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Comments and Quotes

- Investigations of fungus disease
- New design in aquaria
- Not entirely inert

Cure for 'Fungus'

'BRAND X is what I use to cure fungus in my fish' says Bill. 'It won't touch it on mine' says Joe, 'I always use Brand Y'. And there the matter rests, each aquarist suspecting that the other is doing something wrong or is refusing to face the facts. Just how misled one can be in attempting to gather useful information on treatment of something like a fungus infection was, we thought, shown rather well by the results of Dr R. L. Martin, a zoologist of Ohio State University, published in the Progressive Fish Culturist (U.S.A.).

Dr Martin's work shows that not all of the numerous fungi known to grow on damaged areas of fish skin are affected in the same way by chemical treatments. He compared the effects of malachite green and acriflavine agents used for fungus control in commercial fish hatcheries on seven different species of fungi. Although malachite green arrested most fungi it often needed concentrations and durations of application that would also kill fish. Alternatively, acriflavine was found to be effective against only a few of the fungi but it is much safer to use with fishes. But anyone who had used acriflavine to treat an infection for which Saprolegnia parasitica was responsible would have written it off as a failure, whereas if the fish had been infected with Achlya ambisexualis acriflavine would have been voted a raging success!

Dr Martin stresses that it is desirable to know what particular fungus is causing the damage before the method of treatment is selected. For most of us such identification is impossible, but it is worth bearing in mind when notes are being compared with fellow aquarists that 'fungus' isn't just one fungus and what will deal with some fungi may not deal with others.

Evolving Tank Design

It is somewhat rather exciting to be a witness of the continuing struggle to achieve a change in design of a familiar object that had once seemed to have long established its final and permanent form. The conventional aquarium tank has in recent years been the subject of attack by designers many times, and it appears that the struggle might very well now be approaching a turning point. Persistent attempts to replace the angle-iron-framed aquarium have for various reasons failed to produce tanks having the same strength but with improved appearance at something near the same price.

All-plastic tanks at acceptable prices began to emerge several years back, and have stayed with us, but only in the smaller sizes. Use of plastic coatings to protect the old angle-iron frame, the introduction of light-weight stainless steel and anodised metal frames, and use of new sealing techniques, even the attempt to produce all-glass tanks with resin-bonded glass panels, all these begin to be seen as a series evolving towards a final design that will make the best and most economical use of modern materials with minimum labour costs.
Could it be that the combination of an all-plastic frame with glass-panel bonding about to be introduced for small aquaria by one manufacturer (see What’s New in this issue) is now the pointer for the future? The technique is an interesting combination of the various methods that have been tried and would appear to be capable of being further developed for making the popular larger sizes of aquaria.

**Not Entirely Inert**

GLASS is one component of the aquarium that at present seems likely, if only for the reason of cheapness, to be with us for some time to come. This material is usually trusted implicitly by aquarists. They know that glass might let them down by cracking or breaking but it is never regarded as a possible source of reaction with the aquarium contents, from the points of view of either the glass affecting them or the contents affecting the glass, as are the aquarium putty and the material of the aquarium frame. And yet the glass technologist can tell us different. Fortunately the interactions are not usually ones of serious consequence for the aquarist.

In an article entitled ‘The Biology of Glass’ in THE NEW SCIENTIST Dr P. B. Adams reminds us that fungi, algae and bacteria of various kinds may attack the surface of glass. Glass brought into contact with concentrated solutions of chemicals, especially acids or alkalies, needs to be washed very thoroughly thereafter for it is likely to retain acid or alkaline properties for some time. This is because the molecular structure of the glass surface is not wholly inert; exchanges of its atoms with other atoms in contact with it can occur. Beyond the aquarium sphere, it can be a very annoying and costly experience to meet the fungus that marks glass surfaces with its growth, as anyone who has had binocular or camera lenses ruined in this way will know.

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**LETTERS**

**Troubles with Plants**

Arpee’s experiences in Personal Comment (PFM, December 1968) were akin to a page torn from my notebook. Into the larger of two tanks I recently introduced a cutting of Cryptocoryne, which grew in such a forced manner that I reduced the wattage of the bulbs above both tanks. A few weeks later the Cryptocoryne in the smaller tank suddenly wilted in exactly the way described by Arpee, whilst all the other plants looked healthy. The Cryptocoryne in the larger tank remained perfectly healthy. One week later the bulbs above each tank failed within a few days of each other. They were replaced by bulbs of a higher wattage as no others were on hand. Immediately the Cryptocoryne in the smaller tank responded and is now, one week later, showing new leaves.

Poynoton, Stockport

G. ROWBOTHAM

---

**Order of Seniority**

I AM very intrigued to know if anyone else has observed a ‘second-in-command’ position being adopted by a fish in their tank. A year ago, in my fairly small community,

*Continued on page 453*
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LETTERS

Continued from page 450

one of an ever-growing pair of angels was the tank's 'boss', but the other angel was not the second most active community member. This position was adopted by a red-finned shark, which, to our amusement, became a sort of Uriah Heap character, hanging around near the angels and having a secondary bash at any fish the boss angel chased off.

At last the angels grew too large and were removed from the tank. All the tank occupants at last had full swimming facilities and for a few weeks seemed to have equal rights. However, the boss position was soon taken over by a red-tailed black shark whose main activity in life is now to ensure that the original 'second'—the red-finned shark—shall be kept in the plants and not allowed to swim out at all. To my amazement, he has acquired a lieutenant in this task—a male green Molly who has taken it upon himself to threaten the red-finned shark on the few occasions when that fish has managed to escape the eye of his red-tailed tormentor.

In both these cases, the really curious thing is that the first and second tank mates do not attack each other. Also, except for the angels, the fish involved have all been singles, the left-overs of original pairs or introduced singly into the tank. Four cardinals in the tank keep in a school and seem to lead a completely separate life, taking no part and showing no interest in the mad skirmishings of the pursued and pursuers.

D. ROBINSON

Simple Water Testing

A reply to the letter 'So Much for pH and DH', and the editorial 'Inaccurate Equipment' (PFM, December), stressed the importance of reliable measurements of either of these facets of water chemistry requires equipment that the fishkeeper is unlikely to have access to or the ability to use is not satisfied. In order to keep tropical fish at all one must have certain amount of common sense and that all is required in analysing water accurately enough for most aquarium purposes.

I have been experimenting for some time to produce a hardness testing kit suitable for distribution to club members of the Billericay A.S. that is reliable, accurate, fast and simple to operate. Both methods that I tried seemed simple enough for anyone to operate.

The first method is the analytical method recommended for limnologists by the Freshwater Biological Association (Schwarzenbach's method). This relies on the fact that when an indicator (Eriochrome Black-T) is added to water sample containing calcium and/or magnesium ions (responsible for the hardness), then the sample turns red. When a standard solution of EDTA (ethylene-diamine tetra-acetic acid, disodium salt) is then added to the sample in small quantities at a time, the hardness is removed progressively. When all the hardness has been removed, the colour of the sample turns from red to blue. The volume, in millilitres, of EDTA used to achieve this (multiplied by 20 in a 50 ml sample) gives the total hardness in parts per million. (With a 70 ml sample, each ml of EDTA represents 1 degree Clark.) In practice, 1 ml of a borax-sodium sulphide buffer is used to maintain a constant pH in the sample. All that is required is a burette, holding 25 or 50 ml, graduated to 0.1 ml, a measuring pipette (50 ml) and a 150 ml flask, apart from the chemicals. This may sound complicated, but is in fact, quite simple.

The second method involves the reaction between soap and the hardness in the water. As a standard soap solution (Wanklyn's Soap Solution, 1 ml equivalent to 1 mg of calcium carbonate) is added to a sample of water, 1 ml at a time, shaking after each addition, the soap reacts with and removes the hardness as a whitish precipitate. When all the hardness has been removed a persistent lather is formed (it is sometimes stated that the lather should be so many inches high or should last for so many minutes, but in practice it is obvious when a lather has been formed and even the sound made when shaking the sample changes distinctly).

The number of ml used to form the lather, multiplied by 20, gives the hardness in p.p.m. in a 50 ml sample.

Comparisons for the two methods are:

<table>
<thead>
<tr>
<th>Method</th>
<th>Cost of equipment (not including chemicals)</th>
<th>Cost of chemicals (on a 50 ml sample containing 200 p.p.m. calcium carbonate)</th>
<th>Accuracy (on a 50 ml sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDTA method</td>
<td>About £1.10, 6d.</td>
<td>About 1.4d.</td>
<td>Better than 0.2 p.p.m.</td>
</tr>
<tr>
<td>Soap method</td>
<td>About 28.</td>
<td>Per test</td>
<td>About 10 p.p.m.</td>
</tr>
</tbody>
</table>

The EDTA method, although initially expensive, works out cheaper in the long run because, although my calculations were based on a 50 ml sample using the same technique and equipment one can work on a 25 ml sample, halving the cost of reagents. The accuracy is reduced to 4 p.p.m., but this is of little consequence to most aquarists. In fact, for most purposes the sample size could be reduced still further.

The soap solution method was chosen for the kits, as although the least accurate of the two and the more expensive, it was felt that this was justified owing to the extreme simplicity of it and its low initial cost. With an accuracy of 10 p.p.m. it is more reliable than the proprietary kits and much cheaper.

The kits supplied were 500 ml bottle of Wanklyn's Soap Solution (1 ml equivalent to 1 mg of calcium carbonate) and a pipette (6d. from a chemist and marked at the 1 ml level by me). The members supplied their own bottles, clean medicine bottles being quite suitable after marking at the 50 and 70 ml levels. Cost of the kits was about 7s. each (with the club making about 1s. on this!).

The chemicals were bought from a manufacturing chemist (Hopkin and Williams Ltd., Chadwell Heath, Essex; minimum order £3) but are available, on order,
from most chemists (e.g. Boots). At the same time, I also bought several compounds used commonly to treat fish diseases. These were re-packed into tubes and distributed to members at a fraction of the price of proprietary medicines. Of course, it is important to be sure of the quality of the compounds when doing this.

As for pH test kits, the ones that I have seen are quite as bad as Mr Knight points out in his letter, but reliable kits are obtainable. I use the British Drug Houses Ltd. 'B.D.H. 6676 Indicator for Aquarists'. A few drops of this added to a small sample of water in a test tube gives a colour that is compared with a written colour chart on the bottle and the pH is read off. Comparisons with an electrical pH meter showed an accuracy of about 0.1 pH (± 0.05). The results with the B.D.H. Bromothymol Blue Capillar are perhaps more accurate (colour of a dyed sample is compared with buffered solutions of known pH in sealed tubes supplied with the kit), although it is not so easy to use, and this kit can be used in artificial light whereas the '6676' is only really reliable in daylight.

B.D.H. 6676
Initial cost 9s. 6d. per 100 ml.
Bromothymol Blue capillator
Cost per test 3d.
Equipment Small test tube required
About 30s. a kit (sufficient indicator for about 50 tests supplied)
About 1s. per 100 tests

PetFish Monthly, February 1969

Rather comically he says he has set up a marine tank with coloured gravels and artificial plants, and that after 18 months all is well. Serious marine hobbyists like myself with several years' experience must shudder at the thought. Would you not agree that marine fish without exception do not need to be displayed in such un-natural conditions to give pleasure to the beholder? Apart from the aesthetic viewpoint, the chemical balance of the medium is in jeopardy when these childish contrivances are employed. Eighteen months without a fatality is no criterion of success. It is rather a tribute to the ability of the fish for surviving in spite of adverse conditions. And, I may add, a very limited diet.

I am not one of those people (and there are many) who arrive at every opportunity to exaggerate the hazards of our marvellous hobby, but to minimise them is a grave error. To go further and to advocate as Mr Deakin does that one doesn't need the oft-quoted equipment, is sheer folly notwithstanding his success at the shows. Please don't assume sour grapes when I say that there are so few entries at the shows of marine fish, and they are so eye-catching and bizarre they are almost certain to receive prizes for their own if only in consideration for the trouble he has to go to to exhibit them.

Anyone can keep marines successfully if they follow a few simple tried and tested rules. Buy the best equipment you can afford. It need not be expensive: basically a marine-proofed tank, plastic filter incorporating nylon wool, and an aerator. Common sense in trying to simulate natural conditions, coupled with cleanliness and as varied a diet as possible.

Mr Deakin's remarks on the salinity's effect on the Amphiprion banded coloration are quite interesting; however, he will find that with a proper temperature of not less than 74.4°F, and a more varied diet which should include ox heart and/or mussel flesh, the white bands will not lose their intensity. Loss of colour of this kind is usually indicative of deteriorating water conditions. Further, at such a high salinity as 1-93, bacterial infections are more likely to thrive; 1-023 is much more conducive to the fish's well-being.

Finally, may I apologise if my remarks have been blunt but there is an increasing tendency in aquarium literature for minimising the care needed for the successful maintenance of a marine tank. I repeat, anyone can enjoy these beautiful fish in the home tank if they observe the basic rules of common sense. And the proper equipment. Why try to keep a queen angel without a proper air-operated filter?

Glasgow
FRANK MCMENAMIN

I do not keep tropical marine fishes—yet. The urge to start sweeps over me periodically but then I look at the articles written by those already keeping these fish and I pause again. Is the extra equipment essential or is it not? Yes, say some—no, say others like Mr A. Deakin (p.75, January). It's not that I particularly begrudge the expense of extra equipment, but I'm all for keeping my hobby simple and if I can avoid acquiring extra items that break, go wrong, have to be serviced and kept clean I shall be that much happier. Can we not get some agreement from our experts on just what the minimum requirements really are?

Bath, Somerset
D. JOHNSON

Overlapping Dates

A show visitor, though not a club member, I can only speak from experience of hall booking in connection with an entirely different hobby, but I should have thought Mr J. Lindley's letter (p.76, December 1968) was a counsel of perfection. It would probably be an ideal situation if club shows were to be held each year on the same date, but the problems of putting on a show must make this a bit unlikely. I should have thought that, apart from hall bookings, holiday considerations of the most active club members, other events in the locality and major national events would all play their part in the decision about show date. With only 52 weekends in the year (and less than that number of practical use), the large number of open shows as advertised in Dates for Your Diary, and the mobility of aquarists, which makes them anxious to visit shows in other parts of the country, overlapping of fish shows would seem to be an insoluble problem that will always be with us.

Kentish Town, London, N.W.5
L. BEAUFORT

Less than Minimum Requirements

I regard to the feature by Mr A. Deakin, in the January issue of Pet, on his experiences in marine fish-keeping, I may be permitted to reply to the rather sweeping tone of his article? While I am in favour of anything which encourages the marine hobby, it is my opinion that Mr Deakin, with the best intentions in the world, fails to do this. And after all is not this his reason for writing to you in the first place?
Derivatives of Plants for Aquarium Use

PEAT is one naturally occurring material that is used in aquarium-keeping either in the compost for plant growth or as a filter medium. Two types of peat are found.

1. Peat used in some places as fuel. This is composed of clay and vegetable matter, and can be used to make a nutritious compost but should not be used for filtration. It is fairly widely distributed in marshy regions and is blackish, thick and heavy to handle. It does not separate into fragments in the water.

2. Peat used in horticulture. This comes from peatbogs that have been formed by the accumulation of sphagnum moss and rich vegetable matter. These peatbogs are fairly rare. Structurally, this peat is less homogeneous than the former and is lighter and brown in colour. It is possible to distinguish in it the fossilised moss, of which it is largely composed, as well as the separate bits of the plant matter, leaves, stalks, twigs etc. It is sold to horticulturists in large bales, or in small plastic packs for use in small gardens and for indoor plant cultivation. The aquarist uses it for filtration. After use in the filter, it can serve to nourish the compost.

A little care should be taken when using peat for filtration for it has, on the one hand, a powerful acidifying

By J. TETON and A. SERFASS

Photographs by P. F. WYNGAARD

The photograph on this page shows cork and other barks mounted with lengths of creepers and tree roots on a board for use as a decorative background to be placed behind the tank.
effect, and, on the other hand, a darkening effect on the water. Thus it lowers the pH of the water and results in the ‘black water’ required by certain fishes.

**Fossilised and Petrified Wood**

Fragments of branches, trunks of spongy trees from geologically recent times (around a million years) found in peat bogs and the alluvium (silt) of the major rivers. The process of fossilisation may be more or less advanced, depending on the length of time the wood has been buried and on local conditions.

For aquarium use such wood should be carefully scrubbed and washed, then placed in a large container and boiled. It must then be left in the water until this has cooled, when the air bubbles in it will have been completely discharged and because it is completely saturated with water it will remain at the bottom of the tank. This treatment must be repeated every time the wood is left out in the air.

Petrified wood is fossilised wood that has become like stone: trunks of trees, branches, roots; pteridophytes even older (around 300 million years), for example, *Lepidodendron*, *Sigillaria* (*Lycopodiales*), *Calamites* (*Equisetales*).

The phenomenon of the replacement of the wood by silica has taken place here, so that the material now looks like wood but is hard. It is found on the edge of coal beds in the coal face. A well-known example of a coal forest was revealed after the coal had been worked at a pit near Glasgow.

**Bamboo**

Bamboo plays an important role in aquarium-keeping, not only because it is decorative but also because of its

![Image of fossilised wood](image1)  
*Pieces of fossilised wood such as the segment shown here occur in peat bogs and rivers and make excellent aquarium decoration. Fossilisation takes a million years or so to occur.*

![Image of fossilised wood](image2)  
*These pieces of wood have been turned into stone (petrified) in the course of many millions of years. Coalfields yield such specimens.*
Reeds (A) or rice stalks (B) or bamboo (C–E) can be used in the aquarium in the way described in the text. C, D and E are the basal, central and terminal portions of bamboo stalks respectively.

psycho-physiological importance. It may seem astonishing to use bamboo under this heading, but this material does quite definitely contribute to the physical well-being of certain fishes. An entire article would be necessary to develop this subject but we must content ourselves by briefly defining the role of bamboo.

Most aquarists know that the principal defensive weapon of the majority of fishes is camouflage. For example, let us take a very well known fish, the angel—what camouflage can it use to escape enemy eyes? In its native waters it camouflages itself in the long reeds that grow along the banks of the Amazon and its tributaries. Its deep, compressed body streaked with vertical bands allows it to 'disappear' in its surroundings and in this way escape from its aggressive and greedy enemies. So, bamboo grouped in a part of the aquarium reassures the fish by presenting it with a natural retreat and enables it to behave in an instinctive manner.

Bamboo stems, usually varying from \( \frac{1}{2} \) to \( \frac{3}{4} \) inch in diameter, should be pressed into the compost, some in thick clumps and some thinly scattered. Never plant the stems absolutely vertically. Plenty of asymmetry (in number and diameter of the stems, and their slope) gives a more natural decor. Cut the stems so that they just slightly tip the water surface. To make them quite safe for use the stems can be boiled first. After they have been in the water for a few days you will notice the growth along the stems of translucent, mushroom-like fungi. Don't be alarmed by this; the growths will disappear of their own accord when the bamboo is well saturated with water and thus immune to such growths. The bamboo will remain usable for several years.

Depending on individual preference, either the base of the stalk, where the joints or nodes are close together, or the central portion, can be used for larger aquaria. The top of the stem can be reserved for smaller tanks. There are several different kinds of bamboo: perhaps the best known are white bamboo, black bamboo (from Japan and China) and bamboo from Java, which has very knobby, close-together, nodes. Instead of bamboo, reeds

Wood pieces from bogs are dark in colour such as the German Moorkiesholz shown on the left. Wood from rivers is usually pale or even bleached (right).
Wood from peat bogs is ideal for use in the aquarium and the dark colour forms a most attractive feature from Spain and France (from Fréjus and the Camargue) or rice stalks can be used.

**Roots, Stumps, Branches and Bark**

There are many woods where some fine tree stumps, roots and branches can be found. Some particularly interestingly twisted pieces, in proportion to the size of the aquarium, can be chosen. But they should be picked with some care because disappointment will result if the wood is too 'young' (still full of sap).

Not all woods can be used for the aquarium and choice should be restricted to willow, alder, oak and birch.

When the decorative pieces have been found there are certain problems to consider: 1. sterilisation; 2. making certain that the wood remains at the bottom of the tank; 3. complete saturation of the wood by water; 4. the inevitable growth of fungus. To deal with these problems we suggest the following.

1. The wood should be totally immersed in a vessel in which the water can boil for at least 2 hours. Then the wood must be well scrubbed and rinsed.
2, 3 and 4. Once the wood is cold (after boiling), it then has to be sunk and kept at the bottom of the tank. One means of keeping it there is with the use of rocks that also serve to decorate the aquarium—or, better still, try the method that we have used ourselves. Make some holes in the part of the wood that will not be seen. Then fill them with small marbles or heavy bits of copper and stop up the holes again. Copper, being very heavy, will act as ballast and also discharge copper sulphate very slowly from the heart of the decoration (copper forms the salt only in direct proportion to the amount of the metal actually exposed to the water).

Wood found at the bottoms of rivers, lakes, pools and ponds has already been prepared, by natural means, for use as decorative pieces in the aquarium. The water has saturated, washed and prepared the material. It only remains for us to sterilise it by boiling.

The aquarist who can resort to a peat-bog is truly privileged. Wood found in the sphagnum bogs will be ideal material. Such wood is sold in large quantities in Germany under the name of Moorholz. With it one can create remarkable underwater landscapes and re-create a natural biotope. Because of the acidity present where such wood is found, these roots and branches will not decompose. They have been preserved (for more than 2000 years) in their original structure, and because of their acidity they are sterile.

Wood from sphagnum bogs is easily recognisable because of its brown tinge right through to the centre, whereas pieces from rivers are in general much paler, if not actually bleached.

We reserve bark more for the creation of an exterior frame to decorate the back of the tank. The photograph shows a very successful backing using creepers, roots and various barks. Cork bark is very convenient for making such frames. This type of outside aquarium backing, placed between the wall and the tank, gives a fine effect of great depth and it is used in particular by fishkeepers when they are unable to house a very large aquarium.

(First published in Aquarama, France)

We do not recommend the use of copper, as described in this article, for inclusion in aquaria of less than about 20 gallons content.—EDITOR.

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What's New?

New Design Lightweights

A NEW concept in lightweight aquaria will soon be seen in the shops. These tanks, produced by the makers of the Jewel aquaria, have their glass panels framed in coloured high-impact polystyrene angle strip and, instead of the usual aquarium putty, silicone cement is used to seal the joints made by the glass panels. The plastic angle sections used for the ends of the tank are complete units, without joins, and they overlap the plastic angle strips that form top and base members of the frame. Apart from the possibility of the glass becoming broken, these tanks are said to last for ever; they are much lighter than metal-framed 'lightweights' and it is claimed that as there can be no movement of the glass panels the tanks remain completely leak-proof. They are being made in popular small sizes up to 18 in. by 10 in., together with a 24 in. by 10 in. by 10 in., and it is expected that their prices will be no greater than the current ones for metal-framed tanks.
Transatlantic TOPICS

By JIM KELLY

To acriflavine in his classic work DISEASES OF FISHES.

Since the introduction of the so-called wonder drugs I haven't seen it around as much but just in case some readers are still using it may I remind you of what Dr Grace Pickford, of the Bingham Oceanographic Laboratory at Yale University, wrote 17 years ago?

The learned doctor had experimented with the use of this drug on the striped mummichog (Fundulus majalis), a hardy killifish of the American west coast. Her findings were that continued exposure to acriflavine retarded growth in the fish, produced a tendency towards sterility and even liver damage and she suggested that it should be used sparingly and not as a regular antiseptic as was apparently the practice at that time.

Further experiments showed that the feeding with live foods especially Daphnia, during treatment, reduced the harmful effect on the sex glands and the liver.

When you buy this drug be sure to ask for neutral acriflavine as there is also a preparation (acriflavine hydrochloride) that has a strong acid reaction and is especially dangerous if used in aquaria where water conditions are already on the acid side.

Bang! Crack! Phut! Readers who use incandescent lamps to illuminate their aquaria will no doubt be familiar with the end of yet another light bulb—like oil, hot bulbs and water don't mix. If after witnessing such an event you were lucky enough not to get an electric shock, the high price of replacements is a 'shock' still awaiting the unwary. Now, like the U.S. Cavalry of a good Western, the American firm of General Electric have galloped to our rescue and announced they have produced a light bulb so tough you can knock a nail into it!

Instead of exploding, this new bulb merely cracks and is held together by an invisible coating of silicone rubber. This tough outer skin means that the bulbs are 75% more shock-proof. The manufacturers claim their lamps to be untouched by snow and rain—good news for those aquarists who keep their fish in a leaky shed in the garden.

* * *

The alarming thing about theories is the way in which they can be torn away from their context, over-simplified, exaggerated and made as rigid as the Ten Commandments.

The statement that all cichlids are born fighters is one such 'old wives' tale' that hasn't exactly raised these wonderful fish to the number one popularity spot with the aquarist.

Still, take heart all you cichlid enthusiasts for you have a champion in Bill Brown of the South Suburban A.S., in Chicago. He will level the scales if anyone can.

Bill claims that the root of the trouble lies with the hobbyist who fails to realise that these fish have enormous appetites. Keeping them full of rich foods such as ox heart seems to calm them (except when feeding time comes around).

With a sureness that stems from practical experience, Bill goes on to add that you should always give enough food to provide the fish in your tank with several pieces each; this is a surefire way of preventing them fighting and damaging each other.

On temperature, his aquaria are all kept below 72°F (22°C), all that is, except those containing young fish. High temperatures, he says (and I don't disagree with him), tend to turn all fishes into bullies.

* * *

Every year, the U.S. trade magazine PET SHOP MANAGEMENT, issues a 300 pages catalogue crammed full of useful information about the pet field and its related activities.

Having just read this year's

Continued on page 462
The Dwarf Killie from Sierra Leone

By J. Lee

The dwarf killie from Sierra Leone, West Africa, near Matca is one of the smallest of its group and most beautifully coloured. Its scientific name was formerly Epipoecis annulatus but it should now be called Pseudopeoecis annulatus.

The body is circled with deep brown or tan bands interspersed with light yellow to orange bands. The neat dorsal is a blend of two colours, from warm violet to crimson near the leading edge. These colours appear again on the spear-shaped tail of the male, with the violet spreading into a deep crimson wedge that extends from the end of the body through the tail. This is edged faintly with yellow and even blue when the fish gets excited.

The sweeping anal fin is again tinted various colours: violet, yellow, tan; and, most striking of all, is the fish's sparkling green 'eye' with a dark brown or black pupil. Males attain a length of about 1 to 1 1/4 in. and the females slightly less.

The Female's colouring is somewhat similar to that of the male on the body, but the fins are shorter. The small round dorsal does not bear the deep red colour of the male's, the tail is small and round and the anal is a small, wedge-shaped fin, though it does carry a faint trace of violet colour that tends to deepen when the male approaches. When ready to breed, the females never look really fat and robust—possibly owing to their miniature size.

The first of these fish, brought to Europe by a Belgian scientist from Konakri in Guinea, died because of unsuitable water, but I believe that at a later date, about 1963, expeditions to Sierra Leone found these fish in the Kasewe Forest and also near Monrovia (Liberia). There are two or three different colour variations, but it is the variety from Sierra Leone that I wish to describe in this article.

I obtained these fish from a friend of mine in Denmark, and when I took them from the box and looked at them in their plastic bag for the first time they were indeed as my friend had told me—breathtaking. Although they have not appeared in the shops, during the last 2 or 3 years a few have been coming into the country and members of the British Killifish Association have bred them though I do not know how successful they have been in rearing the fry; this presents its own problems because the fry are so minute.

On my first attempt to breed these fish, I used a small 18 in. by 12 by 6 inch iron tank, well cleaned out and thickly planted with the plant usually named Zea. I suspended a wool mop from a cork floating on the surface, on which I floated also a few small Indian ferns and a thin layer of duckweed. The fish were conditioned for a month on Grindal worms, sifted daphnia, micro worms and an occasional feed of egg yolk.

A week after they began to spawn I started to hunt for eggs but never saw any—only fry, and just a few of these. I soon began to learn that, with Epipoecis annulatus, if you look down over the top of the tank the movement of the fry can be detected because a small silver region on the top of the head seems to glow as they move up and down.

The smallest infusorians were put into the tank, but without success. The fry all died eventually and one or two more attempts to breed this difficult little fish also ended in failure. So I decided to change my methods completely. I used a glass bowl 12 in. across and 6 in. deep. Once more, after sterilising it, I set it out with thickly planted 'densa' and Ludwigia and, in the centre, a
nice clump of yellow moss that had, incidentally, been thoroughly washed, and steamed from a kettle. On the surface was a ½ in. carpet of Ricasia.

When I tested the water for the breeders, the pH was nearly 6-7 and hardness DH 5. Temperature at the time of spawning was 77°-78°F (25°C). Once again, after the breeders were removed, at no time did I see the eggs until the fry had hatched. Then, right in the front on a strand of Elodeo I did see three or four eggs that had fungus on them.

Again I was presented with the same problem. I had the fry, but what to feed them on? At this stage, a friend of mine who is an enthusiastic killifish breeder gave me a useful tip that I think may have played a big part in the successful rearing of the fry. After adding water from a pond full of Cyclopa (Cyclopa nauplius), which gave the fry a good variety of tiny animal life, I took a handful of the sediment from the bottom of my daphnia tank, after a visit to the pond, containing mulm, bits of rolled leaves, twigs and fibres and dropped this in the centre of the bowl. Whether this was the answer to my problem of feeding the fry I've really never been certain—their survival may have been due to the Cyclopa nauplius. (Incidentally I did not use tube fry food or egg yolk in this hatching as I usually do with fry.)

I have found that development of this species seems to stand still for 2 or 3 weeks and then about 5 weeks after spawning the fry could be seen to be growing a little. Looking down on the tank from above they appeared to be like tiny beacon lights on the move, for as they darted up and down the silver patch on top of the head appeared to be illuminated.

After about 9 weeks, small food was given to the fry, starting with San Francisco Bay brine shrimp eggs, which are the smallest, I think, of the shrimp eggs and very quick to hatch (I have on occasions hatched them in just over 8 hours, enough for a feed to start fry off). After a few more weeks the fry were taking larger shrimps and micro worms from a good culture that was breeding on potato mash.

The dark tan bars round the fish's body were beginning to form and I was reminded of tiny wasps, without the wings, of course, with the yellow and gold bands in full colour. A faint trace of violet was just beginning to show on the fins with the crimson on the dorsal and caudal fins. It was a long wait—months slipped by before the fish were big enough for me to think of conditioning them for breeding.

Although I have only had one successful spawning up to now of P. annulatus I am hoping in the near future by experiment to achieve greater success. What a pity that more of these lovely fish are not coming into the country. One word of warning, though. Because of their small size they should be kept strictly on their own. Sheer numbers protect them from extinction in the Kasewe Forest—but they are too rare in aquaria to risk them becoming the prey for larger fishes.

** Transatlantic TOPICS **

Continued from page 460

Last year I received a letter from my chum Paul Hahnel, inviting me to visit the Islands with him for their big fish shin-dig, but I had reluctantly to refuse after talking it over with my bank manager. But Paul's colourful postcards stimulated me to read more about Hawaii and especially the hotel on Kauai that has more fish than guests.

The story, like all good stories, commences when once upon a time the Hawaiian government decided to stock the waters of the nearby lagoon with Tilapia mossambica. If you have ever kept this fish you will know that in common with bacteria they have a natural desire to propagate themselves, and when conditions in the freshwater lagoon became overcrowded they even adapted to a more saltier environment.

Today visitors to the Coco Palms Hotel are confronted with a sheet of water that literally bubbles with Tilapia, and one of the favourite pastimes of the guests when bored with the magnificent scenery is to feed tit-bits to these happy immigrants from Africa's south-east coast who have adapted so well to this far-flung outpost of Uncle Sam's.
Personal COMMENT by ARPEE

I was very glad to see that a recent letter to the Editor pleading for greater consideration for the beginner achieved the desired result; we often forget, as our experience lengthens, that some of the most difficult questions to answer are those associated with the more elementary operations and processes.

I was therefore less than impressed with a feature in the Daily Telegraph in November last which was directed at the would-be aquarist. It consisted of two short articles. One listed the therapeutic attractions of the hobby in this worry-ridden existence of ours and suggested that aquarium-keeping is just a piece of cake, requiring only a few minutes (sic) of your attention each week. It spoke alluringly of coloured rocks, pagodas and mirrors set in the sand and the extraordinary combination of an angel, a butterfly fish and tetra glow light (also sic) in the same tank! The other article turned full circle and enjoined the reader not to attempt tropical fish-keeping until passing through some sort of coldwater apprenticeship.

I have had some sort of fish in my keeping for just about 40 years, and my experience suggests that neither writer was doing justice to the scene of today. It is true that an aquarium doesn’t take up much of your time, but if you count this in minutes per week, something is wrong somewhere—either your methods or your motives. On the other end of the scale, the suggestion that the average person cannot be trusted to take on tropicals straightforwardly is a fallacy which should have gone out with the disappearance of gas lighting. Quite apart from the fact that there is plenty of literature and expertise up and down the whole country that will enable the beginner to succeed, the coldwater world and the tropical world are poles apart for the average person, and only the seasoned fishkeeper is likely to enjoy and succeed with both.

What seemed such a pity about these newspaper articles was the fact that both had missed one significant feature of modern living—the increasing introduction of central heating. Since most installations will happily maintain a room temperature of about 60°F (16°C), a midway— we might call it ‘temperate’—type of aquarium is within the means of many, without the need for recourse to electrical heating equipment. There is a vast range of plants that will thrive in these conditions, and everyone knows that the White Cloud Mountain minnow, the poisti, the mosquito fish and the golden medaka are amongst the small attractive fishes that will prosper in this environment, given the correct amounts of light, food and so on, requisite to their well-being. For those who like rather bigger fishes, the paradise is an old favourite for less than tropical conditions, but it is hardly to be recommended as a mixer. I have no doubt that these limited selections can be improved upon. So, perhaps, can their distribution. It would be pleasant to see more aquaria in public buildings, and I am quite sure that those green-fingered people who grow house plants so splendidly in offices would do equally well with fishes if only they put their minds to it.

We all try, at times, to win back to the hobby those who have once tasted its virtues but who, temporarily, have removed themselves from its clutches. I am surprised at quite how many people there are whom one comes across who fall into this category, and when the conversation gets round to the point where I ask them what the principal impediment is to their re-entry, the answer is either financial or marital.

The way of getting round the latter is a matter for the sociologists, but the former is much more susceptible to successful frontal attack, even if these are obtained with financial stringency and like pressures. The would-be re-entrant is all too often badly put off by those well-meaning books which open with dire warnings about the difficulties of keeping tropical fish and then round off the lesson by telling you just how prohibitively expensive it all is. It is perfectly true that one can spend a small fortune on any hobby by buying the best and newest of everything, but I suggest that those of us who are hard up can do quite well in the secondhand market, provided that due discretion is used. Almost every item of equipment which hasn’t obviously come out of the Ark can be safely purchased, though I think it false economy to buy heaters and thermostats secondhand as they are the absolute keystone to the whole affair.

To suggest buying secondhand tanks will, I know, bring recrimination from far and wide, and I shall be accused of retailing misleading information, but really the evidence is very large in favour of the secondhand tank in the circumstances we are considering; if the ‘old hand’ cannot discriminate what is good from what is bad, he deserves to have to buy a new tank or suffer the alternative consequences of his past follies. Most tanks sold secondhand are good for 10 years’ use, either with or without a bit of refurbishing. The rusty bits can be buffed out, with luck, with a power drill and treated with marine silver paint before receiving final coats. Even if you cannot get rid of all the rust on top, I hardly think it matters much, since a new tank gets into a like state pretty quickly, but it takes a very long time indeed before serious consequentials occur.

On the whole I would restrict my purchases to tanks sized 24 in. or smaller in angle iron, as the stresses and strains on larger or lighter ones are often too much for really time-worn structures. A lot depends on what you want the tank for when it comes to deciding whether a
secondhand item will do. If it is to decorate your house, only the best will do, likewise if you require the tank for breeding purposes, as it will receive a lot more than average manhandling. A stocks tank for the fish house need be much less special provided that there are no obvious defects like cracked glass or a warped frame. Leaks are not particularly important provided that they cease after 24 hours or so. It is surprising what you can get away with—I have a little 16 in. tank in which one of the glasses has come completely away from the putty, and it leaks profusely when there is only 3 inches of water in it. When filled to the top the pressure seals the crack and all is well. Not to be recommended as standard practice, but one can get too anxious about these things. At least this tank is consistent.

A new 36 in. tank I bought last year leaked for several weeks after purchase and even now gives me twinges, and this compares very unfavourably with some others I bought for a fiver and which have never shown a single inclination to leak, despite severe rusting on the top frame (this latter is supposed by the dismal Jimmys to indicate inner rotteness, and it just isn’t true!). The vegetable and mineral contents of tanks offered for sale secondhand need a bit of watching, but only if the vendor has found the hobby to have got the better of him; this may indicate that the fishes are diseased or that the tank contains some toxic material. Prices asked in the press by private advertisers vary from the sublime to the ridiculous, but as a rule I suppose you get between a quarter and a half of your original outlay, depending rather on the age of your equipment and livestock.

There are many, many, bargains offered weekly in the columns of your local paper and elsewhere, so push any tempting advertisements to your erstwhile fellow aquarists with a copy of this article, and tell them to write to me if they don’t think, after 6 months back in the hobby, that I have done them a wonderful service!

I have earlier referred to a small source of Daphnia that I have maintained for some years in a rainwater overflow tank. In practical terms their presence has amounted to a lot, but their prestige value is immense. It was therefore a sad blow when they were all wigged out late last summer, due to quite reprehensible carelessness on my part. We had decided to have the house redecorated externally, and the treatment consisted of three coats: one was a resinsious type of liquid seal compound, and the final two were coloured finish coats. Although I had intended on revision, my preparators omitted the covering of the water tank, and the result was that a quantity of the sealing compound was deposited on the water, the surface of which it quickly isolated from the atmosphere. Oddly, this was during that brief part of the summer when the algae actually shone in the West Midlands, and the combination of unaccustomed heat and a sudden oxygen loss was quite apart from any inherent poison from the sealer.

The whole thing lay desolate for a week or so, and after the almost incessant heavy rains gradually flushed away the horrible aftermath. A few weeks ago I detected a few isolated Tubifex in the mud at the bottom, so there were one or two Cyclops and tiny Daphnia on again in evidence. This suggests that the sealer is toxic in itself, which at least is something, otherwise the whole thing would have had to be thoroughly cleaned and this would have been a formidable undertaking.

Before winter began I visited a local waterhole and dredged up an encouraging ‘starter’ population of Daphnia for what I hope will be this year’s supply. There seemed to be some males in evidence, but a larval patch of distinctively coloured females with wintery eggs, all congregated on the bottom mud, encouraged one’s hopes that Nature will make successful provision for 1969.

Whatever metal is used it should be cut into strips about 4 in. long and ½ in. wide (this is about right for 1 in. angle-iron frames). The first step is to scrape away (preferably with a penknife and taking care not to cause strain on the glass), ½ in. depth of the glazing material about ½ in. wide, where your first clip is to be placed. Then, with the pliers, turn one end of your strip up ¼ in. at a right angle, place this ¼ in. turn-up between the glass and angle iron in the little slot made by taking out the glazing compound and, holding the end firmly in position, press the strip over the top of the angle. Then press it over again, which will give you a short strip hanging down into the tank. Next, with the pliers, turn that end up at a right angle, making the fold about ¼ in. from the top of the tank angle iron. When the cover glass is dropped on to this flange the glass will be level with the top of the aquarium top frame. The ends of the supporting flange should be rounded off.

C. WRIGHT
WHEN chatting to a T.V. director I asked him why the stock cards and the Interlude films are usually so dull and uninteresting. Although these were not his particular department he said that he thought the test cards interested by the dealer and engineer, and as the interlude shots—most people knew used this time to brew a pot of tea! We talked of the early days of television when the gaps between the programmes were more frequent than they are today and I asked that a tank of guppy fish at London Zoo aquarium had one interlude film.

'Very popular', my friend replied, and so were the guppies.' Now I was all ears... Apparently the event was the National Radio Show held at Earl's Court, London in 1954. A suitable subject required to transmit on the new length proposed for the Independent Television Authority, then a year away, and someone (any reader know who?) produced a rosy guppies, velvets to be precise. With an eye on future sales most of the T.V. dealers at the Show used this test picture and were pleased when the Press seemed very much. Next day, to the dismay of the dealers, they found that most of the newspaper reports gave more usage to the fish and their habits than to the Show itself.

That isn't so surprising. Any artist could have told them that only thing that will take people's away from the 'goggle box' is a living picture presented by a real live fish tank.

By Peter Unwin

In his paper he quotes the following formula for calculations:

\[ N = \frac{5\pi L}{5} - \left(0.7L - 14\right) \]

\( N \) is the number of fry; \( L \) the total length of the female from tip to tail (in millimetres) at parturition.

Cannibalism would have seriously affected Bob's findings so he designed a unique breeding trap to save as many of the fry as was possible. This trap design, with a sloping portion that rolls the fry through a slit, has now been manufactured commercially by many firms.

Five female forms are shown in the current FANCY GUPPY ASSOCIATION HANDBOOK and a little bird whispers that they may soon have a companion. It seems that Mr Ken Rigby, chairman of the F.G.A. Judges and Standards Committee, has been producing in quantity a new variety of female guppy with a caudal fin shaped like the old Welsh miner's shovel and nicknamed 'copper'. (A standard for male corydoras was instituted by the Guppy Breeders Society, later to become the F.G.B.S., as early as 1947.)

Already familiar on the show benches of the north, this 'new' variety is shown in drawings and descriptions now before the F.G.A. for their approval and proposed acceptance.

This column has always campaigned for more varieties. Its answer to those guppy breeders who cry: 'We have enough already!' is for them to take a look at the rose-growers. Every year these energetic folk add still more new varieties to their already long list and in doing so seem to grow from strength to strength, if you will forgive the pun.

Seriously, the chance to have the results of one's labours accepted must be available to all breeders, and the constitutions of both British guppy societies have provision for this.

Improve the existing standards by all means, set up legislation to stop the flood of 'odd mutations', but we mustn't bar progress. If my memory serves me right, isn't the motto of the F.G.A. 'We Lead the Way'? Seems they are doing just that!

... You like your holidays in the sun—not how about your guppies? If you feel like sending them to the land of sunshine, now is your chance, because Midge Hill from the San Gabriel Valley Guppy Association, California, is hoping that more and more British breeders will enter their Show on 24th and 25th May, 1969. I hope to be able to give more details in this column shortly.

... It is often puzzling to the beginner to find the scientific name of the guppy printed both as Lethes reticulatus and Pocellia reticulata. Though this has already been explained elsewhere in the pages of PFM in the past it won't go amiss with those who have just joined us if we briefly explain it again (older and knowledgeable readers please bear).

As a species, the guppy has occupied many different genera. Today the wheel has turned a full circle and we are back at square one, with the name first given to the fish by Wilmot C. Peters way back in 1839. Unlike the hard-backed textbook, the aquatic magazine can keep its readers abreast of change, hence our use of the 'new' name Pocellia reticulata. Like Empires, the names of fishes will rise and fall as the taxonomists succeed—or fall out!
What Kind of Lighting?

An extremely important factor to decide when embarking upon tropical aquarium keeping is what form of overhead lighting one should employ. The word ‘overhead’ is vital to the situation, as plants grow towards light and such a situation is essential for the light source if natural growth is desired.

I will not attempt to deal in this article with quantities of light required, as although attempts have been made to reduce this to a formula I think it will be agreed fairly generally that local factors play such a great part in the well-being or otherwise of plants and fishes that the correct balance has to be determined empirically in most cases. I am therefore confining these comments to the aesthetic factors surrounding the three commonly employed sources, namely the fluorescent tube, the strip tungsten and the bulb tungsten.

There is no doubt that the use of the fluorescent tube is on the increase, and I think that this is attributable to several good selling points. The installations themselves are good-looking and well-produced, they embody a number of safety devices that are not always attainable by the amateur in tungsten arrays, and the running costs and reliability of the tubes are of considerable attraction. With tungsten installations the two last-named features often cause concern as applied to big tanks or collections, simply because the power bill itself is many times bigger by comparison and the life of bulbs and striplights often leaves a lot to be desired.

In fairness, though, I think that with bulb and striplight life a lot depends on the attitude of the dealer who sold them; many will exchange a lamp for a new one if the original one gave an obviously inferior performance. It is not true to say that the brief test of a bulb or a lamp in the shop is the only safeguard the buyer has against a faulty purchase. Many people think this is so, but if you are known to a dealer he will see that you get fair treatment; if you take a bulb back to a super-market or chain store you can hardly blame them if they show less interest as there are all too many smart aces trying it on all the time, and it is surprising how similar we all look, the honest and the dishonest alike!

For general purposes in the fish house it will probably be found that the ordinary ‘cold’ fluorescent tube is acceptable. Although it enhances neither fish nor plants it is a good bright light and gives a clean-looking impression. It is a bit clinical though, and I doubt whether it will outlast other forms of lighting from the purely decorative indoor tank.

The most interesting and controversial variant of this lighting is the Gro-Lux tube, whose emission can best be described as lavender-pink. I will not dwell on the technical details, which can be obtained from distributors of these tubes. Although I use this method of lighting it is not one I would specifically recommend to anyone, because whether it is liked or not is so much a personal matter. Further, I think that a lot of nonsense has been written about this tube; it has been over-praised, which is most unfair to something that has modest, but not supernatural, qualities, and this can only be harmful to its long-term reputation.

When you first switch it on in your tank you will be struck by the rather sickly colour it applies to the plants, and this will be offset by the astonishing improvement it makes on the colours of most fishes, particularly the ‘fluorescent’ patches of colour such as exist on the neon, glowslights and the beacons. Certain of the glassy and rather common place fishes like the pristella assume a glamorous lavender hue, but those with reflective scales like the silver dollar and angelfish do not come off half as well. The overall effect is therefore rather curious but is better in daylight than after dark, seeming then, to me at least, to be rather more natural-looking than any other form of artificial lighting I know.

The effect on plant life has been measured scientifically under all sorts of conditions, and I should be the last to criticise the recorded conclusions of the makers. All the same, don’t expect your plants to go mad and do all sorts of wonderful things just because you install a Gro-Lux tube. I have found that some plants do well under them and some do remarkably badly. This indicates to me that this illumination has much the same qualities as other light sources, and that you have got to learn how best to use it under your conditions. Having arrived at its optimum application I then think it does possess some quite definite advantages, but you will have to experiment with it and give it a fair trial. It is emphatically not, in my experience, the magic thing that some adherents claim it to be; on the other hand I now regard it as a permanent part of my equipment because I have learnt how to use it to my greatest pleasure.

This is by combining it with strip-lighting. The main Gro-Lux tube runs the length of a tank in the middle of the cover and striplights are installed parallel with the front and back of each tank, set in about an inch from either. The mixture of the two forms of lighting provides a mellowing effect and removes the liverish greenness of plant life imparted by the Gro-Lux, replacing...
it with something that is far more pleasing and natural. There is an impression of greater depth, too, on account of cross lighting on plants and physical features like rockwork and submerged driftwood. By ringing the changes on the positioning of the striplights it is possible to conjure up many different effects, and if you can safely arrange that the individual elements of your installation are movable, the possibilities are almost endless.

Striplighting alone is quite satisfactory but is distinctly yellowish when seen against fluorescent illumination, and, of course, the same applies to conventional tungsten lamps. The latter tend to create wells of light that may not suit general plantings, but if you lay a tank out with specialised groupings you can make your lamps work for you by setting out your clumps of plants as near as possible to them. For the exhibitor keen to produce interesting lighting effects the tungsten lamp can be used to good purpose, as it possesses flexibility both in terms of positioning and power output that the other sources seem to lack.

The ideal arrangement would seem to be one that enabled permutations of the various sources to be made fairly readily. There are many who advocate the use of coloured side and back lighting to produce special effects, and I think this is quite legitimate in the short term. In the long run, though, I doubt whether this would be in the best interests of the contents of any aquarium, as both the inmates and beholders would soon tire of the novelty.

Sea Water Filters and Filter-Media

By G. JENNINGS

Probably more has been written about the filtration of marine aquaria than any other aspect of marine fishkeeping. On close scrutiny of the opinions expressed, a large proportion of this material seems in fact to be conflicting. These notes are simply the result of some investigations 'in the field.'

Marine fishes, unlike most of their freshwater counterparts, are accustomed to a constant movement of water and should therefore also be given this when in captivity, either by a continuously running filter or by alternation of filter and airstones.

For optimum conditions the filter used in your marine tank should be capable of theoretically passing the total volume of water in the tank through itself three times per hour, i.e. a 20 gallon tank would therefore require a 60 gallons/hour filter (although the filter will not in fact pass this water through itself three times per hour, as some of the water will pass through the filter more than the stated number of times).

There are two basic types of filters available to the prospective marine aquarist, these being the conventional air-powered filters, and the more modern direct-drive power filters, pumping water only, without 'air-lifts.'

Air-powered Filters

The air-lift filters form five categories: 1, standard inside air-lift types (corner filters); 2, internal bottom filters (Hydro De Luxe, Halvin no. 1); 3, undergravel filters (Windmill Biological, Hydro Hi-Fi); 4, outside filters (standard types); 5, Filterfast filters (Halvin).

Excluding their use in quarantine tanks, no filter of category 1 is efficient enough for use in tropical marine aquaria, although they are quite suitable for small native marine aquaria.

The only filters of category 2 that may be used are those with built-in airstones, as the throughput of this type is far greater than that of the standard models without airstones. One major disadvantage of this type is that the filter boxes are not very large and the media therefore require frequent changing in even the smallest of aquaria.

There are two basic designs of sub-gravel filter, the first having a series of perforated tubes, the water passing through the gravel into the perforations. The second type has a slatted grid covering the whole base of the aquarium. Of these two types the second is probably the more useful as, besides being available in a wide range of sizes, they are far less likely to become clogged. If you intend using a deep layer of sand and sub-gravel filtration, then you will have to place a layer of nylon wool over the base of the filter to prevent percolation and clogging of the filter by the sand.

Outside filters (category 4) do not have the throughput required for the maintenance of tropical marines, except where they are used in
extremely small or quarantine aquaria.

Of all the outside types of filter, however, the Filterfast models are the most suited for use in marine aquaria, as by virtue of their construction they are able to equal power filters in their performance. There are three models currently available; the Junior Filterfast, with a throughput of approximately 30 gallons/hour, has a single inlet and a specially constructed aeration chamber to ensure rapid flow rate; the Senior Filterfast, with a throughput of approximately 60 gallons/hour, has twin inlets (one from each end of the tank, ensuring even circulation), and a slightly larger aeration chamber; the Large Filterfast, being the largest filter in the range, has a throughput of 100 gallons/hour and is suitable for quite large aquaria. All Filterfast models can be modified to give an even greater throughput than those quoted, although when the modification has been accomplished they require a far greater pressure of air to operate them. Filterfast filters are also large enough for ion-exchange resins to be used in them.

Remember that if the angle of your aquarium is over 1 in. in width you may have difficulty in fitting the lips of outside filters onto your tank. This problem is easily overcome by shaping a small sheet of stainless steel or Perspex to enlarge the lip of the filter.

Aeration by means of an airstone is not altogether necessary with a filter of the recommended capacity. However, if you are intending to use ozone in the aquarium, either for bactericidal or medicinal purposes, then you may require an airstone in your tank. This can be avoided, however, if you are using a filter with a built-in airstone in which case the ozone-air line can be attached directly to the filter, thus completing the purification process in one operation.

Airstones are also handy if you do not wish to run the filter continuously, as they can then be switched on, being an auxiliary source of water movement, although I think it is far better to filter continuously wherever possible.

**Filter Media**

The types of materials that can be dealt with here are numerous, but to some extent the medium selected depends on the size of filter box used. It is therefore advisable, where a choice exists, to have as large a filter container as possible.

**Activated carbon and charcoal.** Many authorities state that you cannot use this medium successfully in marine aquaria, but I have on occasions maintained several tropical and coldwater marine aquaria for periods up to 6 months with nothing but this medium and nylon floss. However, it has the disadvantage that it needs changing quite frequently, its effective 'activity' being quite short. If activated carbon free from ammonia can be obtained this would be a far better proposition than ordinary carbon or charcoal.

**Glass wool.** One hesitates in listing this medium as it has now been almost completely superseded by the more modern nylon floss, which does not act, unlike glass wool, as an irritant, nor does it allow small particles to pass into the aquarium, as sometimes happens with glass wool.

**Nylon floss or wool.** This is probably the most important advance in aquarium filtration materials for the last decade, being both efficient and re-useable as well as completely inert and therefore non-toxic. It is an ideal filter medium for use in any filters.

*Photo: BARRY PENCILL*

This species of butterfly fish (Chelidon lunula) exemplifies the way tail colour patterns differ in young fish and older specimens. The eye spot on the dorsal fin of this youngster is not conspicuous in the adult.

*Synthetic ion-exchange resin.* These resins, once marketed for Eheim power filters, can now be purchased singly, and have the advantage that they are the only filter medium capable of extracting ammonical and nitroformous waste materials excreted by the fishes. They are basic types of exchange resins commercially available: a rechargeable one (trade name SER), the rechargeable SER. SER resin is now only approximately 3 months thus this depends on the size of your tank, after which it has to be discarded. SER, on the other hand, although slightly more expensive, is the first instance, is partially rechargeable. It contains two sets of resins, one of which is rechargeable with a solution of sodium chloride (common salt), the other set resin being discarded and a new set purchased. These resins can be used in all filters.

*Other media.* Other media that may be used with a moderate amount of success include marble chips, silver sand, gravel and synthetic sponge. The first has the advantage of being able to maintain an alkaline pH of the water; the last-named, although somewhat unconventional, is quite effective as a tempering measure.
Readers' Queries Answered

Fry Feeding

It is just best between 200 and 300 gourami fry about 4 days after they are hatched. The temperature of the water should be 25°C, the water is best fed on fry and very perfect by mixing it with a very small amount of food. If the fry are not fed, they may die. Can you please help? The breeding procedure that you were previously correct, and very likely that the loss of the fry is due to the free-swimming stage most certainly due to starvation. It is essential that good food should be instantly available to them.

Method of providing food that grows in a medium made of lettuce leaves in boiling water is the liquid cool. See page 233 of June 1966. Practical Aquatic Aquatics gives an excellent food, and all of 200-300 fry can get three 2-lb jam jars of each day. Hard-boiled eggs are excellent through muslin is a source of food. Proprietary fry is widely used for fry at all stages of the life cycle, but the eggs given must be adequate. 5 or 6 days the fry can be fed hatched brine shrimp or sifted through muslin to the smallest fleas, and then progress to larger foods. e: to rear of batch of 200 fry on 1 or 2 would be a very time-consuming and space-demanding task.

Under average circumstances, after 30 or 50 so would be different genera. A dwarf gourami (Colisa lalia) and a thick-lipped gourami (Colisa labiosa) has been reported but the offspring were sterile. It is possible for eggs to be laid, of course, but they are not likely to be fertile.

Concrete Rockery

I want to make some pieces of rockwork out of cement and sand for my tanks. Could you tell me what substance and quantity is added, to kill the impurities and make it safe for fish? Is it also necessary to soak the finished article in water for several weeks afterwards?

Small pieces of concrete rockwork can be left to soak in frequent changes of water, but it is a slow process. A way to speed the process of removing the alkali from the concrete is to use a dilute solution of hydrochloric acid. The rockwork is placed in a plastic container, covered with water and a dilute solution of hydrochloric acid added until a strip of neutral litmus paper dipped in the water shows a red colour. After some 2 hours the acid will have neutralised the alkali from the concrete and the litmus test paper will turn blue. Fresh dilute acid is added daily for 2 or 3 days until the litmus paper test is applied to the solution and the paper consistently remains red. The rockwork is left in the acid for 3 or 4 more days, then given a wash and is scrubbed. A further soaking in fresh water for about a week makes it safe to put into the tank.

Copper in Water

We have recently decided to enlarge our business to include the sale of goldfish but our assistant assures us that water from our pipes, copper pipes installed about 15 months ago will kill them all as the pipes take up to 5 or 4 years to clear themselves before being safe for use. Furthermore, in the area in which we have our business, it is a general belief that the natural springs do give quite a heavy deposit of copper sulphate.

The facts about copper in water are these: water containing copper is poisonous to fishes although the susceptibility of different species and (within narrower limits) of individual fish varies. Small goldfish would be more susceptible than big ones. If the water available is charged with copper from the source it could be dangerous; it all depends on the amount present. Your local water supply company should be able to tell you the water's copper content without charge. As regards the copper pipes—unless the characteristics of the local water supply are such that the new pipes have not developed some protective layer, 15 months should be a sufficient time lag to make them safe but to make certain ensure that the water is run freely from the tap for a while each time before drawing off for use in the aquarium.

Spirostomum

I have just spawned some Siamese fighting fish and I have noticed that on the inside of the breeding tank there are tiny white things like wisps of hair which appear to be moving. They split in two when they multiply. I would like to know what they are and if they are harmful to the fry.

These are large protozoans known as Spirostomum. They are not harmful to the fry, but since these organisms feed on bacteria it is a clear indication that the tank conditions are becoming foul. The Spirostomum will disappear when the tank conditions improve (when they have cleared all the bacteria) and steps should be taken at once to replace at least half of the water.

All-glass Tanks

I am interested in making my own all-glass tanks, approximately 3 ft. by 1 ft. square. Should quarter-plate glass be used and is there any special sealant? I have this sealant but it does not mention on the label tanks bigger than 2 ft. Is it possible to make tanks larger than 3 ft. entirely of glass? And finally can sand from the sea shore be
used if it is cleaned and boiled!

Tanks of 3 ft. and larger have been made entirely from glass sheets with an aquarium sealer such as Dow Corning Aquarium Sealant or Bostik no. 6. For such larger sizes it is recommended that the glass panels should be set within light wooden frames enclosing the bottom and top edges of the tank to give additional support. Glass of 1 inch plate thickness should be used.

Well-washed sea sand can be included in the aquarium, but as this sand is usually of a fine grade it is not advisable to place this as a deep layer. Therefore, if an undergravel filter is to be used, a coarser type of gravel should be incorporated over the filter area.

**Fundamentals of Keeping Goldfish**

**By L. C. BETTS**

A failing that is common to all of us at times is that of not realizing that we stand too close to our problems, with the result that our assessments are faulty, through having a wrong perspective. A lesson I have never forgotten was one taught me by my professor of judo, Yukio Tani, when he said: 'Life's problems are best understood when seen affecting others. If you would understand yourself, stand back sufficiently far to appear to yourself as a third person'.

Applied to keeping goldfish, this could mean our approach is coloured by personal weaknesses in which impatience, bigotry and lack of vision impinge, making a biased judgment. What is there about goldfish keeping that can make success elusive?

Basically, goldfish are not difficult to maintain and keep in good health, provided that they have plenty of room and the water is 'clean', well-aerated and not subject to violent temperature variations. This and a balanced diet completes the picture and any failures can be attributed to errors or failings in this respect. Let us take each factor separately.

Plenty of room is a question of degree and needs realistic appraisal. Ordinarily garden ponds have the potential for plenty of swimming room, but fish grow rapidly, and 12 adults happy in the spring can soon be struggling for oxygen by the late summer when competing for the available oxygen with elevated temperatures, rotting vegetation and perhaps a five or six hundred spawning!

Never forget that one degree of temperature over 60°F (15°C) will reduce the oxygen fractionally even if the water is direct from the tap or a spring. The faces of the fish and the dying back of the early growths of the plants absorb large quantities of oxygen during the oxidative processes that convert such waste material into harmless compounds. What appears to be the odd 20 or so fry swimming about at the surface can represent twenty times that number underneath the lily pads and grubbing about on the floor of the pond.

The question of space when applied to the aquarium is even more relevant since this medium has no gentle winds undulating the surface of the water, and the siting of the aquarium in relation to the light can make all the difference for the aquarium plants between 100% effective photosynthesis and oxygen production and none at all. In fact the latter situation is worse than it seems, for a poor light can result in the plants taking up the oxygen instead of giving it off.

Goldfish, keeping in aquarium needs the most meticulous judgment as the aquarist is in fact breaking all the rules; constant vigilance must be the order of the day. The odds are definitely stacked against the aquarist and if he is to be successful the odds must be reduced to reasonable limits. One way of doing this is to decide that any aquarium for goldfish below a capacity of 36 in. by 15 in. by 15 in. is definitely out of the reckoning, and even this capacity in the long run is too small. The ideal minimum size is 36 in. by 18 in. by 18 in. and even this requires supplementary means of providing the necessary reserve of oxygen so vital to offset the water variations found in aquaria in Britain.

There are various types of filters and water circulational systems, and if the aquarist has yet not convinced himself of the efficacy of these systems, he should do so at the earliest moment for goldfish aquaria without some filtration are ultimately doomed to failure. The importance of clean, well-aerated water cannot be too heavily stressed and as this factor becomes more appreciated so the obsession with disease on the part of some aquarists will die down.

And so we come to the diet, a factor almost too obvious to mention and yet the subject of much misunderstanding. By domestication the goldfish has become what is popularly known as an omnivorous feeder but this is not to say that the food the fish will swallow necessarily meets its dietary requirements completely. Some aquarists will remember the late Mr Nicholls of Streatham, whose lovely twintails received nothing but live Daphnia, and no one will deny him the credit for producing lively colourful fish capable of reproducing themselves.

In brief, one could say successful goldfish breeding and maintenance is achieved with sound fish housed in large containers with well-aerated and filtered water and given the correct types of foods supplemented with adequate daily additions of live Daphnia.

This is not to say there is only one way of achieving this, but we do know that the items enumerated are all essential.
WARRINGTON A.S. members were able to give an immediate demonstration of the success of a recent lecture by Mr Frank Partington on show standards when they were invited to judge half-a-dozen fish at the end of the meeting. Mr Partington had explained the point system and how it was applied; and the points awarded by members to the fishes judged were so uniform that the judges had clearly benefited the audience. Beginners and experienced aquarists alike gleaned many useful tips and snippets of information from a subsequent taped lecture by Mr Jim Kelly on breeding, that covered many aspects of the subject.

Recent fish-of-the-month competition results have been:

- Pairs egglayers: 1, Mr Baker; 2, Mr B. R. Worrall; 3, Mr Worrall and Mr M. G. G. Worrall. Pairs livebearers: 1 and 2, Mr H. Worrall; 3, Mr J. A. W. Millows. Pairs, 1 and 2, Mr M. Baker; 3, Mr B. Worrall. Pairs, Guppies: 1, 2, and 3, Mr B. R. Worrall. A.O.V. coldwater: 1, Mr D. G. Evans; 2, Mr F. Clarke. Swordtails: 1, Mr J. A. W. Millows; 2, Mr J. A. W. Millows; 3, Mr R. Trench. Platy: 1, Mr L. Crawford; 2, Mr R. Trench. Guppies: 1, Mr R. Trench; 2, Mr B. R. Worrall. A.O.V. livebearers: 1 and 3, Mr M. Baker; 2, Mr B. R. Worrall.

Many local societies were represented at the LLANTWIT MAJOR A.S. annual dinner, at which the guests were Mrs and Mrs J. Wheeler of Trowbridge and Mr Curry of Penarth. The president, Alderman P. J. Smith, C.B.E., presented trophies to the following: the wing Commander Smith Cup and the J. Holmes Memorial Cup to Mr Stan Nelson as member of the year and winner of the breeders egglayers award; the Miles Thomas Cup to Mr A. M. Allibertson and the Stamcop Cup to Mr Alun Rogers. The President’s trophy for breeders livebearers was presented to Mr Richard Wigg.

The home team won the inter-club match by 16 points when they entered the BRIDGEND A.S. in this event, judged by Mr P. Batista.

At the last meeting of the year, six new members were enrolled.

MEMBERS OF ILFORD & D.A. & P.S. found the talk by Mr J. Morris on fish houses and fish shows most instructive and helpful. Aided by a large number of coloured slides, Mr Morris described in detail different methods of heating and the use of various equipment in the fish house; and his pictures taken at open shows highlighted the different methods of presentation used in displays of aquaria. Future programmes that club members look forward to include a lecture by Mr Dodkins on water (10th February), a talk on fish house construction by Mr Smalley (10th March), and an auction of fish, plants and equipment on 14th April. These meetings will be held at 8.30 p.m. at St Laurence’s Church Hall, Donnington Avenue, Barking-side, Ilford, and guests will be very welcome.

At the ninth meeting of the BIRMINGHAM SECTION of the A.A., chairman Mr Sam Croft was supported by 45 members and visitors. After the film show presented by Mr Bull of Dudley A.S. had been enjoyed, the table show awards were announced. 122 entries were bunched by 11 exhibitors. Best fish in show award went to Mr P. W. Jinks for a long dorsal veil and the best opposite sex award for a roundtail female also to Mr Jinks. Mr P. W. Duffly won the best breeders award.

Novice, Mrs Duffly; – other, Mr P. W. Jinks, Mr M. H. Delingpole; pair, Mr M. H. Delingpole; topweights, Mr P. W. Jinks; bottomweight, 1 and 2, Mr M. H. Delingpole; double award, Mr M. H. Delingpole; lyretail, Mr M. H. Delingpole; original veiltail, Mr P. W. Jinks; long dorsal veil, 1 and 2, Mr P. W. Jinks; (3, Mr J. Wills); short dorsal veil, 1, Mr P. W. Jinks and (2, Mr M. H. Delingpole); short roundtail, 1, Mr J. Wills; (2, Mr P. W. Jinks).

Results of the Points Cup competition to date are: 1, Mr P. W. Jinks (55); 2, Mr M. H. Delingpole (46); 3, Mr R. Cheshire (274); 4, Mrs J. Croft (268). Visitors are always welcome on the 4th Sunday of the month at the Glebe Farm Community Centre, Glebe Farm Road, Stechford, Birmingham.

Over 300 people attended the Aquarists’ Convention sponsored by HORSFORTH A.S. at the College of Technology, Leeds. Visitors attended from all over Yorkshire and from Durham, Scarborough, Oldham and further afield. Secretary Mrs B. Helm and the show secretary, Miss J. Helm, were interviewed by Radio Leeds about the Convention. At the club’s December meeting, 43 people attended for an evening of bingo, fish showing and a fish and chip supper to round off the occasion. Table show winners were: Specified class, pairs: 1, Mr B. Girdham; 2, Mr Barker; 3, Mr M. Pollard. A.O.V.: 1, Mrs P. Hall; 2, Mr S. Corrin; 3, Mr D. Corrin. Junior A.O.V.: 1, Master D. Shaw; 2 and 3, Master and Miss Holmes. Best in show, Mrs P. Hall.

IT has been some time since news has been received of BOSTON A.S. but now things are happening and members are busy planning for the first open show to be held in East Lincolnshire. The date is Sunday, 1st June and the venue the Blackfriars Theatre, Boston. Club activities have included an absorbing talk on marine tropicals given by John Yeado and Mr Alan Dales of Skegness Natureland. Mr Yeado described the marine set-up there, where the salt water is obtained by underground pipes from the sea—the only such system in the country. He also explored many accepted and expensive, theories with practical proof. Mr Dales has been keeping marine in his home for quite a time and, indeed, believes he has had one spawning. Coral decoration, water conditioning and specific gravity, and filtration were all dealt with in detail.

The Society would welcome new members to their meetings. These are held on the first Thursday in each month at Fogarty’s Social Club, Mount Bridge, Boston, Lincs. All details from secretary Mr D. Moody, 56 Kingsway, Boston, Lincs.

A very entertaining talk and slide show was given by Mr Terry Gledhill to members of the NEW FOREST A.S. on some aspects of the work of the Freshwater Biological Association’s establishment at Wareham. Its new establishment and the origins of the Association in 1929 on Windermere (the Wareham establishment was opened in 1962). Members heard descriptions (many of them most amusing) of the hazards of experimentation in uncontrolled conditions and of the varied types of organisms found in fresh water. There were also some harrowing pictures of the effects of pollution. Table show results at this meeting were: Siamese fighters: 1 and 2, Mr A. Williamson; rasbras: 1, Mr K. Newton; 2 and 3, Mr A. Williamson.

New members are welcome to attend meetings, which are held on the third Monday of each month at the Lymington Community Centre. Details from secretary Mr W. Newey, 6 Auckland Avenue, Brockenhurst, Hants.
Record Entry for Aireborough Show

LAST year's record of entries in the AIREBOROUGH & D. A.S. open show was well and truly broken by the 579 received from 31 societies this year. Apart from the 106 from the home club, Swillingham entered 39, Halifax 13, Independent 17, Alfreton 18, Keighley 10, Brampton 13, Sunnybrow 39, Barnsley 31, Nelson 13, Salford 8, Whittington 17, Loughborough 7, Stocksbridge 13, Rotherham 15, Lyne 14, York 33, Lincoln 19, Hartlepool 16, Heywood 6, Huddersfield 15, Honsforth 12, Tadcaster 29, Mixenden 13, Oldham 2, Top Ten 26, Accrington 2, Leycester 2, Rochdale 19, Pontefract 14, Sheffield 8, Bradford 6 and Tyneside 4. Judges Mr W. Catmull, Mr F. Taylor, Mr A. M. Deakin, Mr A. Lindley, Mr J. M. Skinner and Mr G. Holmes made the following awards.

Best novice exhibit, characin 82 points, owned by Miss S. Gerrard (Alfreton); furnished aquarium, won by Halifax with 78 points and set up by Mr Shields. Best breeders exhibit (livebearers, swordtails) 80 points, owned by Mr J. Tunney (Stocksbridge); best breeders exhibit (egg-layers, barb) 81 points, owned by J. & V. Wright of Alfreton; best advanced exhibit and also best exhibit in show, the piranha, 87 points, owned by Mr J. Whiteley (Aireborough), Exhibitor with most points (20) Mr Eadon of Sheffield. The complete list of results is given below.

Novice classes (155 entries).
- A. V. livebearer (24 entries) 1 and 2, Mr E. Kirkland (Sunnybrow, 75); 2, Mr and Mrs Hogarth (Rodale, 74); A. V. barb (20 entries) 1, Mrs J. Lacey (Aireborough, 75); 2, Mr W. Duncan (Barnsley, 75); 2, Mrs Cary (York, 70); A. V. characin (17 entries) 1, Miss S. Gerrard (Alfreton, 82); 2, Master D. Lacey (Aireborough, 75); 3, Mr J. Kay (Aireborough, 71); A. V. cichlid (26 entries) 1, Mrs M. Kay (Huddersfield, 70); 2, Master K. M. Scottson (Barnsley, 73); 3, Mr C. Thompson (Aireborough, 70); A. V. angelfish (21 entries) 1, Mr R. Aquil (Lincoln, 76); 2, Miss S. Gerrard (Alfreton, 73); 3, Master D. Robinson (Aireborough, 71); A. V. carps and molluscs (6 entries) 1, P. & B. Jones (Barnsley, 74); 2, Mrs Brown (Mixenden, 73); 2, Mr J. Kay (Aireborough, 70); A. V. catfish and loach (24 entries) 2 and 3, Mr Rhodes (York, 76, 73); 2, Mr M. J. Allison (York, 78); A. V. (44 entries) 1, Miss S. Gerrard (Alfreton, 72); 2, Master D. Robinson (Aireborough, 68); 3, Mr B. Conolly (Lincoln, 67).

Furnished aquarium (5 entries). 1, Halifax (78 points) set up by Mr Shield; 2, Swillingham (77) set up by Mr J. Tims; 3, Mr Stringer; 3, Aireborough (67) set up by Mr and Mrs Robinson.

Breeders classes A. Livebearers (19 entries).
- Copepia (3 entries) 1, Mr Thickbrook (Pontefract, 76); 2 and 3, Mr Gardner (Aireborough, 74); Flies (7 entries) 2, Mr Gardner (Aireborough, 77); 2, Mr R. Hasey (Barnsley, 74); 2, Miss and Mrs Hogarth (Rodale, 74); Swordtails (6 entries) 1, Mr J. Tunney (Stocksbridge, 80); 2, Mr Burgan (Aireborough, 78); 2, A. V. (4 entries) 1, T. & W. (Sunnybrow, 74); 2, Mrs R. Robinson (Aireborough, 78); Mollies (5 entries) 1, Mr D. Shilds (Halifax, 73); 2, Mr Burman (Aireborough, 71); 3, Mr J. Whiteley (Aireborough, 79).

Breeders classes B. Egg-layers (23 entries).
- Barbs (1 entry) 1, J. & V. Wright (Aireborough, 81); 2, Mr F. Buxton (Barnsley, 78); 3, Mr and Mrs D. Cohen (Pontefract, 75); Characins (4 entries) 1 and 2, Mr F. Buxton (Barnsley); 2, Mrs R. Robinson (Aireborough, 78); Cichlids (2 entries) 1, Mr P. Harris (Aireborough); 2, Mr G. Robinson (Brampton, 73); Anabantids (4 entries) 1, P. & B. Jones (Barnsley, 74); 2, Master D. Kaye (Huddersfield, 73); Carps and molluscs (4 entries) 1 and 2, Mr and Mrs T. Webb (Barnsley, 75); 3, Mr P. Reynolds (Wellington, 69); Catfish, loach and A. V. (5 entries) 1, Mr J. W. Holmes (Tipton, 71); 2, Mr D. Wright (Aireborough, 77); 3, Mr W. Scott (Tipton, 76).

Advanced classes (177 entries). 1, Mr D. W. Bennett (Tipton, 72); 2, Mr J. Greenwood (Tipton, 72); 3, Mr and Mrs Grimsme (Salford, 72); Flies (18 entries) 1, Mr D. G. Jones (Barnsley, 74); 2, Mr and Mrs Webb (Barnsley, 82); 3, Mr and Mrs Shoff (Tipton); A. V. Swordtails (12 entries) 1, Mr Althrop (Aireborough, 78); 2, Mr and Mrs Pontefract (75); 2, D. & R. Brand (Pontefract, 74); Mollies (16 entries) 1, Mr and Mrs Sunnybrow (72); 2, D. & R. Loye (75); 3, Mr and Mrs Pike (Altrincham, 74); A. V. Livebearer (5 entries) 1, Mr and Mrs Sunnybrow (74); 2, Master J. Lacey (Alfreton, 73); 3, Mr and Mrs Robinson (Rotherham, 74); 3, Mr F. J. Whiteley (Aireborough, 78); Mollies 3 entries) 1, Mr Robinson (Tinsley); 2, Mr and Mrs Taylor (Aireborough, A. V. Angelfish (15 entries) 1, Mr and Mrs Stringer.
HARTLEPOOLS A.S. tenth annual autumn show was won by the tinsel barb belonging to Mrs R. Sundley of Stockton on Tees. 222 entries were received and selected results are as follows:

**Best Fish**
1. Mr K. Wadlow (Stockton); 2. Mr F. G. Bland-White (Darlington); 3. Mr R. D. Davidson (Darlington);

**Gold Beauty**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Coldwater Beauty**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Beauty**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Coldwater Beauty**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Plume**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Coldwater Plume**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Plume**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Coldwater Plume**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Coldwater Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Coldwater Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Skimming Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Skimming Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Coldwater Skimming Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Coldwater Skimming Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Variegated Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Variegated Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Coldwater Variegated Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Coldwater Variegated Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Skimming Variegated Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Skimming Variegated Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Gold Coldwater Skimming Variegated Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

**Silver Coldwater Skimming Variegated Comet**
1. Mr J. D. Page (Darlington); 2. Mr R. D. Davidson (Darlington); 3. Mr R. A. Johnstone (Darlington);

A PLEA from newly formed BLAKEBOROUGH A.S. (Brighouse, Yorks). Can any other clubs help them out with slide shows, films and addresses of speakers? Mr G. M. Smith (11 Woodfield Avenue, Siddalendworth Road, Greeland, Nr Halifax, Yorks) would be very grateful for any help.

**Badges of the Month**

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In Brief...

... TOTTENHAM & D.A.S. have elected the following committee for 1965: president, Mr E. (Nipper) Harris; chairman, Mr Ray Smith; secretary, Mr Brian Meaden; treasurer, Mr D. Elsdon (who has retired); show secretary, Mr J. Kain (telephone 01-953 8919).

... AT their third A.G.M. members of NUNEATON A.S. elected the following into office: president, Mr R. Mayer; chairman, Mr D. Rice; vice-chairman, Mr P. Beasley; secretary, Mr D. Tunnicliff (Rowans, 86 Bulkington Lane, Nuneaton); Nuneaton: 28g, 3rd; show secretary, Mr G. Cox; assistant show secretary, Mr E. E. Edkins; committee, Mr and Mrs W. W. Freeman, Mr A. H. Hunt, Mr W. M. Moxon, Mrs B. G. Lewis; auditors, Mr J. M. Smith; Mr W. M. Moxon; Mr B. Ashby; Mr B. N. Wood.

... A NEW club for the Brighouse, Yorks, area. Known as the BLAKEBOROUGH A.S., the Society meets every other Thursday evening at Blakeborough Sports and Social Club, Bradford Road, Brighouse, Yorks. New members are welcome; please contact Mr G. M. Smith, 11 Woodfield Avenue, Saddleworth Road, Greetland, Huddersfield.

... OFFICERS of BETHNAL GREEN A.S. appointed for the coming year are: chairman, Mr A. Colings; secretary, Mr A. Millhouse; show secretary, Mr J. Coombs; resident lecturer, Mr F. Tomkins; treasurer, Mr A. Haynes; P.R.O., Mr D. Trains. The society meets every Thursday evening at Bethnal Green Institute, 229 Bethnal Green Road, London, E.2 at 7.45 p.m. and new members are very welcome.

... A NEW society for South Wales is HARLECH A.S. Sixteen aquarists from the Cardiff area, attending the inaugural meeting in December, appointed the following officers: chairman, Mr Bill Gorwill; secretary, Mr M. J. Parry (57 Caerau Court Road, Ely, Cardiff); treasurer, Mr Alan Payne; show secretary, Mr Peter Garner. At the second meeting, 38 people attended to hear Mr Bill Gorwill give a talk on the keeping of larger species of fishes. Meetings are held at Gwynedd Junior School, Colwill Road, Cardiff on the third Tuesday of each month at 7.30 p.m. An attractive programme for 1965 is nearly complete and includes an "Any Question" session in March. A slide lecture on ornamental ponds in April and a talk by the Keeper of Zoology, National Museum of Wales, in May. Prospective new members are cordially invited to attend.

... OFFICERS for the year elected by STEVENAGE A.S. members are: chairman, Mr Mike Rhodes; vice-chairman, Mr Ray Nye; secretary, Mr Jim Luhan (7 Broadway, Stevenage, Herts); treasurer, Mr Petre Austin; show secretary, Mr Gordon Ward; assistant show secretary, Mr Albert Toombs. Annual awards were presented to Mr Ray Nye (the Smiter trophy for meeting table shows) and to Mr Manfred Heyl (the Chairman's Cup for breeders class—the runner-up to be shared by Mr Alf Johnson and Mr John Dobbin. Mr Mike Rhodes was awarded the Stiles Cup for the best fish in show at the A.G.M. for his entry of a Metyensis (judge, Mr P. Kavanagh).

... NEW YEAR greetings to fellow aquarist societies from BRISTOL T.F.C. Club members have recently enjoyed an extremely fine film show presented by a retired club member, Mr M. M. A. Clowes, whose film photography skill was admirably demonstrated.

... BECAUSE of pressure of work, Mr G. Nash has had to retire from the office of secretary to SWILLINGTON A.S. New secretary is Mr H. R. Scott (12 Lilac Avenue, Thorne, Wakefield). Members have recently enjoyed two slide shows, one on brine shrimp from Hendon & D.A.S. and the other on cichlids by Hampson of Horsforth A.S., both showing Mr P. Reynolds enthralled at the Society's guests, SELB and a talk by successful fish breeding Mr H. R. Scott gave members helpful advice. Recent table results have been: rasbora, 1; Jubb; 2; Mr P. Hing; 3; Reynolds. Pairs egglayers: 1; Mrs R. Stringer; 2; Mr D. D. Sandley; 3; Mr G. B.
a first (A. ramirezi, 83 points); 2; Mr Watkins (B. conchoon, 78); 3; Mr Poole (P. variatus, 76).

COVENTRY P. & A.S. found the discussion on decorated aquaria at a recent meeting much enhanced by the slides shown, when the audience were able to see very clearly the standards to be aimed at and the ideas put into practice by others. All the film of Society events taken over the year made a very enjoyable programme for the pre-Christmas meeting.

... HUTTON GRAMMAR SCHOOL A.S. have been experiencing many difficulties since the departure of their secretary and founder, Neil Swindlehurst, last July. Suddenly changes in officials had to be made to cope with unexpected school leavers. Things seem to have settled down now with Roger McCann as secretary. Neil Rowlandson as treasurer and Peter Webster in charge of publications such as the club’s Aqua News. We wish the new officials much success this year.

NEW A class judge in the FANCY GUPPY ASSOCIATION is Mr Tom Hibbert. Mr W. Myers and Mr D. A. Crane have both passed the B class tests with honours, and C class training is being newly undertaken by nine members. Mr Ken Rugby, chairman of the Judges & Standards Committee, congratulates the Association on this sign of thriving activities.

... EAST DULWICH A.S. are holding their first open show on the 12th April 1969 at St Barnabas Hall, East Dulwich, London, S.E.22. A warm welcome is extended to any fishkeeper who might be interested in joining an ‘up-and-coming’ club. Meetings are held on the first and third Mondays in the month at Dulwich Baths, East Dulwich Road, Dulwich, S.E.22, or contact the assistant secretary, Mr M. A. Todd, 2 Trenear Close, Tressillian Road, Brockley, S.E.4.

... THURROCK A.S. had plenty to congratulate themselves on at their A.G.M. thanks to everyone’s great enthusiasm and effort. Officers for 1969 are: President, Mr R. Nicholls; chairman, Mr Peter Hinson; secretary, Mr John Apsinall (48 York Avenue, Corringham, Essex); treasurer, Mr H. Juson; recorder, Mr D. Strudwick; librarian, Mr R. Strudwick; publicity, Mr E. Nicoll; raffles, Mr P. O’Bryan; Mr Albert Mathews; special duties, Mr A. Appleby; show secretary, Mr D. Durrant, 22 Kingsman Road, Stanford-le-Hope, Essex. The second open show is in April when the club hope to greet many old friends and meet many new ones.

... THE less-experienced fishkeepers among the members of MERSERYSIDE A.S. benefited particularly from a recent discussion on equipment. A local shop loaned a variety of equipment, which was demonstrated and explained by Mr Ken Parkes. Members were able to discuss and give opinions as to the efficiency of the articles, and while it was found that practically every article had its adherents and detractors, newer members gained a great deal from hearing about the experiences of others.

... MEMBERS of DAVENTRY A.S. and COVENTRY P. & A.S. RUGBY & 4th A.S. to watch a very entertaining programme of films presented by Mr Mason-Smith of Cambridge. The table show at this meeting attracted some very good fish. Juniors, pairs eggayers, was won by Master D. Boult (73); 2 and 3, Master Q. J. Wells, Livebearers; 1, 2 and 3, Mr and Mrs Thomas with red-eyed reds.

... NOTTINGHAM & D.A.S. provided their own experts when Mr C. Hill spoke on coldwater fishes and outdoor ponds. Mr G. Barber described his attempts at and final success with breeding orange chrysiodes and Mr J. Holland described a favourite fish of his, the pike. Table show results were: 1, Mrs I. Bulleyment (74 points); 2 and 3 Mr J. Amott (72, 70).

... NEWLY formed S.A.O. KETTERING A.S. enjoyed a most successful meeting when Mr F. Gunn, secretary of South Park Study Society, gave most helpful lecture on choosing the equipment necessary for successful fishkeeping.

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Dates for Your Diary


22nd March, ASSOCIATION OF MANCHESTER & D.A.S. Open Show, The Body Centre, Werneth Park, Oldham, Lancs. Open to all societies. Schedules from Mr F. Jones, 9 Bedford Street, Chesham, Bucks.

22nd March, KEIGHLEY & D.A.S. Second Open Show. Victoria Hall, Victoria Park, Keighley. Schedules from Mr A. Ainsworth, 46 Daleside Road, Riddlesley, Keighley.

22nd March, HUDDERSFIELD T.F.S. Open Show. Drill Hall, St. Paul’s Street, Huddersfield. Schedules from Mr Eric Kaye, 53 Hall Road, Holmfirth, Huddersfield.

22nd March, TOP TEN AQUARISTS Monthly Fish Show and Exhibition. Huddersfield Town Hall. Details from Mr J. Kaye, 4 Totties, Holmfirth.


26th April, THURROCK A.S. Open Show.


15th May, WORKSHOP & Z.Z. Open Show, North Notts College of Further Education, Byth Road, Worksop.


15th May, RAINWORTH & D.A.S. Open Show. At Showrooms, E. Taylor & Sons, West End Garage, West Gate, Nottingham.

18th May, MIDLAND AQUARISTS LEAGUE (Coventry Pool and Aquarium Society hosts). Foleshill Community Centre, Foleshill Road, Coventry.

24th May, TAUNTON & D.A.S. first Open Show. Priory Secondary Modern School, Cranmer Road, Taunton. Schedules from Mr D. J. Rumney, 32 Parklands Road, Wellington, Somerset.

1st June, NUNEATON A.S. second Open Show (provisional announcement). Details from Mr G. Cot, 36 Manor Court Road, Nuneaton.

1st June, BOURNEMOUTH A.C. Open Show. Kinison Community Centre, Pelhams Park, Kinison, Bournemouth. Schedules and entry form after 1st April from Mr Jack V. Jeffers, 26 Durnford Avenue, Southbourne, Bournemouth BH6 4JF.

14th June, SOUTHAMPTON & D.A.S. Open Show, St Deny’s Church Hall, Southampton. Details from Mr C. McCann, 7 Waterhouse Way, Southampton, SO1 3PA.

14th June, LLANTWIT MAJOR A.S. Open Show. Town Hall, Llantrwit Major, Glam.

15th June, BRIGHTON & SOUTHERN A.S. Open Show (provisional).

18th-22nd June, Second NATIONAL FURNISHED AQUARIUM EXHIBITION. St George’s Hall, Bradford.

21st June, BRACKNELL & D.A.S. Open Show. The Priestwood Community Centre, Priestwood Court Road, Bracknell. Details from Mr Len Little, 126 Shepherds Lane, Bracknell.

22nd June, COVENTRY POOL & AQUARIUM SOCIETY Open Show. Foleshill Community Centre, Foleshill.
Road, Coventry. Schedules from Mr C. J. Grant, 26 Cedard Road, Coventry.

22nd June ALFRETON & D. A.S. Open show. Alfretton Hall, Alfretton, Derbys. Details from Mr W. Hill, 35 South Street, Riddings, Derby.

26th-28th June BRISTOL T.C.F. Open Show. Enquiries to Mr E. Newman, 71 Somerdale Avenue, Knowle, Bristol 4.

29th June MEDWAY A.S. third Open Show. St John Fisher School, Chatham, Kent. Show secretary, Mr G. A. Craft, 75 Uargers Road, Waldersale, Chatham, Kent.

5th July LEAMINGTON & D. A.S. fourth Open Show. Details from Mr P. Thomas, 199 Brunswick St, Leamington Spa, Warwicks.


26th July GOSPORT & D. A.S. third Open Show.

6th 7th September MID-HERTS A.S.

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