the tropical seashore. Those further afield will find the project fairly costly and those in temperate regions will probably find that even with unlimited money and resources it is difficult even nearly to reproduce the magic which Lee Chin Eng has so painstakingly captured at the other end of the world.

In between these two extremes there has been developed a number of techniques which allow for what could be described as controlled dirtiness—biological control, if you like. The concept here is that provided you can keep on one side of the pollution (and the margin may often be perilously narrow), natural interactions can be allowed, so long as they are mutually beneficial. It has been found that with quite simple means of control, coupled with common sense, aquarium management, limited “natural” conditions can be built up. The parameters within which such license can be exercised have yet to be established, and herein lies room for much fascinating research by members of the hobby. (With a little care many of us can undertake experiments in the ordinary course of our marine fishkeeping which, if given publicity, can be of immense value to other beginners in the art.)

There is growing confidence that tropical marines can be kept quite successfully by using a simple undergravel filtration system, always assuming that it is used without abuse. The basic argument is that you use a deep layer of gravel or coral sand over an undergravel filter which covers the entire base of the tank. After a time millions of microorganisms develop within the interstices of the medium and work away to our benefit by using waste products from within the tank to keep their numbers going (see “Starting With Sea Water” in *FPM* for May, 1971 and L. C. Betts’ series on biological filtration beginning in *FPM* April, 1967). Theoretically, the older the system gets the more it can be abused. The experimenter with plenty of spare cash may care to pursue this line but I am quite sure that there is a breaking point which in practice is far too near to enable the careless to wallow in comfort.

This logic, therefore, determined my initial approach to the subject, and I set out with a 15 gallon stainless steel tank, a home-made undergravel filter made as described in *FPM* (May, 1971) and an air supply tapped from a double vibrator pump which already served half a dozen other tanks with simple aeration. I covered the filter with between 2 and 3 inches of white gravel and introduced as much coral, sea fan and sea tree as could decently be accommodated. The water came from the domestic hot water system, which contains copper piping, and Tropic Marin artificial sea salt was added to achieve a specific gravity of 1.024 at 73°F. Lighting came from a Gro-lux source and a combined heater/thermostat took care of the temperature. A steel thermometer was relieved of its rubber suction, which was replaced by a plastic one and a sheet of glass covered the tank top, coming between the lighting and the water surface to prevent the highly destructive corrosive action of the salt on the metalwork of the light fittings.
The corners of the cover glass at the front of the tank were cut in such a way that they were removable for feeding and for introducing new stock; they allowed an average sized plastic bag to be inserted comfortably. I took great care about the fitting of the cover glass so that salt deposits external to the tank could be minimized, and even fitted a plastic flap on its rear edge, leading back into the tank, in the hope that condensation could be confined to where it could do least harm. I put a plastic sheet under the tank before filling it to minimize the effects of spillage of salt water on the furniture. Light blue plastic sheeting was fixed to the back of the tank and the side panel nearer to the window, the latter as a measure to defeat the growth of algae. This rather tedious list is recorded on account of the mistakes encountered within it, and these will become evident later on in the argument proceeds.

I set the tank up just before going on rather less than a week's break in the summer. The filter was switched on from the air valve and it looked to be functioning satisfactorily. One of the precautions I had taken was to ensure that the air stones at the bottoms of the filter 'up' pipes were tailored to give a flow of fairly small bubbles. This meant reducing, by the use of a coarse file, a standard air stone to about half its thickness.

It was inevitable that whilst on holiday I should get chatting to fishkeepers further afield about methods and I received my first rude jolt in learning that the proposed throughput of air would be quite inadequate for my experiment. I was advised that only a pump with two outlets would do the job and I duly bought one. The rather pitying comments I received on my modest approach to one of fishkeeping's alleged greater problems took some of the pizazz out of my enthusiasm and I returned from holiday rather more concerned with the state of the roses than with the progress of my exploratory trip with marines. In fact at one stage I nearly scrapped the whole idea of tropical marines and toyed with the notion of a temperate seashore tank, but as the colour tones of the latter are perhaps more appropriate to the fish house than to the interior of a modern house I rejected the idea for the time being.

After I had restored the garden to less than jungle proportions I took another look at what I had set up and the first thing to do, clearly, was to test the efficacy of my new pump which I had bought for its claimed power and silence. I led one line to the marine tank and the other to my other tanks and switched on. The power behind the air was splendid to see and there was no doubt that by adjusting the individual knobs controlling either channel, a fine degree of variation to outlets could be achieved. But to my ears the noise was quite intolerable and although I tried every known way of reducing it I completely failed. I concluded that only by banishing it to a distance could we live together. Since the noise penetrated every wall within the house I decided that the pump would have to be placed in the greenhouse, and there it is today. An enormous length of airline connects it to the house in a quite unobtrusive way. Domestically, we are delighted, since the only noise we now have is that of bursting bubbles. My only problem is whether or not I should ever fertilize the greenhouse again. Obviously no sprays or smokes may be used whilst the pump is running, but even if I disconnect, the outlets will have to be sealed up and the pump removed whilst the polluted atmosphere prevails. As fertilization usually means containing the smoke within the greenhouse overnight I shall have to switch to an alternative air source for this period or else face the fact that the greenhouse may at last have won their little battle. We could, of course, bring the pump back indoors for a day or so, but I am not sure that my nerves are quite up to that.

The stage had thus been reached where many beginners would withdraw their life savings and gone along to their dealers for a tankful of fish. This is the advice commonly given at this stage of proceedings but my experience has led me to advocate an alternative course, to be described next month.

Featured in the latest '007' film 'Diamonds are Forever' is this 7 ft. diameter transparent water-bed encircled by tropical marines and freshwater aquaria. The specially made Perspex tanks, holding 200 gallons of water, were proof-loaded to a 14 tons strain. To facilitate filming by the Panavision camera the water was continuously filtered.
how, when and what to buy, but in the present context it is probably reasonable to suggest that you should buy small fishes (provided that you do not intend putting them together with hungry adults), and also that you should buy the less volatile species. In my own experience I have done quite well with goldline rasboras, glowlight tetras, cardinals, black neon and kuhli loaches. In between come the blood characins, the larger pencilfish and Bodia salmincola. I have done rather badly with flamess, zebras, O mocinou and, alas, the black wedge tetra, which is a great favourite of mine. I do not suggest this as some sort of buyer’s guide because these species have only performed well or badly in my own set of conditions. It would be interesting, however, to have the reactions of others as to the general tendencies I have outlined.

I have directed these comments particularly to the smaller inhabitants of our tanks since these are by far the most popular purchases as well as being the least predictable. I believe it is true to say that the larger growing species like sharks and tinfoil barbs have a distinct edge as regards longevity, and therefore if you are on the threshold of the hobby and can make a decision as regards big fishes or little fishes, you may well be inclined towards the former if you can settle for the stability and solidity of the scene offered by this group. On the other hand, if you are naturally inclined towards species and inhabitant, the kaleidoscopic scene which alone the tinier fishes can provide may well be the subject of your choice.

A few weeks ago I decided that I could do with a little micro worm in a hurry, but, alas, my very thriving cultures of Keratella and Asplanchna did not produce on demand. Therefore I thought of importing the two species from Italy. I was delighted to hear from you that you had already received the three dozen cultures and that they were thriving.

I often get the feeling I am sinking into a humpy featherbed. I’d slept in during my childhood. One such happening that affects our aquarists is the problem whether the fish in front of them is actually a guppy and not a similar looking fish from another genus. Older readers will remember the argument that raged some years ago when imports into Britain from the Far East were passed off as guppy females, often by innocent breeders who had purchased them as such. It wasn’t until after numerous disqualifications by judges that the FOA set up a committee to go into the whole problem. After a thorough investigation the fish in question were proved to be Colisa affinis affinis.

How much simpler the task would have been had we had a copy of Kurt Jacob’s new book: LIVING-REARING AQUARIUM FISHES. In questions of doubt tin, ray and scale counts are necessary. For the benefit of those who don’t know the figures for Pterobryis reticulata, here they are:

Dorsal fin: 7-8; caudal, 16-18; and, 8-9; ventral, 5; pelvic, 13-14.

Lateral line, 26-38; transverse (across the body in front of the dorsal), 8.

Now all you have to do is to get the fish to keep still while you count them!

Have you ever stopped to wonder why the females of the species carry I mean guppies, though it does apply...
THE MBUNA—6

Among the mbuna it is the female that undertakes the incubation, the 'parental' activity of the male ceasing with fertilisation. If the female has been isolated and is fed regularly at the end of the incubatory period she will show no aggression towards her offspring when these leave the buccopharyngeal cavity. On the contrary, for the next 5 to 10 days after their first outing, the fry will continue to seek refuge in their mother's mouth, particularly at night or at any sign of danger, even though she is now eating normally. Even after this transition period, which may be of varying duration, the fry can be safely left for another month or so with the female. It is the female who defines the limits of the transition period by ultimately refusing to take the fry back into her mouth.

Seventeen Labeotropheus fuelleborni fry, aged from 7 days and no longer allowed back into their mother's mouth, were put in a tank with a female with a diffuser to ensure aeration and movement of the eggs, contact with some object, preferably something dark, is sought by the fry from the thirteenth day of their development. This contact behaviour can equally easily be demonstrated if the female is removed immediately after natural expulsion of the fry has taken place; if a dark object (black glass, for example) and some 2 to 3 cm. in diameter is then moved with slow, regular movements up and down and backwards and forwards near the fry, after a brief instant of fear the cloud of fry will collect round the object that has become their adoptive mother and follow all its movements. If the object is pierced with holes or is a tube, the fry will try to take cover in the holes. As we have said, this contact behaviour continues to show itself for some days after the end of the incubatory period.

Conditions Required for Fry Rearing

Of the three species of mbuna studied, Pseudotropheus auratus is incontestably the most robust and the easiest to raise, being able to bear quite noticeable variations in its physical conditions

Rearing Malawi Fry

By D. Terver

Laboratory and Museum of Zoology
Aquarist Circle of Nancy, France

L. trewavasae whose own fry had just left her mouth for the first time; the fuelleborni fry continued to seek refuge in their adoptive mother's mouth for a further 5 days, although at first, for a few hours, they did show some signs of hesitation and desire for flight. The adoptive mother showed not the least sign of aggression—confusion of her own offspring with the newcomers would be very possible because of the great similarity between the fry of the two species. The adult females, however, were extremely different from each other both as regards weight and size as well as colour: L. trewavasae: 7 to 8 cm., elongated and speckled; L. fuelleborni: 4 to 5 cm., dumpy and grey.

In an extension of the same experiment, the fry of the L. trewavasae were not caught up by the L. fuelleborni female as she had terminated her 'transition' period.

This instinctive behaviour of the fry in returning into their mother's throat (adopted even when they are expelled artificially before the end of the incubatory period) and their ability to find refuge there at night or when danger threatens for a further 5 to 10 days is known as 'contact behaviour'. The fry seek out contact with their 'mother' whether this is a natural or artificial 'mother'.

With an artificial incubation (when the eggs have been extracted from the female's throat 24 hours after the spawning and placed in a bowl (water pH, hardness, temperature) without serious harm. L. fuelleborni and L. trewavasae, on the contrary, showed themselves at the beginning of our rearing programme to be particularly sensitive to variations in temperature. A minimal temperature of 77°F (25°C) and optimum of 78-80°F is apparently essential to the development of these two species. These temperatures are, in fact, those operative in their natural habitat for the greater part of the year.

Among our first broods, 29 fry of L. fuelleborni and 18 of L. trewavasae, kept in a 600 litre aquarium at a temperature of only 73-5°F (23°C), in the fourth month showed the most alarming symptoms: abnormal swimming, body covered with a whitish film, panting for air at the surface. Raising the temperature and strong aeration did not prevent the death of two spawnings (except for two L. fuelleborni and one L. trewavasae). A few days later, however, the same symptoms in a spawning of L. fuelleborni were checked in another aquarium by raising the temperature in time.
Following on this, two other spawnings were partially lost after accidental falls in temperature to 71°F and 74°F respectively.

The latter case reveals so clearly the sensitivity of *L. fuelleborni* compared with *P. auratus* that it merits description. A 600 litre aquarium, normally maintained at a temperature of 80–6°F, contained eight *P. auratus* and 12 *L. fuelleborni* of from 5 to 6 cm. and aged about 18 months. A fall in the temperature to 72°F, spread over a period of 4 hours and due to too rapid a replacement of water in the circulation system, was sufficient to cause grave symptoms among the *L. fuelleborni* in spite of a gradual return to the normal temperature. Twenty-four hours later all the *L. fuelleborni* were covered with a whitish film and were gasping for breath at the surface in a practically vertical position.

Fortunately the application of a fungus cure, together with powerful aeration, saved them. It was this incident that showed us the sensitivity of *L. fuelleborni* to even a slow, fairly slight, drop in temperature. The *P. auratus* at the same time showed not the slightest symptom and they continued to behave perfectly normally throughout the whole episode.

Since these early accidents, we have had several repetitions of similar incidents to young and adult *L. fuelleborni* in the same aquarium without a fall in temperature being involved. In a few hours all rose to the surface for air, with the body held obliquely and moving with a characteristic rocking movement. The immediate use of a fungus cure has always given instantaneous results. All the symptoms clear up and disappear quickly. The rapid development of a fungus, particularly over the gills, causes progressive asphyxiation and is the reason for the symptoms, and causes very serious results if not dealt with.

*P. auratus* reacts much more slowly and it is quite strange to watch in the same aquarium this species behaving quite normally compared with the sickly comportment of the *L. fuelleborni*.

Lowering of the temperature undoubtedly triggers off the process described above, but other factors such as feeding, pollution in the filter or in the tank during a critical period in the fry’s development etc. do play their part.

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**Guppy World**

*Continued from page 466*

‘Tower of Pisa’. I base my remarks on man’s inefficiency to keep up with Nature; the frequency with which said standards are altered and the number of comments and criticisms these outfits are subjected to.

Most recent in the long list of alterations comes from the International Fancy Guppy Association, who largely confine their activities to the North American continent.

Under the title ‘Classification of Entries’ appears these new rules...

- **Bloodcolours**: two basic different colours with a minimum of 25% of the secondary colour. The primary colour must be specified. *A.O.C.* shall be any other colour not covered by classes. *Multi*; three or more equally distributed basic colours in any pattern; half-black body with black tail shall be in the black class. *Snakeskin/cobalt snakeskin* must have distinct snakeskin pattern on the body. Cobra must have three or more distinct vertical bars on the body.

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**MR. ALBERT LINLEY**

The British guppy fraternity has been shocked to learn of the sudden and untimely death of Albert Linley, Breeder, showman, lecturer and judge. Albert was a man of many parts and rarely have the Club News pages of *PFM* appeared without some mention of his prowess and unsullied work in the hobby.

I am proud to be numbered amongst his many friends. Our association goes back to the grass-root days of the organised specialist hobby. For the past few years we have represented both the FGBS and PGA at the British Aquatics Festival, when we shared the adjudication of our favourite fish.

Hailing from Jescaldale in Nottinghamshire, Albert was very active in Midland aquatic affairs but was always ready to judge a show or help newcomers with advice anywhere in these islands.

To his widow and daughter Maureen, the condolences of us all are sincerely offered. I have lost an old friend and the guppy world a great advocate. 

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**JIM KELLY**
Have You Seen These?

Fish photographed by

CLIFF HARRISON
at
Harrow Green Aquatics, London

Above: This 'tiger' or 'shovel-nosed' catfish (Pseudoplatystoma fasciatum) is an attractively marked species of odd appearance. Specimens for sale are about 10-12 in. long, although it is reputed to grow to 36 in. Light-avoiding, like most 'cats', the tiger catfish also lives up to its name if placed with smaller fishes.

Left: Young arowanas (Osteoglossum bicirrhosum), about 3 in. long and still showing their underslung yolk sacs. These youngsters are obtained in the Amazon Basin by killing the male arowana, who carries 100 or so in his mouth from the egg stage onwards. Interestingly, voracious aquarium fishes, capable of growing to at least 2 ft. long, a report of an aquarium spawning by arowanas (in a 360 U.S. gallons tank) was made in 1967. The adults can eat up to 100 goldfish a day.
A Broad-leaf Aquarium Sword Plant

Echinodorus cordifolius

By J. ELIAS

Photographs by the author

This plant was identified as long ago as 1857 as belonging to the genus Echinodorus, though the earliest description of it in 1753 refers to it as Alisma cordifolia. Amongst aquarists the name E. radicans is customarily used and it has even been known as Sagittaria radicans, but both these names are quite incorrect. The plant grows in the swampland of the central and southern states of North America and is also found very occasionally in Mexico.

The rootstock forms a dense mass of roots with small, elongated nodules, which are probably reserve supplies of nutrient. In nature the leaves can reach from 10 to 30 in. in overall length, though the stem is much longer than the leaf blade, which measures only 6–8 in. by 4–5 in. wide. The blade is shaped like a heart with a rather blunt point, and usually shows seven to nine longitudinal leaf ribs, which join the central rib at a rather sharp angle. The flower stems, vertical at first and then becoming horizontal, bear clusters of buds that look like little bunches of...
grapes. The flowers themselves are about 2–3 in. in diameter on short stalks an inch or two high. They are white and self-pollinating. The fruit is rough and shaggy-looking and the seeds germinate quickly. Simultaneous with the flowering, leaves and roots also appear on the actual flower stem. A mutation of the basic type has the flower stem forming a number of further flower stems all radiating from a single point.

Submerged plants differ from the emerged plant both in leaf structure and in the number and length of the leaf stems. Leaf stems of submerged plants remain fairly short, and the leaf blades are rounded with a deeply-cut heart shape. Those above water measure as much as 6 in. by 6 in. and unless prevented will quickly cover the surface of the container and prevent sufficient light reaching the other plants.

E. cordifolius is not as easy to grow as the more common aquatic plants because it does not really do well in its submerged form. Growth will therefore chiefly occur as floating leaves on the water surface, provided that the conditions are suitable. So, with this plant, an undernourished specimen is the more attractive for the aquarium.

If the plant does spread out too much over the available water surface, it is possible to stop the growth for a time, and particularly the production of new leaves, by tugging it up slightly from the bottom medium so that the roots are broken. This manual disturbance of the roots is an effective way of limiting growth but it must be admitted that there is a certain element of risk in the procedure and the whole plant might be lost. An easier method of regulating growth is to cut out some of the light reaching the container or it is sometimes possible to check the plants by controlling the amount of artificial nourishment given as a liquid addition to the tank.

The plant tolerates normal ordinary temperatures between 62 and 68°F (17–20°C); over a short period of time temperature swings, particularly downwards, do not have any great adverse effect, nor is water hardness at all critical. It is for this reason that E. cordifolius retains its popularity amongst growers of aquarium plants and is not exactly rare in aquarists’ tanks.

Flowers of E. cordifolius formed above water and shown slightly larger than natural size.

Front of E. cordifolius at the end of a flower stem above water.
Starting the Right Way

By F. W. COLES

he is simply stating a fact and he is right. The information that, on the day before at the particular site mentioned, the temperature was 70°F is not recorded. Neither of these temperatures need be the optimum for the variety discussed—it can be something in between, and generally is.

Now on this question of temperatures we ourselves can be too cautious. In Nature a fluctuation of 10°F is a daily occurrence, but of course fish are usually able to choose their own conditions by altering position from shade to sunlight or vice versa as required. They have the room to do it and in the body of water is seldom the same temperature throughout. The pH fluctuates, too, because in low water conditions both in rivers and pools the water becomes more alkaline and harder, because the same salts are retained in the smaller body of water. When the rain comes and the level of water rises the pH and the hardness go down with the increased volume of water.

There are then the conditions pertaining in Nature, so in our limited little aquatic world what must we do about it to be successful?

In most branches of livestock keeping one is urged to start in a small way because things are more easily managed. This does not apply in fishkeeping and a larger tank is more easily managed because temperature changes are slower than in a small one, and the water chemistry does not alter quite so quickly. A little overfeeding is often fatal in a small tank, where the same amount of overfeeding would not make as much difference in a large one.

Also in a larger tank two heaters can be used, one at the end and one in the middle at the body; this will give a temperature gradient from one end to the other of a few degrees, and your fish can sort out the positions they prefer for themselves.

This temperature gradient will also circulate the water, and by the allow gases to disperse and oxygen to be absorbed, without the necessity for a pump.

Keep a small enough number of fishes for them to be visible without the use of magnification, and make sure that the fishes you keep are compatible. Select only the hardy types so that they will all live peaceably together.

Set the tank up with 3 in. of gravel at the back and 1 in. at the front (level with the tank frame) and then siphoning off mud and unwanted food will be easy. Do this as often as possible. You can see it—siphon it out. Do keep a clean tank. In connection with this, if the water goes at all cloudy, feed only live food sparingly for at least a week, when the water should have become clear again.

Most people have trouble with condensation if they use cover glasses, but this can easily be overcome. Make a couple of aluminium clips to hold a length of dowel rod level with the bottom of the single pane of the front frame, and clip a piece of double glazing rubber along the angle at the top of the rear frame. You can then put your cover glasses under the front frame, supported by the dowel rod, and resting on the rear frame, and any condensation will run back into the tank without touching any metal, and the tank top will be perfectly dry at all times. This is invisible from the tank front, and it works.

Change a proportion of water each week, siphoning from the bottom of the tank, and if possible collect pure rain-water for some of the replacement.

If your water supply in the house contains chlorine or is suspected of containing it, put a couple of hypo crystals in each 3-gallon bucket of water. It will remove chlorine immediately and can itself do no harm. The number of fishes killed by chlorine must be astronomical, and
most aquarists are ignorant of this. Keep your tank as free from debris and root as possible. Those that must be used can be sited in the rear corners, and if you have to net your fish for any reason a clear tank is a big help besides being more satisfactory aesthetically. An outside thermostat helps, too.

Feed your fish alternately on dry and live foods if possible and watch the water carefully for signs of overfeeding. Keep it clear and bright always.

Always adopt a positive attitude towards fish-keeping and look out for things going wrong. Keeping one's fingers crossed is never enough!

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**TRANSATLANTIC TOPICS**

By JIM KELLY

**FACED WITH A POWER FAILURE THROUGH THE ACTIVITIES OF A HURRICANE, ONE U.S. AQUARIUM DEALER CAME UP WITH AN INTERESTING, IF NOT NEW, SOLUTION ON HOW TO KEEP HIS FISH霧 CROWDED FISH TANKS AERATED.**

Piercing a few small holes in the base of a 5-gallon plastic aquarium tank, he filled the container with water from the aquarium and placed it across the corner of the tank frame. The slow drip of the water back into the tank worked wonders, because though the electricity out lasted 3 days he didn't lose a single fish.

From my personal experience air pumps and heaters always seem to pack up just after the shops have closed, so here is one Transatlantic Tip worth remembering.

**WONDERING AROUND A FISH SHOP RECENTLY, I WAS SURPRISED TO FIND THAT AN OCEAN-LIVED FEATHERBACK, *Notopterus chitala*, had been judged best fish in the show. Surprised, because this fish, though a splendid specimen, was only some 11 in. long and I had seen similar fish in the States over 2 ft. My inquiries from both judge and owner revealed that they knew very little about this fish. The adjudicator was honest enough to admit he had tried to obtain more information but in vain.

The fish hails from South-East Asia, India and the Australian Archipelago. In Thailand, adult specimens reach just under 2 ft.; it is those found in the Indo-Australian waters that attain lengths of over 2 ft. (60–70 cm). The Thai government considers it an important food fish and helps towards its propagation.

The long rippling, strong fin, in conjunction with the caudal, ensure that the anglerl or eel *Notopterus* can swim easily both forwards and backwards, though they seem to prefer a forward motion.

What does make the featherback unique is that the young specimens, just over 1 in., display blueish to dark grey vertical bands on their bodies. At 2 months old a rounded spot appears at the lower end of these posterior cross bands. Further growth sees the spots, each surrounded by a lighter ring, develop and the bands disappear. In adult specimens the ocelli number from five to ten on each side of the fish.

Another aid to identification is the hump commencing just behind the head of the fish. This shape becomes more pronounced as the fish matures. Missing in the young *N. chitala*, this gibbous hump becomes more pronounced as the fish matures. The species in Thailand is represented by probably three species: *Notopterus chitala*, *N. notopterus* and the rare *N. hornemanni*.**

**ONE ASPECT OF THE VIET NAM WAR**
has been that it has brought many U.S. aquarists in touch with the South-East Asian fishes in the wild. And not only in the wild but captivity too, as witnessed by a report on Fighting Bettas told by U.S. Air Force member, Bill Felinski, who has described the first Betta fish he experienced in a Bangkok city night-club.

‘Above the bar, along with the liquor, were many jars containing short-finned, very stocky Betta splendens. The bartender explained that I could purchase one and any other patron’s opponent. This we did and the fish were then placed on each side of a divided tank to work themselves into a frenzy.

‘During this time a crowd gathered and bets were placed, the bartender acting as both bookmaker and referee of the subsequent “contest”. He would not let an unmatched pair fight nor would he allow a fight to the death. It was his duty to announce the winner before this happened. After the fight the bartender buys back each fish, the price of which depended on the outcome and the damage sustained by the fighters.’

Bill continued, ‘As a hobbyist I analyse this practice not as an injustice imposed by man against animals but as witnessing one of Nature’s most admirable attributes. It is comparable with the fursmooth protecting its young or an angel fish establishing a territory. I was assured by the bartender that real damage was suffered by the fish other than exhaustion. Very few fish are ever lost.

‘Sorry, Bill, I disagree and think that the degradation is suffered by those who permit this so-called sport to occur, especially if they prefer to be aquarists. Thankfully you attempt to start this practice in Britain some time back was stamped out. Old-fashioned I may be but the fish to me has many more attributes to give us than his ability to fight.

* * *

Take a tip from Jim Troule in Alaska. Don’t stress the water quality you supply from your fish tanks when you do the servicing. Use it to water your house plants—she has found it to be an excellent plant food. Considerably cheaper than the proprietary brand.

DECEMBER was a particularly busy month for members of FRAS (Fish Reared Aquarists Society) who held their usual club meeting on Christmas Day. The president, Mr Alec Firth, gave a talk on the care of the more unusual species of fish found in bog garden tanks, but the annual dinner dance and prizegiving was held and the Society’s annual show opened. The winners of the annual trophies were: Thames Memorial trophy: 1, Mr J. E. Cheesley; 2, Mr C. Butterworth; 3, Mr G. Fairclough. Shurvy trophy: 1, Miss H. Homes; 2, Mr A. Day; 3, Mr S. Toddle. Junior Master J. Moorehouse. The show attracted the largest entry ever with 450 entries; the best fish in the show were awarded to the Katushi, entered by Mr D. Kennedie. Results were as follows:

Guppies: 1st, Mr K. Mitchell (Chapel) 2nd, Mr J. C. King (Cambridge) 3rd, Mr J. A. Walker (Hertford).

Betta splendens: 1st, Mr J. E. Cheesley (Cheesley) 2nd, Mr C. Butterworth (Cheesley) 3rd, Mr G. Fairclough (Cheesley)

Routa: 1st, Mr J. E. Cheesley (Cheesley) 2nd, Mr C. Butterworth (Cheesley).

Tetra: 1st, Mr J. E. Cheesley (Cheesley) 2nd, Mr C. Butterworth (Cheesley).
the year and Breeders Egglayer Cup, Mr Alf Dilbertson received the Breeders Livebearer Cup. One disappointment was losing the inter-cup contest with RHONDDA by a few points: Miss Bill Gorwill on mouth breeders made a very interesting meeting in November and when the table show was judged by Mr Glin James results were: Class A: 1, Mrs Helen Jones; 2, Mr J. Edwards; 3, Mr R. Wigg. Class B: 1, 2 and 3, Mr R. Wigg.

THE final evening's entertainment of the 1971 season at EALING & D.A.S. (FBAS) took the form of a judging competition. The table show classics were guppies, platies, swordtails and mollies. Mr Harry Towell did the official honours and the intense took over. Mr R. C. Mills reports: 'There were a few "group practices" in evidence—three newcomers to the society got up as did the junior members—but Mr John Batia, the Society's new table show champion, went it alone. As expected, John came closest to Harry's marking and placings although the juniors certainly seemed to know their guppies. Mr Pete Cooper, spokesman for the newcomers, put up a good show and all who took part enjoyed the competition and learnt a thing or two.

In Brief . . .

WHEN PRIVATEERS A.S. (Shapley) met in December the large-than-usual audience were most appreciative of the excellent and informative talk on classic fish given by Mr J. Herningway of Batley.

NEWCOMERS to the inter-club competition held by MID-SUSSEX A.S. won by half a point: Tonbridge, 112; 2, Mid-Sussex, 112; 3, Brighton, 111; 4, Crawley; 108; 5, Redhill, 106, but Mid-Sussex retaliated the following week when they made a return visit to Tonbridge and were awarded their first prize.

WHEN Mr Ron Terch lectured to HORSBORTH A.S. he warned the Society that the large albino clarias he had taken along was in a bad temper, and sure enough one large pink fish was soon sweeping the floor! The monthly trophy was won by Mrs Dickinson with a very nice coldwater fish and Mrs Dickinson also received the first award in the a.o.v. specified class. Mr M. Ott was first in the a.o.v.

'A GOOD year for the Society' was the A.G.M. report on 1971 for ERITH & D.A.S., filled with interesting talks, films and outings and with a small profit in hand at the end of it all. The club's Champion of Champions class was judged by Mr C. Harrison (FBAS) and won by Mr Frank Squires with a C. sebaezi (3, Mrs B. Scates, sargae form; 3, Mr Bob Mildred, barb). Mrs J. Squires remains the hard-working secretary and is always pleased to receive show schedules and enquiries for membership at: 30 Woodhurst Road, London, S.E.2.

...MR F. OLIVER of WREXHAM T.F.S. was extremely successful in the Society's annual competitions and won the Endurance Trophy (2, Mr E. Gillam; 3, Mr J. Evans), the Paramount Trophy for the fish of the year, and the trophy for the Home Aquaria Competition Secretary Mr C. Pritchard adds, 'As you see, Mr F. Oliver won the major trophies and there is a note of interest here—he has but one tank so you see this goes to show that you don't have to have a lot of tanks to win'. The highest pointed junior award went to Master M. Edwards. The club are also delighted to have another trophy to compete for, presented by Mr Wexley of the Cumulative Arms.

PLYMOUTH D.A. & P.S. members heard a very interesting talk on all aspects of fertilisation by Mr B. Taylor at their December meeting. The table show class for livebearers (ex guppies) was won by Mr Kendall (50 pts, novice), and Mr Hookings (platy, 50 pts, beat in show premier).

THE BRITISH KOI-KEEPERS SOCIETY now numbers 8a. Enquiries should be made of Mrs H. Allen (secretary), 1 Anthony Close, Francis Gardens, Peterborough, PE2 2XU.

A PIE and pea supper held by HARROGATE & D.A.S. was a very successful new venture. Other items of entertainment at this meeting were a quiz (quiz master Mr Penfold) and an auction. Table show winners were: Rasboras, Mrs Atkinsen; a.o.v., Mr Peggall; junior a.o.v., Master Groves. Member Mrs Briggs is leaving Harrogate and the society will sadly miss her services.

50 MEMBERS and visitors were present for the KEIGHLEY A.S. annual Juniors' evening. The junior members organised the meeting, held an auction of fish and equipment and judged the table show. Winners of the classes were: fish of the month, Mrs Gart; a.o.v., Mr Hoop; junior a.o.v., Master Jones.

WHEN Mr D. Sealman lectured to fellow members of ILFORD & B. A. & P.S. on setting up an aquarium for both competitive and domestic purposes the large audience appreciated that they were listening to expert advice since Mr Sealman was the outright winner of the Society's Home Aquaria Competition for the past 3 years.

PRE-CHRISTMAS activities of MID-SUSSEX A.S. included a very well supported dinner and dance, at which vice-president Mr Jack Stillwell and Mrs Stillwell proposed the toast to the Society, and a children's party at which 50 children and Father Christmas had a splendid time. The Society were very pleased to welcome back the chairman after his three-month sabbatical because of work commitments. The home aquaria competition results are now available. Mr D. D. Edwards (2); Mr L. Edwards (2); Mr N. Short. L. Temple won in the junior class (2, P. Johnson; 3, K. Bridie), and a special award was made to Mr S. Taylor for his coldwater marine entry.

THE best fish in the show award at the WHITLEY BAY A.S. biannual jar show went to a magnificent marbled angel entered by Mr J. T. Burns, the bi-annual shield being won by Mr A. Little of Blyth. The Society thought it fortunate to have Mr Gordon Lovethin as judge, a world traveller and authority on tropical fish, plants and reptiles, who gave an informative report on each of the 28 entries. The Society hold their meetings in the
... YORK & D. A.S. had a fair number of trials to contend with in 1971 in finding a permanent venue, but now this has been accomplished (Railway Working Men’s Club), they look forward to settling down to ‘get on with the very serious business of fish’. In spite of their difficulties, however, there were enjoyable coach trips, a very successful open show, and tremendous support from members at open shows, which won them a best society award at Cleveland and again the Ingarnells Cup.

... WHEN Mr Bob Hesp of the R.B.A. lectured to COVENTRY P. & A.S. on the case of keeping killifishes he emphasised that though many were attractive in the wild they would, in fact, live for years in the aquarium. B. and F. First won the Killie class in the table show (48 pts). Mr M. Lewis was also very successful, winning in both the carassius and the livebearer class, and receiving the best fish in the show award for his snuffin moyle.

... THE BREEDERS Cup (the L. C. Betts trophy), which was presented to a member of THE GOLDISH SOCIETY OF GREAT BRITAIN for the best team shown within the year, went to Mr Atten. Tagg for his team of bubble-eyes benched at the April meeting. Winners at the November table show were: Breeders classes (judge Mr B. Evers): pearlscales, Mr M. Clow; brachyheads, Mr A. Tug; globe-eyes, Mr T. Tillett; Novice’s class (judge, Mr Walters): single-lined variety, Mr A. Lawman; twintailed variety, Mr P. Radcliffe. Training is to be given at future meetings for class B judges, who are now urgently needed by the Society.

Dates for Your Diary

February 1972


February: FEDERATION OF NORTHERN AQUARIUM SOCIETIES Meeting. The Birth House, Belle Vue, Manchester, 2.30 p.m.


March: BELLE VUE A.S. Open Show. Openers’ Lodge Club, Craylton, 2.15 p.m. Details: Mr R. Davies, 38 Stanley Street, Higher Openers’ Mans., Birkdale.


March: NELSON A.S. Open Show. Civic Centre, Station St, Nelson, from Mr P. McKee, 32 Bath Rd, Nelson.


March: TOTTENHAM & D. A. Silver Jubilee Open Show, Hazley Green Drill Hall, High Road, Tottenham, London, N.17 (opposite Tottenham Green). Schedule: Mr R. M. Moss, 27 Woodbine Road, South Chingford, Ilf. 077 7918.


April: SHEFFIELD & D. A.S. Open Show. Grenville College, Grenville Road (nr. Railway Station), Sheffield. 1

April: STOCKTON-ON-TEES Open Show. St Peter’s & St Paul’s School, off Durham Road (A171). Schedule: Mr M. Menfield, 15 York Crescent, Billingham, Teeside.


April: THURROCK A.S. Open Show. Park School, Bridge Road, Grays, Essex. Schedule: Mr C. E. E. D. M. Davison, 17 Trinity Road, Southend, Essex; phone Southend 81976.

April: FREELANCE A.S. Open Show. St Stephen’s Hall, Inner Square, London, S.W.7. Details: Mr J. J. Stump, 72 Bethnal Green, Hauth President Street, S.E.1; phone 967 6060.

April: UXBRIDGE & D. A.S. Open Show. G.P.O. Motor Repair Depo, Willow Tree Lane, Yeading Lane, Yeading, Hayes, Middx.

April: BLAKEBOROUGH A.S. Open Show. Coopers, J. Blakeborough & Sons Ltd, Birchhouse. Details to follow.

April: COVENTRY POOL & AQUARIUM SOCIETY. Open Show. Foleshill Community Centre, Foleshill Road (A444), Coventry. Details to follow.

May: OSRAM A.S. Open Show. Recreation Hall, Belfield Street, Oldham, Lancs.


May: Llantrisant Major A.S. Open Show. Schedule: Details to follow. Place: Mr A. Bunsen, 84 St Mary’s Avenue, Barry, Glam.
London's Fifth Annual Exhibition of Fishkeeping

The AQUARIUM SHOW '72

Friday 27th October to Sunday 29th October
at the Royal Horticultural Society's Old Hall, London S.W.1

All enquiries to the Show Organiser,

PFM, 554 Garratt Lane, London SW17 0NY Phone 01-947 2865

11th June. BISHOPS CLEVE A.S. Open Show. Tythe Barn, Stow Hill Road, Bishops Cleve, Cheltenham, Glos. Further details: Mrs M. Serrin, 47 Warden Hill Road, Cheltenham, Glos.

11th June. HIGH WYCOMBE A.S. Open Show. Lane End Hall, Lane End, High Wycombe, Bucks.

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