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Monthly 2s 6d

Vol. 2 No. 1
April, 1967

Subscription rates: £1 15s for 12 issues; 17s 6d for 6 issues (U.S.A. and Canada \$5.00)

Editor: Anthony Evans

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PetFish Publications

554 Garratt Lane,
London, S.W.17

Telephone 01-947 2805

Advertisement Offices
47 Gresham Street,
London, E.C.2

Telephone MONarch 7644

One Year On

IT is one year since the first issue of PETFISH MONTHLY appeared on the aquarium scene. In that first issue I wrote an introductory message 'About PetFish Monthly' in which I expressed the hope that readers would find that we had something fresh to offer in this field.

I also invited you to talk about us to your friends, and this month seems a good time for me to thank readers for the way in which they responded to this and spread the news about PFM. Our march to the established position PFM can claim today was greatly accelerated by your enthusiastic reception.

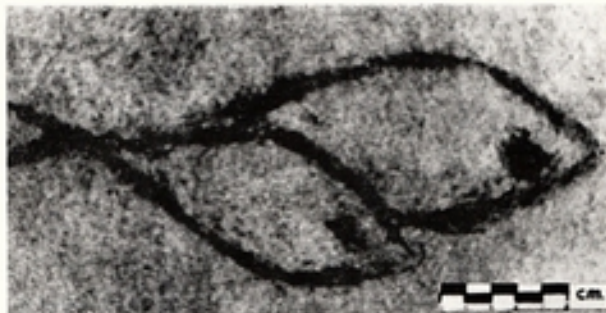
Thanks are also due to the foremost firms in the aquarium hobby who showed confidence in our future by becoming advertisers in our pages. It is, of course, results that count with advertisers in the long run, and here too PFM has already proved itself.

What has brought most congratulatory comments has been the quality of articles in PFM, which reflects the acknowledged status of its writers. Accuracy and authority have been, and will continue to be, our editorial watchwords, with the aquarist's requirements always in mind. This aim and its achievement are facilitated by the fact that PFM is produced by practising fishkeepers.

Amongst other new ideas introduced in our first year, PFM published a 1967 Diary, which proved to be such a popular venture

Continued overpage

30-40,000 Years Back



ALTHOUGH the above could be our artist's first sketches for a rarrist symbol, it is in fact a photograph of impressions of fish outlines from a prehistoric cave that are believed to have been drawn 30,000 to 40,000 years ago. The drawings were found recently, along with others depicting various animals and

men, in an S-shaped cave on the east side of the Rock of Gibraltar. In addition to the special interest the outlines have for us at PFM, it does seem likely that the prehistoric artist had viewed fish underwater and watched their swimming behaviour for him to have been prompted to portray them in this way.

Comments and Quotes

- Food from a pest ● Mystery of a letter
- When water plants grow in excess

Blue-Green Menu

IN our note (PETFISH MONTHLY, March) on the discovery of a virus that attacks a blue-green alga, we were prejudiced enough to wish this infection on to the alga that wreaks havoc in one of our aquaria. A correspondent has written to us about this and says 'Don't infect your alga—eat it!' He tells us that natives of Central Africa collect blue-green algae for food. What is more, scientists at Antibes in the Maritime Alps have been culturing the algae in a large pond.

They have discovered that when it is dried, this aquarium nuisance has a protein content of over 60% and can supply a useful quota of vitamins. It is likely that production of the algae will be taken up commercially with the idea of obtaining a valuable cattle food from the crop. Further treatment could even lead to a product generally acceptable as human food.

Since hearing about this we've tried to see our blue-green alga in a

new light but the sight of it doesn't exactly make the gastric juices flow. Algae-eating fishes seem likewise to be indifferent to its highly nutritious nature. Plecs, otos and sucking loaches leave it to itself. Don't they know what's good for them, or can it be that they do?

The pee and the aitch

FROM time to time arguments break out at aquarists' gatherings about the meaning of that mysterious symbol used to express the degree of acidity of water. All kinds of imaginative statements about the p and the H of pH are made in an endeavour to simplify the symbol. The H stands for the concentration of hydrogen ions, the charged atomic particles always associated with acidity, and this is usually correctly defined (although not always correctly printed in aquarium literature with the capital letter it should have).

It's the p that causes the trouble, for although rather loosely it could be held to stand for power (mathe-

matical sense), it really means 'exponent', and is mathematical shorthand for the reciprocal of the logarithm of the hydrogen ion concentration.

It is easy to show why the expression pH is a useful one: if the actual concentration of hydrogen ions in an aquarium water sample were used to describe the acidity we would have to talk of it, for example, as 0.000000162 gram ions of hydrogen per litre. This is in fact the interpretation of pH 6.5. The p of the pH indicates that we have adjusted this unwieldy figure to record it as pH 6.5 (1/log₁₀ 0.000000162, if you want to work it out). Simple if you like that sort of thing, isn't it? Personally we say hurrah for S. P. L. Seemsen, the Danish biochemist who thought up this use for p nearly 60 years ago, and who derived it in his writings in German and French from the words *potenz* and *puissance* respectively.

Water Plant Control by Fish

ROTORUA lakes in New Zealand are being choked by growths of the underwater plant *Lagarosiphon*. On the advice of Dr G. A. Prowse, director of the Tropical Fish Culture Research Institute in Malacca, some Chinese grass carp are to be introduced in an attempt to limit the growth of the plant.

Dr Prowse is reported as saying that in a half-acre pond choked with water weed 20 grass carp fingerlings polished off the lot within a month. Chinese grass carp were coping with *Lagarosiphon* and associated weeds in other parts of the world, Dr Prowse said.

'He knew of no other weed-eating fish that could withstand the cold such as would be encountered in Rotorua waters. The grass carp could also withstand high temperatures.'

'A difficulty with the grass carp is that it spawns naturally only in its habitat, the Pearl River in China and the Amur River in Mongolia. Artificial spawning could be induced by using pituitary gland extract, but this had only about 30% success.'

'If the carp were placed in Rotorua lakes they would probably have to be replenished occasionally from overseas.'—OTAGO DAILY TIMES.

One Year On Continued from page 1

that our Aquarist's Diary for 1968 is already being planned. A mark of the way in which copies of PFM are valued by readers has been the large number of requests for a binder to keep issues for easy reference. This demand has been met by the PETFISH MONTHLY Binder, now available. Further developments will be made in the months to come.

Don't forget to send me any suggestions and comments you would like to make—these are greatly valued. And if you do know a fish-keeper who is not yet a regular reader, please suggest to him that he too can be in the mainstream swim with PFM.

Anthony Evans

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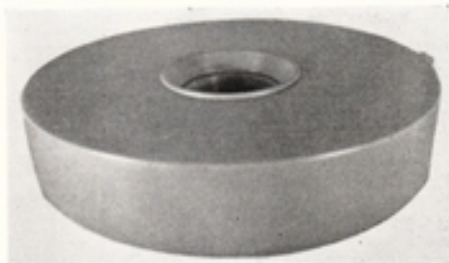
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LETTERS

Guppies and Guppy Showing

ON reading Bill Armitage's article (Guppy Comments, PETFISH MONTHLY, February), I am indeed a little puzzled by some of his reasoning. He says his friend does not want to know about guppies because of what he saw in the dealer's tanks at his local pet stores. He visualises guppies of show quality on sale in all pet shops. What an admirable thought, but how unrealistic can one get?

Such idealism could never be achieved for several reasons. Is the dealer prepared to pay a reasonable price for such quality? When will the average aquarist realise that the guppy is not just an insignificant little fish to be purchased for the sum of 1s 6d or 2s per pair only for the purpose of ascertaining whether or not his newly set-up tank is in good condition, for the well-being of his barbs, characins and what have you, or for the production of live food for some large cichlid?

I have been breeding guppies for some 12 years or more and, may I add, with some considerable success on the show bench up and down the country. Now you may well think, as many do, that any fool can breed guppies. Quite so! But it takes an experienced aquarist to produce the prize specimens we so want to see. It is my experience over the years that the so-called better stock acquired from some reliable source often produces even worse results than the stock I am familiar with.

Guppies transported some distance to different water, environmental and feeding conditions, produce offspring completely out of character with their parent stock. This, I hasten to add, is no fault of the supplier and many a budding guppyist is lost to the hobby for just this one reason. It is only by careful observation and the culling of all undesirables, and selective line breeding of the best of what we have got, that we can get back to the original stock standard. It may take three or four generations, and a lot of disappointments. If patience is a virtue, then for this branch of the hobby its cultivation is a MUST.

Is there a breeder in any part of this hobby who can honestly say 'I have never bred or reared a poor specimen'? We all have our bad patches, we all breed rubbish at some stage—when experimenting with a new strain, for instance, or when a line becomes weak—but whether we dispose of them to the dealer or feed them to the cichlids is a matter solely for the individual concerned.

Furthermore, not all guppy breeders see their hobby as a means to supplementing their financial returns. I breed guppies solely for the pleasure I receive, from meeting friends with similar interests, exhibiting in various parts of the country and as a source of relaxation from the daily grind and not for what I can make out of them. I have many friends who do likewise. The hobby would rejoice if good guppies in the pet shops would lead to the recruitment of new members to its ranks, but the idea seems to me sheer fantasy. I think on the contrary it would have the reverse effect.

A5

I wholeheartedly agree with the writer on his point that all clubs and societies should cater for the aquarist—and aquarist he is—who is quite satisfied with his one mixed community tank in his lounge and who couldn't care less about breeding. By and large most societies do. I think it is unfair to suggest that a lot of members look down their noses at this chap. I believe most members are only too willing to lend a helping hand. The society has a lot to offer indeed; let the new member be courageous enough to ask for advice, and I am sure it will be nothing but the best that he receives.

Now to so-called open guppy shows. F.G.A. and F.G.B.S. alike should make a much greater effort to cater for the aquarist who is not yet a member, who breeds guppies equal in quality to anything those two noble organisations can produce. The F.G.B.S. does in fact put on a class for non-members, but this does not allow him to assess his exhibit against the so-called experts. In my opinion this is not enough—as is apparent from the lack of support received. Should a non-member be allowed to compete against the member, and let's face it he could win, what a boost to his morale! I am willing to wager another new recruit to our ranks would follow.

May I take this opportunity of congratulating you, Mr Editor, on a very fine publication, and I wish you every success in the future.

PHIL JENKS
Show secretary, F.G.B.S.

I WAS interested to read your article about the F.G.A. holding what they call an annual open show that is, in fact, for members only (Guppy Comment, February). I would like to point out that this is not the case in the Federation of Guppy Breeders Societies. Last year on 27th August the F.G.B.S. South Midlands section held their annual open show at the Bingley Hall, Birmingham, and included in the various classes was one for non-members. A friend of mine took his 14-year-old son to the show. The boy had entered a fantail in the non-members class and to his joy was awarded a first. I will admit there were only four entries in this class, but the boy went home from the show feeling ten feet tall and has since become an ardent guppy fan.

A. BAKER
South Midlands Section, F.G.B.S.

IN reply to Mr Armitage's comment concerning F.G.A. open shows (Guppy Comment, February), I should like to refer him to the 1966 Liverpool section open show when two classes (single male and single female) were available to non-members. Local societies were circulated with, I may add, a very poor response, though individual entries made the classes worthwhile. The same classes were available at the F.G.A. International Show in Manchester and will also be available at this year's Liverpool Section Open Show. Anyone requiring details should write to me (56 Royden Road, Billinge, Nr Wigan).

K. RIGBY
Chairman, Liverpool Section F.G.A.

From the Source

AS collectors and shippers of freshwater and marine tropicals in the past the letters in PETFISH MONTHLY about parasitic diseases have interested us very much. All newly arrived fishes should be quarantined. In the small confines of the plastic bag during transit the fishes cannot escape from the parasites that become active away from the light.

Several years ago, while collecting marine tropicals in the Thousand Islands of Java, we had this experience. The newly collected healthy fishes were placed in floating baskets (baskets tied to the inner-tubes of trucks). After several hours' collecting, we tied these floating baskets to the side of our boat; we then had our lunch, and after everything had been arranged the last thing to do before we started for home was to put the fish in plastic bags with oxygen.

Imagine our surprise while catching the fishes to notice that many had been infected with *Oodinium*. Our conclusion was that the newly caught marine tropicals had been healthy in the lower depths of the sea. When we towed them and placed them in the shade of the boat the *Oodinium* parasites were there by the billion. The fishes could not swim away or defend themselves. We had been very cruel—just as if we had tied up someone and placed him in a jungle full of wild beasts!

Djakarta, Indonesia

LEE CHIN ENG

Prize Letter

Several years ago, while collecting marine tropicals in the Thousand Islands of Java, we had this experience. The newly collected healthy fishes were placed in floating baskets (baskets tied to the inner-tubes of trucks). After several hours' collecting, we tied these floating baskets to the side of our boat; we then had our lunch, and after everything had been arranged the last thing to do before we started for home was to put the fish in plastic bags with oxygen.

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Djakarta, Indonesia

LEE CHIN ENG

Show Conduct

MY Society heartily concur with all that was said in the letter from Stone A.S. (PETFISH MONTHLY, February) and would like to stress the following points. It is up to the host society to cater for all in an open show. To this aim, entertainment for the juniors and the long-suffering partners of the aquarist should be provided. At our open show on 11th June at Lowther Gardens, Lytham St Annes, we have laid on magic acts and film shows for the juniors, and a talk on subjects of interest to all; trade stands for fish enthusiasts and trade stands for displaying flowers, cacti and many items for the home-loving.

At most open shows, a small minority seem to delight in removing their exhibits before de-benching time; and even in front of the judges if they have not won. Such persons—I won't call them competitors—are discourteous to the host society, to the judges and indeed to their own society. To help stamp this out, some rules such as (1) competitors removing exhibits before de-benching time will forfeit all prizes won, (2) competitors who need to leave early can by prior arrangement have their exhibits de-benched by the stewards only, should be adopted. If all societies ensured that this was done by the stewards, it would help in stopping this malpractice, which tends to mar our friendly and happy hobby. I don't think that societies would be called officious by the true competing aquarist, only by the small minority we speak of.

Do have a think on these lines and let us all have a pattern to work to. And don't forget 11th June, Lowther Gardens, Lytham St Annes.

WILLIAM C. MATTHEWS
Secretary, Lytham A.S.

Fluorescent Lighting

SEVERAL types of fluorescent lamps have been specially designed to encourage plant growth, the best known being the Gro-lux lamp made by Sylvania and distributed in this country by Atlas Lighting Co. On a recent continental tour we found this lamp being widely used with great success in such famous public aquaria as Frankfurt-am-Main and Antwerp, and we have been using it effectively here for the past 2 years.

Rumours have been circulating that under some conditions these lamps have caused sterility in certain fish, but the manufacturers know of no proved cases and it is very hard to see, from the spectrum distribution, what radiation could cause such trouble. We would be very interested to hear from any hobbyists who claim to have had any experience of such trouble, with details of the way in which the lamps were applied.

J. K. B. YEADON

General Manager, Skagness Natureland, Lincs.

Sucking Loach

I WAS very pleased to see an article about the sucking loach (PETFISH MONTHLY, February), a fish I would like to see more of. However, I cannot agree with all that was said in the article. I have kept one of these fish for over a year, in an 18 in. community tank. I found that it cleaned up the glass and plants for the first 4 months but then it went on strike. During this cleaning process it scratched the glass very slightly with the horny plates around its mouth. Although the damage to my tank was negligible, the long-term effect could be serious.

When the fish grew to above 3 inches, it spent most of its time altering the contours of the gravel, at the same time digging up the plants. This obviously spoils the arrangement of the tank and as it could stay under the gravel or rocks for some considerable length of time it was very hard to catch. I often felt that a spade, not a net, would be more appropriate for catching it. Once it has been enticed out of hiding, it is a very powerful swimmer and a good jumper. The fish is very nervous and if disturbed its colours fade and don't return for several days. When angry it glows pink round its mouth.

I have not found it to be a very peaceful fish. It often chased the swordtails and it once killed a prize male guppy by tearing its tail to shreds. I could, however, have had a particularly badly disposed fish. Also, I think the size seems to have been somewhat underestimated. My specimen grew to a good 4 in. and I have seen them 6 in. long. Several books quote them as growing to 10 in. long. However, despite all this I intend to purchase some more specimens, my first one having died of some bacterial disease, but I will keep them with active fishes, such as barbs.

West Bridgford, Nottingham

PETER BATES

A sucking loach we have been keeping in a tank with some African knife fish has proved to be a nuisance in persistently attaching itself to the sides of its tank companions. Its activities appear to have caused some damage to the skin of the pestered fish, so that some individual sucking loaches at least may not be good community specimens.—EDITOR.

First of a series of articles in which filtering procedures that employ Nature's own water-purifying processes are described

What is Biological Filtration?

By Capt. L. C. BETTS

THE rudiments of filtering water have been known for many centuries and the early principles evolved are still used by many water undertakings all over the country. The Metropolitan Water Board, for example, still filters Thames water through sand filters, which, with other safeguards such as chlorination, is sufficient to render it clean, clear and fit to drink.

Mechanical filters using other media than sand have been developed but the principle is the same: the water is passed by gravity or pressure through a porous material, the pore size of which is smaller than the size of the material to be removed from the water. Filters employing this method have the inherent disadvantage that the material held back must be removed at intervals or the filter will fail to pass the water through itself. Normally this is done by renewing the filter medium or reversing the flow and the polluted water is allowed to go to waste.

Early aquarium filters employed this straining action method by using an airlift to run the water through cotton wool or glass wool, but this invariably meant daily renewal of the wool and many untimely and unexplained deaths of fishes could be attributed to tiny sections of glass wool in the gut of the fishes.

At the turn of the century many of the large towns in this country were in danger of being metaphorically submerged in their own filthy waste waters, and the effective and sanitary disposal of sewage became an urgent issue. Since rivers and streams were natural water carriers, ultimately discharging into the sea, the problem became one of purifying the sewage to a degree reasonable for the rivers to accept. To use the method employed for the freshwater supplies could not be considered on the grounds of expense, and an alternative one had to be found. Thus, the first biological sewage filter came in about 1910 and proved an immediate success, so much so that, following the lead of this country, all sewage the world over is treated biologically.

What is meant by 'biological' treatment? In terms of aquarium keeping it means nothing more than providing conditions whereby living organisms, which will feed on the impurities in the water, can develop without detriment to the fishes in sufficient numbers to maintain the water at as high a state of purity as is necessary.

Anyone who has left an aquarium undisturbed for



The rotating arms of this sewage filter system deliver jets of the sewage on to a bed of clinker. Biological purification occurs as the water percolates through the bed

more than a month will have noticed that a slime will start to form on the glass sides, which if allowed to persist will consolidate into a jelly form. This film, which is known as a zoogeal film (or mass of living organisms), is a complex of bacterial and other colonies indigenous to water. The zoogeal film is a conversion system for dead plant and animal (organic) matter and, so far as water is concerned, contains two general groups of organisms. One group is classed as aerobic (i.e. it requires oxygen for survival) and the other anaerobic (non-oxygen consuming). By their activities the water is biologically purified.

So far we have discussed very lightly two methods of purifying water; (1) by straining the water through sand or other media, and (2) by providing means for development of living organisms which will remove the undesirable substances by feeding on them. What are the pros and cons for each method, bearing in mind that the

water in an aquarium does not need to be of as high a quality as drinking water?

To take the straining action first. Water so filtered sufficiently to remove algal growths, will also lose beneficial organisms such as Infusoria, rotifers etc. As previously pointed out, the medium will also require frequent renewal. As a filter it will work with diminishing efficiency, for as the medium slowly becomes clogged, so the rate of flow will diminish until finally it ceases and in certain circumstances overflow may occur. The choice of filter medium is thus a difficult one, for too large a pore size will have no effect and too small a size will rapidly clog.

Under working conditions such a filter can act as a propagating device for algal and other unsightly growths. It is true that these objections apply more to gravity-flow filters than pressure filters but anyone who has had a tubing joint part and all the water pumped on to the floor, will agree with me that there is enough risk with gravity flows.

The biological method of filtration has none of these objections to it but has many points to commend it. To start with, the medium is composed of clinker or small pebbles, which makes it virtually indestructible besides being relatively cheap and easy to obtain. The limits of pore size are most flexible as it is vital that the water flows freely through the filter, and sufficient room must still be left for the zoogeal film to develop.

The periods during which the filter can run without attention is anything up to 6 months and then all that is required is to wash the clinker under a tap to remove any loose humus. Strange as it sounds, a biological filter will also remove many of the egg-laying parasites which infest fishes, such as egg-laying flukes and parasitic Protozoa. It also acts in this fashion for many other parasites which normally die quickly in the absence of a host.

A biological filter can be operated either by an air pump (using the airlift principle) or by a small water pump, and since the gravity method of flow is feasible, any number of tanks can be filtered with one pump. By incorporating a container of filter medium into the flow between tanks, the normal objection to a common water flow for a number of tanks is overcome, since disease will not be carried from one tank to the next.

Where plants are involved such a filter is of benefit, as the black (anaerobic) areas of planting medium, which is detrimental to plant growth, no longer develop. Once the system is working satisfactorily, the clarity of the water is excellent and there is sufficient capacity in hand to absorb the occasional overfeeding or effects of too strong an overhead light.

Whilst in theory a biological filter is foolproof and requires no more attention than that given to the pump moving the water, there are considerations attendant on the particular type of job it is doing, but these will have to be considered next time.



Guppy Comment

By
BILL ARMITAGE

MOST aquarists are agreed that little jewel is a very apt name for the guppy. There is no doubt at all when seen in his full colours he is a magnificent fish. It is a remarkable fact therefore, that at a table show of one of the guppy specialist clubs it is possible to see an entry of between two and three hundred, yet the entry of guppies at local society shows is usually in the region of half a dozen, and sometimes even non-existent. One wonders why this is so.

The answer is very simple. Guppy breeders are not displaying their goods in all the right places. While it is a fact that most guppy breeders are members of a specialist society, and exhibit regularly at their shows, they are obviously not members of their local society and are definitely not exhibiting at these shows. It is

said it pays to advertise. This being so, surely local shows are a golden opportunity for guppy breeders to create a widespread interest in the guppy.

At a meeting of the Liverpool section of the Fancy Guppy Association, Mr Allan Smith gave a practical demonstration of Gro-lux aquarium lighting. It really is amazing how this form of lighting brings out the colours in guppies, especially the red. It has to be seen to be believed. Mr Smith informed us that the tubes which are produced in the U.S.A. are comparatively expensive to buy.

As this system of lighting is extremely popular in America, it shouldn't be long before there is a far greater demand for it in Britain and the price reduced accordingly.

It has been Mr Smith's experience that plants grown under this lighting show phenomenal growth, as much as an inch in 24 hours in some plants. Also plants that he had difficulty in growing at all under normal lighting, grow perfectly under this illumination.

I was interested to read Mr Roy Beresford's comments in his letter to PETFISH MONTHLY (February issue). One of the aims of 'Guppy Comment' is to advise beginners to make a good start with breeding stock of one particular strain. It isn't much use me stressing this point and advising novices to become members of the Fancy Guppy Association, if upon joining they are

Continued on page 19

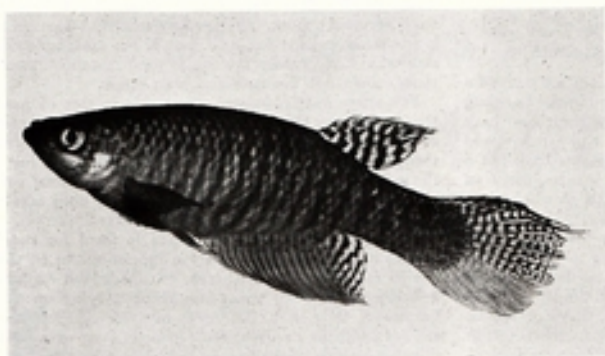
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Breeding Fish



in Soft Peat Water



By D. B. McINERNY
(McLynn's Aquarium)

Soft peaty water gives best
breeding results with many fishes,
including killifishes such as
Pterolebias zonatus

THE first articles I wrote in this series were concerned with discussion of three types of water, namely, hard tap water, medium rainwater and soft peat water. Those of you who troubled to get the peat water under way at the beginning should now reap a rich reward. For you should have at your disposal a fair quantity of soft peaty water, crystal clear, though deep brown in colour.

This will be ideal for breeding many of the so-called difficult species, such as glowlights, minors, serpac, rosy tetras, bleeding hearts, some of the pencil fish like *Naemastomus aeneus* and *N. marginatus*, most of the *Aphyosemion*, as well as neons and cardinals. The last two mentioned require very soft peat water, with a hardness not exceeding 10 parts per million; the others will breed and hatch in water of hardness up to twice this figure. Thus I shall leave the breeding of neons and cardinals for the next article, when the water still soaking in peat will have had a further period of softening.

Those of you who have a titrating outfit can test and find out the hardness of your peat water; those without this equipment must just try it out and if the eggs hatch it will prove the water to be soft enough; if the eggs do not hatch the water is still too hard and must be left for a further month before repeating the experiment.

However, if you made the peat water when suggested, some 10 months ago, it is almost certain to be soft enough by now.

For breeding glowlights, clean out a breeding tank (measuring 24 in. by 8 in. by 8 in. or smaller) having a glass base, and wipe it dry. Take a two-gallon enamel bucket and place it close to the source of peat water, and with a siphon tube about 3 feet long place one end an inch or two below the surface of the peat water, suck the other end and, when the water begins to flow, place this end in the bucket. Be careful not to disturb the sodden peat and your bucket should fill with deep reddish brown, very clear peat water. When an inch from the top of the bucket withdraw the siphon tube.

Place this bucket of peat water on a gas ring, or insert an electrical heater, and heat until it reaches a temperature of 80°F (27°C). Now pour it into the breeding tank; if this tank measures 24 in. by 8 in. by 8 in. the water will be approximately 4 inches deep. Maintain a temperature of 80°F. Into this otherwise empty tank place a handful of spawning medium, such as clean willow root, coconut fibre or a nylon mop; cover the tank with a sheet of glass and leave undisturbed.

It will be found that in warming up the peat water a considerable amount of oxygen is driven off, but this is absorbed again during the next 6 to 8 hours and some

gas collects in bubbles on the spawning medium, making it so buoyant that it will float just under the water surface. You can keep shaking it, but more bubbles are likely to collect, and shaking has to be repeated many times. If, however, you ignore it for 24 hours, one shake then will dislodge all the bubbles and the material will sink to the bottom permanently. I have found leaving it for 24 hours to be the less troublesome method.

Having taken this bucketful of peat water out of your store, replace it now with a bucket of rain water. In a week it will be ready to use again and thus your supply will last for many months.

If you have followed these articles carefully, you should have set up, some time ago, two stock tanks containing sand and plants and each filled with rain water. In one will be all the males of the species you wish to breed, and in the other all the females. If so, it will now be easy to select one healthy looking male and one well-filled female glowlight tetra.

Spawning Preparations

Catch these breeders about 3.0 p.m., place each in a separate jam-jar and float these jam-jars in the breeding tank for 20 minutes. Once the temperatures have equalised do not tip the jars into the tank—this would increase the hardness of the water. If you have not a very tiny net that will go inside the jam-jar, place an ordinary net over a basin and tip each glowlight into this, and then transfer them immediately, without water, into the breeding tank. Replace the cover glass and leave them alone. They will have time to get to know each other and their surroundings before darkness falls.

Next morning approach the tank cautiously and you may well see the pair spawning; if not, they may spawn the following morning. Should a pair not spawn within 4 days, change them for another pair. When the spawning act occurs the male swims alongside his mate and, with their bodies pressed together, they will do a 'victory' roll, afterwards breaking apart. You may see some eggs falling, but the best way to judge how spawning is going is to take a magnifying glass and from underneath examine the glass base of the tank. You should see quite a number of clear, slightly golden eggs lying on the bottom.

As soon as the fish begin to lose interest in each other, or if you see any sign of either picking up eggs, remove both parents. Do this carefully. First, gently dip a jam-jar into the tank and half fill it with water; quietly guide both fish to the far end of the tank. Now, using a fairly large net, very slowly encircle the fish, lift them out and place them in the jam jar, float this back in the male's tank and after half-an-hour net out the female and place her in the female stock tank. After this you can tip the male into his tank.

The following morning, that is 24 hours after spawning, view the breeding tank from below once again. Provided that the water is soft enough the eggs will have hatched into minute fish. These are much bigger than the egg. There will be a small bulge at one end, which is the head, and a tiny tail at the opposite end. There will be no movement except for a tiny wiggling now and then of the tail, so leave well alone. No food is required as the tiny fry will be subsisting on the yolk sac.

The next morning when looking up through the base of the tank, you will see one or two fry skidding about on the bottom glass. Now use one 2 lb. jam-jar of Infusoria to feed the fry; do not worry if this water is not as soft—the danger period, that is the hatching period, is over and a gradual hardening of the water up to the hardness of rain water will be satisfactory. Indeed, the babies must be acclimatised to harder water before you can safely dispose of them to other aquarists. In a further 4 days, a small amount of newly hatched brine shrimp can be fed to the fry, and 14 days later a little micro worm can be added to the diet. When the fry are as large as newly born livebearers they may be fed on a good quality, fine dried food.

The procedure for minors, serpaes, rosy tetras and bleeding hearts is similar except that they should be given two full buckets of peat water, making the depth in the breeding tank about 8 inches; this is because they prefer to spawn over the spawning medium rather than against it. They may not be such ready spawners so allow them a week. This means that they will require a few white worms for food, but if the tank becomes somewhat dirty, return the fish to their respective stock tanks, clean out the tank and start again.

For spawning *Nannostomus* use one bucket of peat water and cover the surface of this with a half-inch layer of *Riccia*. Place a pair of the fish into the tank and leave them for 3 or 4 days, when spawning will occur. Feed the parents with a few white worms daily and they will not devour the eggs. After 4 days net out both adults and wait until fry are seen before adding Infusoria.

The peat water you have made is ideal for most species of *Aphyosemion*, but some species spawn on the top in *Riccia* or moss, whereas others deposit eggs in a half-inch layer of water-logged peat, lying on the bottom of their tank. The eggs of some *Aphyosemion* species hatch in 14 days, other take as long as 3 or 4 months, so you must find out which species you have and treat accordingly.



GOLDFISH BREEDING

Male singletail goldfish showing the tubercles on its gill cover by which male goldfish can be identified when they are in breeding condition



Good Chasers Give High Fertility

By R. D. ESSON

GOLDFISH should be showing all the signs of breeding at this time. The males will have small white 'pimples' on their gill covers (operculum) and on the front rays of their pectoral fins (those immediately behind the gills). These pimples are generally called breeding tubercles and a male will carry them all the time he is in breeding condition. They are a good sign of his breeding prowess.

A male with plenty of tubercles which are large and well raised will invariably be a good chaser and give a high fertility rate, whereas males with few tubercles tend to be poor chasers with low fertility yields.

The females will be full in the body. This is easy to see in singletails but not so obvious in twintails. I'm afraid only experience tells, but if one is not sure of the sex of a twintail, one can only assume that if the fish is adult and not showing tubercles it is a female. An experienced goldfish breeder should be able to discern the sex of a fish by its vent. Unfortunately the difference is so fine that although it can be seen, the printed word cannot show you.

There are two methods of breeding goldfish: the natural spawning and by hand-spawning. Natural spawning is to allow the male to chase the female and mate in this fashion as in Nature, but that is all that is natural about it, as invariably it is under controlled conditions in the fish tank. This is the way for a beginner to start and many established breeders still use only this method, as they feel that hand-spawning has a weakening effect on a strain.

The smallest tank which will accommodate the fish without causing them any distress should be used. It is a good idea to only half fill the tank with water. This is

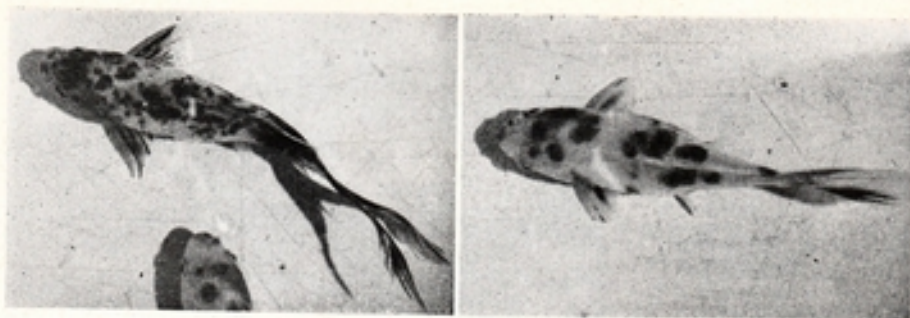
done to increase the chance of the eggs being fertilised. A female goldfish sheds her eggs in a most haphazard fashion and it is only the vast quantities shed that ensure some of them being made fertile.

A 24 in. by 12 in. tank is usually large enough for twintails and a 36 in. by 15 in. for singletails. It must be thoroughly cleaned before use by washing with Dettol solution or similar disinfectant. Make sure that all traces of the disinfectant are rinsed away and then fill with water. At one end put something for the fish to spawn on. Plants can be used but I do not advise this. Disease can be introduced and also they will deteriorate very quickly in the days following the spawning. It is better to use an inert medium such as coconut fibre or nylon wool, which can be readily cleansed.

There should be enough spawning medium to enable the female to hide and rest for a short time, especially if you intend to use more than one male fish. A nylon mop can be made quite easily. Buy two or three fishing rod handle corks with a $\frac{1}{2}$ in. hole in the centre. These are cut into $\frac{1}{4}$ in. lengths and the nylon wool into 12 in. lengths. Take about twenty lengths of wool and tie with a knot in the centre. The ends are passed through the hole in the cork, and there is your mop.

The fish are put into the tank in the early evening; as goldfish invariably spawn in the morning this enables them to settle in overnight. If conditions are not right they will not spawn and many fishkeepers then go through ritual performances to induce the fish to breed. These range from changing half the water to drop the temperature, applying aeration, top lighting and other devious means—to my mind a waste of time.

If the fish do not spawn remove them from the tank



and concentrate on getting them into breeding condition. A much more sensible attitude than trying to force a spawning.

As I have said, some males are poor chasers and if you wish to breed with such a fish it is policy to use another male of the same variety to get things going. This is called a trigger fish. The failure of this is, of course, that most of the fry will be fathered by this fish. I would not use a male fish for breeding, no matter how well finned or coloured, were he not a good chaser. I feel that this is a feature that I would want to keep out of a strain of fish. If they are not ready breeders then the strain will most certainly be lost, and all your work with it.

Let us assume that the fish chase and spawn in the morning. Note that goldfish are spasmodic spawners. The male chases the female around and she will periodi-

Single-tail goldfish viewed from above. In the male (left) the body is seen to taper towards the tail from before the pelvic fins whereas the female (right) shows fullness of body along its entire length.

cally go into the spawning medium and shed some eggs, then swim around the tank, then return to the medium and so on, until she is spent. This is to be remembered when attempting to hand-spawn.

There are two main drawbacks to tank spawnings: the wastage of eggs—only a percentage are fertilised (a good spawning being 60% and under 50% being about normal)—and the fact that quite often the female is damaged during the chasing. Both drawbacks can be overcome by hand-spawning.



by ARPEE

I AM always attracted to the 'Readers' Queries' section of magazines, not only because I learn a lot from them, but because some of the questions are almost incredible. We all have to start somewhere, certainly, but considering that there are so many excellent textbooks about, it is a little surprising that so many really elementary queries are lobbed at the Editor.

Perhaps the most frequently asked questions on aquarium subjects arise because of overcrowded and dirty conditions; certainly, there are many who think that there is no limit to the fish capacity of a 24 in. tank! The great marvel about replies to questions is that they probably often work, despite the almost complete lack of background data provided by the questioner.

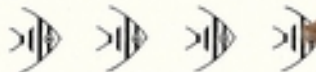
Although consultants invariably give opinions based as closely as possible on the facts given, enquirers must

appreciate that their answers cannot always be right. There are so many variables in any given tank that a single one can completely nullify what looks, *prima facie*, the best of good advice. An obvious variable is the hardness of the water, but if a plant thrives in one tank but not in another the hardness is unlikely to be the sole deciding factor. Some not very evident factors are the composition of the tank floor, the amount of floating foliage, the possible chemical emissions from rocks and the habits of the fishes themselves.

So far as plants are concerned, light is one of the most vital factors, and this does not always mean that there has to be a lot of it. Certain plants seem to have an aversion to rooting in particular composts and take kindly only to sand, whereas others can't stand it. Some varieties of fish have a particular liking for this plant or that. You may well find that floating fern does well in a community tank, but fails in a tank of fry because the growing fish nibble the fine hair rootlets. Against this background of uncertainties the adviser does his best, but it does emphasise the need to tell him as much, succinctly, as you can, when sending in your problems.

For those who learn the hard way and never write, a record book is a great help, in which the salient conditions of each tank can be registered and used as a rough guide in the diagnosis of either trouble or success. A card index (using cards as large as you can manage) is

an even better way of maintaining a case history of each tank.



Like many other readers of PFM I have greatly enjoyed Mr D. McInerney's articles on the breeding of tropical fishes. I should like to remark on a number of his observations and practices. My principal disappointment with the series has been the assumption that the beginner can handle Infusoria feeding satisfactorily enough to raise reasonable quantities of young fish. On the large-scale breeding programmes to which Mr McInerney has been accustomed for many years I imagine that Infusoria production is a key feature. Like many other things, if you do them big they are more likely to succeed than if you just dabble on a small scale.

Now, for me, the beginner is the aquarist with not many tanks and not much space, and he is almost certainly a part-timer, with normal business or studies getting in the way of that degree of devotion to the subject which really effective breeding demands. I think many aquarists will agree with me that it is far easier to breed and raise fish without Infusoria than it is to culture the Infusoria themselves, let alone feed it safely, and there are no doubt innumerable witnesses to the sorry and stinking tanks of desolation resulting from overfeeding with an infusion to what looked like a promising hatching.

I acknowledge that Mr McInerney's article on Infusoria production and feeding cannot be faulted, but I feel rather strongly that the beginner should, where practicable, work towards Infusoria feeding after having experimented with preparations like Liquifry in the course of his first attempts. It will be said that this, too, is a potential killer if misused, and of course it is just as dangerous as any other food if given in excess, but since (unlike most Infusoria cultures) it is initially 'clean', its success is rather more within the control of the breeder, though I think it is generally true that one may not raise as many fish as might be obtained from a trouble-free course of jam-jar Infusoria.

Liquifry, apart from giving the youngest fry minute particles of food material to ingest, aids the multiplication of Infusoria in the aquarium water, and the whole art of feeding this preparation lies in adding small and diluted doses by means of a medicine dropper, never letting the water get really clear, and never letting it get too cloudy. The Infusoria cloud can be fairly easily seen with a pocket lens, and so long as some can be seen you may assume that the fry have enough food for an hour or so. Inevitably, you add just too much to your first batch or so of fry, and that wraps up proceedings for a week or so, but hope springs eternal, and you will ultimately hit the balance; once having done so, instinct should look after your efforts henceforth, though it is part of the nature of things that the expected will often not happen, and you will think you are back where you started. At its very worst liquid fry food takes up very much less space than a battery of Infusoria containers. With the flat-dweller and the aquarist who is not blessed with a fish house or room this feature of saved space will count very heavily.

AJ§

I have recently had a spate of exploding electric light bulbs in those of my aquaria which do not contain strip or fluorescent lighting. This rarely seems to happen with 40 watt bulbs or less, but sixties fall by the wayside all too often. This is caused by cool condensed drops of water falling off the cover on to the hot glass of the bulb. One way of overcoming this trouble is to fit lower power bulbs, but more of them, but this will recommend itself to few. I am experimenting with the fixing of foam rubber strips three-quarters of the way down the aquarium covers, which might have the effect of trapping some of the surplus water which otherwise falls on to the bulbs when the cover is raised, but if this fails it looks as though small shades will have to be fitted to each lamp. This will have the effect of subjecting condensation to the immediate heating action of the bulb, and of drying it up before it can cause harm. If readers have any personal success stories over this little problem, I shall be interested to hear from them. I am sure that I am not alone in having trouble from this source.

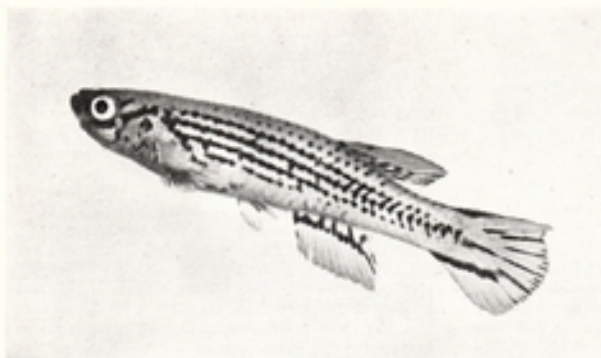


One of the most splendid of outdoor aquatic plants is the water hawthorn (*Aponogeton distachyon*), which has glossy floating leaves and an oddly shaped inflorescence of an incredibly beautiful and 'heady' perfume. I am sorely tempted to try one in one of my tropical tanks, as the scent might then be available in mid-winter, but I have so far shirked the issue as I am a little apprehensive about introducing any hidden insect horrors to otherwise well-ordered communities. If anyone has tried this with success I should be interested to hear how things went; otherwise it looks as though I shall have to take the plunge and report my own experiences at a later stage. I have fearful visions of long, twining thin stems and masses of leaves all over the surface, with never a bloom for my trouble, but it may well be worth trying in, say, the White Cloud tank, which is seldom above 70°F anyway.



A newcomer to Cheltenham Aquatics tanks came my way a month or two back in the form of *Botia sidthimunki*, and very fine little fishes they were, too. I cannot remember having seen this diminutive botia before. It has gorgeous gold and black marbling on the body, with light underparts, and the gold really is gold! As it grows to no more than 1½ in. it is a desirable fish for the 'small' community tank, and its liveliness and inquisitiveness are readily appealing. There seem to be, so far at any rate, no particular fads over food, and no personality clashes have become evident in the tank in which I have mind. The largest fish there is a silver dollar, and the smallest is a *Nannostomus marginatus*. The *B. sidthimunki* keeps well in evidence, without being unduly fussy, and anybody seeking the introduction of an unusual colour feature in a mixed collection might well try adding half a dozen of these little loaches. I don't know whether they would tend to shoal—I rather think that they would—in which case the effect would be distinctly arresting.

Photographs by
T. & K. PAYNE



OVER the past few months there seem to have been a great many happenings in the world of killiefishes. In this country many new and interesting species have come to light, some by way of sports or mutations, others by way of collectors.

The striped *Aphyosemion* of this article has grace and colour, is long-lived compared with most species of killies, is easily cared for and easy to breed. *Aphyosemion striatum* was

The Striped Aphyo. is a Switch Spawner

By P. R. STOKES

(Chairman, British Killiefish Association)



introduced into this country by killie breeders in the States, but discovered by Boulenger (1912). The species is found in parts of West Africa, in rain forest areas, probably in the Southern Cameroons, the full location not at present known, but in areas with a heavy rainfall.

The male's body coloration is cream with flecks of red, and four horizontal ruby red bars run from the gill covers through to the caudal fin, with two broken red bars beneath. The back region is a darker buff. The eyes are rather large and slightly protruding. The dorsal fin is positioned well back on the body but in line with the anal fin; no extensions occur with this fish to compare

Spawning mops made from nylon wool and suspended from floating corks are used in the 12in. by 8in. by 8in. breeding aquarium

with the fine extensions to the caudal fin of *Aphyosemion australe*.

The dorsal fin is pointed, and coloured with a broad yellow band, from the uppermost tip to half the depth. The lower half of the dorsal is spotted, continuing to streaks of rich red. The anal fin is similar in colour, bordered with yellow, but rounded. Indeed, a fish with plenty of colour, and this has proved to be most static; the fins are held erect at all times.

One drawback about this lively *Aphyosemion* is that it is rather shy at times and tends to hide, except when courting its less colourful mate.

There seems to be little feeding problem as the fish will take dried foods occasionally. To keep them in full breeding condition, live foods in some form or another should be offered, just as with all fishes intended for breeding. White worms, tubifex, daphnia and mosquito larvae are all taken with some relish. There is no need to feed too often—only about twice a week.

Many people seem to avoid keeping killies for the reason that reports have stated they will take only live food. Believe me, you name it—they will take it and thrive! However, for pairs in the breeding aquarium, mainly live foods should be used.

Small aquaria are all that are needed to breed this fish. A 12 in. by 8 in. by 8 in. tank without compost is best to use. It is equipped with nylon wool mops suspended from corks so that they can float, and it is also desirable to have one mop weighted at the tank bottom. *A. striatum* is classed in the killie world as a switch



Eggs viable on the extended finger of the hand on the left have been removed from the nylon mop, taken from the spawning tank, by the method described in the article

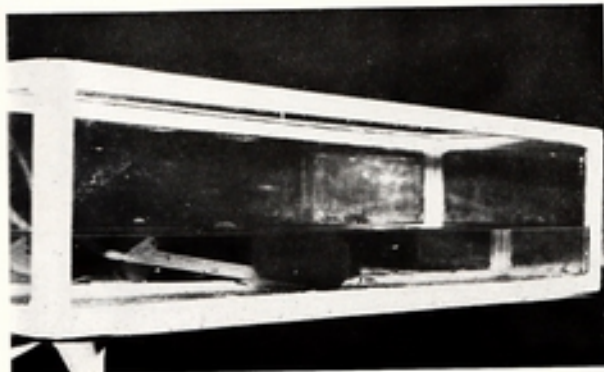
spawner, a term used for fishes that lay their adhesive eggs towards the surface of the plants or which can switch their tactics and spawn on the roots of plants or trees.

Eggs are laid over a period of days and they are quite large. Although many eggs are deposited the fish do have resting periods, i.e. a period of a weeks may pass in which no eggs are laid.

Some eggs may be deposited around the cork, others may be found on the ends of the nylon strands. The eggs are collected for incubation in separate containers.

Method of collection is quite simple if you have a gentle touch, so to speak (or why not get the wife to do it—they are supposed to be the gentle sex!). After the pair have been in the spawning aquarium 4 or 5 days the mops are taken out and gently squeezed to rid them of as much water as possible. By taking a strand at a time, with the thumb and forefinger run gently down the strand, the eggs can be felt; these are then taken from the material, to which they adhere by small hairs at each pole of an egg.

For hatching the eggs are placed in hard plastic boxes (sandwich boxes), closed with a lid for this helps with the incubation. Only about 1 in. depth of water is needed and this should be taken from the spawning aquarium. Water used for the breeding tanks can be around 50 to 80 parts per million hardness with a slight acid content (pH 6.4 to 6.8). On first collection the eggs are clear and then develop a spotted pattern until the eyes start to form. The full incubation period is 12 to



Shallow water is used in the growing-on tank because the fry are hatched in only 1 inch depth of water and need to become accustomed to greater depths gradually

14 days at 72°F (22°C). Higher temperatures delay hatching and may even stop pairs from spawning.

When the fry have hatched and are free-swimming they may be transferred at 3 days old to growing-on tanks. One word of warning here. As the fry have been hatched in only 1 in. depth of water, they must be transferred to shallow water for

growing on; 3 in. depth at the most is used for a few weeks until they grow stronger.

The fry are quite large and can take micro worms as a first food. Infusoria is not needed for this species. Later, brine shrimps can be given. Growth of the young fish is

slow compared with that of most *Aphyosemion* species and they start to show sex characters at around 4 months. This is probably why they are longer lived than most members of the genus.

This is a species well worth the trouble of breeding, if only to see an adult male in full courtship display flitting from one female to another.

MARINE FORUM



A brownish growth forms on the glass of my tropical marine tank. It looks horrible and I would like to know if conditions can be changed in any way to prevent its development.

The brownish growth you refer to is probably the result of a low redox-potential in the water. The easiest way to change conditions to prevent this is to introduce a supply of ozone into the tank. Although this growth may look unsightly, there is no doubt that it is quite harmless and will form a useful supplementary food for most of your marine fishes, especially the *Chaetodon* species. You may find that by altering the lighting the tank is receiving the brown growth will disappear of its own accord.

Your Marine Aquarium Queries Answered

What do you consider the optimum density for a marine tropical tank? Several books vary on their opinions about this matter. Will it affect my fish if I reduce the density below 1.023?

Many authorities differ about which is the optimum density to keep marine tropicals at, but the density selected will depend to a certain extent on whether you intend keeping marine fauna other than fishes in your aquarium. Most of the lower forms of marine life require a density of over 1.025. If, however, you were intending to keep only marine fishes, it is probably an advantage to keep the density as low as possible, say 1.021 to 1.023, as at this lower density most marine micro-organisms find it more difficult to survive—hence healthier fishes. Your marine fish (depending on species) should be able to have their water density reduced gradually to about 1.021-1.023.

I have just set up a nylon-coated 24 in. by 12 in. by 12 in. marine aquarium and intend to stock it with the following fishes: two domino damselfish, two blue yellow-tail damselfish, four percula clownfish and two neon fish. Will this be a peaceful community, or should I not keep these together?

Yes, your selection should make for a good community although you should make sure there are some hiding places in the tank, should any of your clowns or damselfish pester each other, as they occasionally do. Organ pipe coral can be cut quite easily and makes an excellent ready-made natural retreat.

Queries on marine aquarium topics from readers of PET-FISH MONTHLY are answered here by the Technical Panel of the Marine Study Aquatic Society of Great Britain by special arrangement.

Recently I obtained sea water from rock pools at Folkestone, East Cliff. The specific gravity of this was 1.016 (60°F), which is not dense enough to maintain tropical marines. Does the S.G. vary according to locality?

Specific gravity is liable to extreme variations in the oceans, and densities ranging between 1.010 and 1.040 have been known between places just a few miles apart. Do not keep tropical marines in native sea water. For a few shillings you can now purchase the latest synthetic sea water in packet form, which is much safer than using possibly polluted native sea water.

Anemones obtained locally have been eaten by my scat. Does this mean that they do not have stinging cells?

No. All anemones have stinging cells, and native ones probably have slightly more powerful ones than tropical marine species. Certain fish species, such as scats and Malayan angels however, seem to enjoy anemones as part of their wide range of possible foods.

British Crustaceans for the Marine Aquarium

By H. J. VOSPER

Crustaceans

IT is difficult to provide a generalised description of the Crustacea. They have a hard outer covering (the exoskeleton), mandibles and allied structures which act as jaws, and the legs show a great variety in number and arrangement but never match the three pairs of the insects, the four pairs of the spiders nor the numerous similar pairs of the centipedes and millipedes.

The body and limbs are divided into segments, those of the body (somites) being sometimes fused together, and each somite usually bears a pair of limbs. The body usually consists of the head and thorax contained within a single shield (carapace), but it must be noted that the terms head, thorax, abdomen etc. do not fulfil the same function as they do for insects or vertebrates.

Many and varied forms have evolved, for the Class contains such diverse creatures as lobsters, woodlice, daphnia, crabs and barnacles—to name only those with which the layman may be acquainted.

The group with which we are here concerned, the Decapoda (i.e. having 10 legs), is built on the general lines indicated, with a large carapace from which spring the walking legs and pincers plus a distinct posterior part (abdomen), which is clearly segmented and possesses segmental limbs known as swimmerets.



ALTHOUGH the freshwater aquarist who turns his attention to local marine life will consider the fishes to be the greatest attraction, the almost infinite variety and interest of other life forms inhabiting the ocean should also be turned to account in saltwater aquaria.

Of all the animals available for personal collection around our shores the fishes are perhaps the most difficult of access, whereas the larger crustaceans are the easiest to capture—apart from sedentary forms such as molluscs and anemones. To this it can be added that many members of the Class Crustacea are abundant, even if local, and take fairly readily to confined quarters, being hardy and able to accept meaty or fishy foods whether live or carrion. Most have a good tolerance for temperature and salinity changes and often show a comparatively high level of 'intelligence'.

Mating Behaviour

Amongst decapods the sexes are separate, a factor which is not constant in the Crustacea, and the chief external difference between the sexes lies in the comparative widths of the abdomen. In the photographs the narrowly pointed abdomen of a male swimming crab and the abdomen of the female common shore crab are shown.

The male produces sperm in a case or long tube which he places on to the female, there being a typical mating embrace (illustrated). The male inverts the female beneath his own body, she remaining quiescent and with the walking legs and pincers held closely bunched. After a while the female clasps the male at the edge of his carapace by means of the tips of her walking legs and then flexes her abdomen so that it stands away from her body at an angle of 90 degrees, whereupon the male inserts his own abdomen between that of the female and her body, the sexual processes being now in conjunction.

That the female is not entirely disinterested in this activity may be deduced from the firm grip which she will maintain should the pair be disturbed, for the male

Swimming crab (*Portunus depurator*). Note the narrowly pointed male abdomen bent permanently under the body and the paddle-shaped final segments of the last pair of walking legs. Segmentation of body and limbs is clearly shown.



Pair of common shore crabs (*Carcinus maenas*) in the mating embrace. The flexed condition of the abdomens is apparent and the broad abdomen of the female is shown. The pair are inverted for the purposes of photography.



Close view of the position of the abdomens of common shore crabs during mating. The flattened yet pointed character of the final pair of walking legs in this species is also shown. The female is considerably smaller than the male in this pair.



Common shore crab: the large and densely packed cluster of eggs is shown between the abdomen and the body of the crab. This cluster is attached to the swimmerets, the segmental limbs of the abdomen.

might walk and clamber for considerable distances before the linkage will be broken. If the pair become separated the female remains supine for a minute or two, yet it may be that the rather passive condition of the female is designed to avoid arousing antagonistic reflex actions in the normally bigger and stronger male, and consequently has little to do with her interest in the mating activity.

In the embrace illustrated the female gripped the male during the whole of the physical examination period (some 7-8 minutes) and the interlocked pair were under observation, either among rocks or in a tank, for nearly 35 minutes before the embrace was concluded.

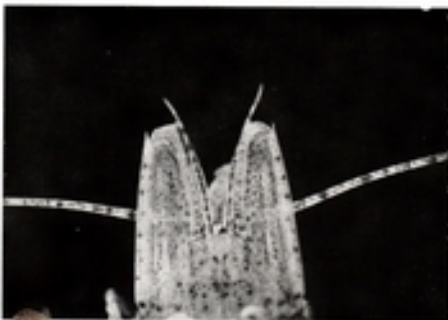
The eggs, once produced, are carried by the female by attachment to the swimmerets, in which condition the crab is said to be 'in berry'.

Development and Growth

In general, the larvae which emerge from the eggs do not resemble the adult form and several changes occur before that stage is reached, with growth taking place meantime. At length the animal settles down to its ultimate form of existence, which may be free-living, entirely sedentary or even parasitic, but growth still continues into maturity.

Owing to the presence of the hard exoskeleton, which is continuous over the entire surface (although thinner at the joints than elsewhere), the animals are forced to moult this tough covering to increase in size. In the crabs, a split appears just beneath the posterior edge of the carapace and through this the animal emerges, it being then quite soft and thus highly vulnerable. But within 2 or 3 hours it will have enlarged and thereafter the covering begins to harden. It appears that this hardening takes place in stages, complete firmness being established firstly at the defensive and feeding areas, such as on the inside of the pincers, then the jaws and so on.

Incidentally, I have met seashore fishermen who thought 'soft crabs' (which they used for bait) were a



Characteristic flattened processes extending forwards from the head, as well as the lack of a pointed rostrum jutting forward from the edge of the carapace, establish the fact that this is a shrimp (*Cragosus vulgaris*) and not a prawn. 'Prawns' are generally more common than 'shrimps'.

different species entirely from the 'hard crabs' they normally encountered.

Those decapods which might usefully be collected as prospective inhabitants of marine aquaria form two sections: Natantia (swimmers) and Reptantia (walkers). The differentiation lies not in whether or no the animals can progress by swimming but in what manner this activity is accomplished, for the Natantia use the swimmerets while those of the Reptantia that swim have lost this particular ability but regained their swimming powers by utilising some other organ. One method employs a widely spread tail fan, which, swung under the body with great force, thrusts the animal rapidly backwards at a speed which is quite astonishing.

This process, which is continuous, is that adopted by the galatheans and is an extension of the quick 'flips' made by Natantia such as prawns, whose true swimming method is by means of the swimmerets. Another development has been made by the portunid crabs, in which the final section of the last pair of walking legs has evolved into a flattened paddle, which, waved rapidly in a vertical direction, enables the creature to manoeuvre through the water in a remarkable and speedy fashion—this paddle limb is shown in the photograph of the male swimming crab.

Prawns and Shrimps

The decapod crustaceans of our shores appear to represent several evolutionary stages, from the typical Natantia (i.e. prawns etc.), through the lobster-kind and galatheans to the true crab-kind. The genera represented are not in the exact line of evolutionary

descent but their several body forms indicate the trends involved.

The shrimp forms of the Natantia are to be distinguished by the comparatively large size of the abdomen, which is symmetrical and not carried more or less permanently under the body. There are various subdivisions, based upon such factors as the number of pairs of walking legs armed with pincers and so on, but we are here concerned with the larger members known collectively, though unscientifically, as shrimps and prawns.

These are to be separated by the presence, in the prawns, of a definite toothed prong (rostrum) which juts forward from between the eyes. This rostrum is absent in the shrimps, which have instead two flatish processes.

Although some 15 species may be present around our coasts, only a few can be expected to be discovered and, for the differentiation between the majority, the reader is referred to Barrett & Young for their *GUIDE TO THE SEASHORE* (1958) is first class in most parts. Yet owing to the presence of immature specimens, plus damage to spines, rostrum and pincers etc., exact identifications are apt to be most difficult, indeed 'that way madness lies'.

We can note, however, that the common prawn (*Leander serratus*) grows to the largest size, with a body length of about 4 inches, while the rostrum provides a ready distinction between it and the common shrimp (*Cragston vulgaris*), with a body length of about 3 inches only.

In the next article reference will be made to commonly available members of the Reptantia, with notes on handling and keeping lobsters and crabs.

Guppy Comment

Continued from page 8

advised to purchase their stock from a dealer. While most of us have bought fish of one kind or another from a pet shop, it is hardly the place one would expect to find guppies of a particular strain!

There are exceptions, of course, but most dealers obtain their supplies of fish from various sources and have neither the space nor time to segregate the strains. All guppy breeders know how important it is for the beginner to keep the strains apart. How then can the beginner be expected to breed guppies successfully while these conditions prevail? One would be inclined to question the statement that F.G.A. members are quite happy with this state of affairs. Surely they should be more concerned with the idea of getting the law changed.

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There is no doubt that the visit to Britain by the Soviet Prime Minister was a visit of goodwill. If this spirit of goodwill could be extended by British guppy breeders to guppy breeders in the U.S.S.R., we may be able to exchange news, and could create a great deal of interest on both sides. We know there are numerous guppy breeders in East Germany, and that their fish compare very favourably with our own. Therefore it is not unreasonable to suppose that there are guppy breeders in the U.S.S.R. who would be pleased to swap experiences. If any reader can put us in contact with one or two Russian aquarists interested in guppies or have any news of them, we would be very pleased to hear from them.

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When last year's International Guppy Show was promoted it was

intended to invite American guppy breeders to exhibit their guppies. Some F.G.A. members objected on the grounds that some of our American friends use hormones in their breeding operations, and the invitations were not sent. This was a great pity as quite a number of F.G.A. members would have welcomed the opportunity of comparing our guppies with those from the U.S. It is to be hoped that these objections can be overcome, and that at this year's show we shall not only see and compare these controversial guppies, but also have the pleasure of meeting their owners.

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It is with the deepest regret I have to report the death of Henry England, one of the founder members of the Liverpool section of the F.G.A. Henry in his quiet unassuming way helped to build up the section to its present proportions. He will be sadly missed by all who knew him.



A small rock beauty, bright orange with a large black patch and blue eyes, starts to clean a blue surgeonfish which has solicited its attentions. The latter is sky blue with a yellow tail



A female bluehead wrasse, one of the most common types of cleaner fish in the Caribbean, starts work on a sponge held on the back of a crab. This female is bright yellow; the male gives them their name, being green with a blue head

Barbers of the Shallow

A PARTICULAR angelfish has long been known to the Mexican fisherman, working in the Gulf of California, as El Barbero, because they claim it cleans other fishes. It was not until 1928, however, that zoologists began to recognise not only that this claim was justified but that other fishes might also be carrying out similar functions, comparable with the tick bird cleaning the hide of the rhinoceros of its parasites, or the Egyptian plover taking leeches from the mouth of a crocodile. In that year William Beebe, while diving in the Gulf of Mexico, saw several small wrasses attending to a parrotfish, apparently cleaning it.

These were no more than early pointers to what is now known as a regular and widespread feature of the behaviour of marine fishes. The systematic study of cleaner fishes can be dated from 1949, when the American Conrad Limbaugh observed the phenomenon while skin-diving off the coast of California. His later studies of this subject have shown that there is nothing haphazard about the process. On the contrary, they reveal the very important part the cleaner fishes play in the economy of the oceans.

One of the early surprises came when cleaner fishes were filmed, a few years after Limbaugh had recorded his first observation. In the film one could see the cleaner fish at work on a much larger fish belonging to another species, systematically going over its body. Meanwhile, other members of the species to which the larger fish belonged were waiting their turn in a queue, reminiscent of the waiting customers at the barber's.

Cleaner fishes have been seen to pick off and eat any parasites as well as bacteria and fungi clinging to the surface of the body of their customers, to clean wounds

Opposite, left: a banded angelfish of the Caribbean is in aggressive display. However, when it draws near to a pistol shrimp (right) it relaxes into a quiescent attitude, as it stations itself to be tickled by the shrimp's antennae. The pistol shrimp is so named because of the sharp sound it makes by clicking its claws. It always lives beside a sea anemone, which is on the left of the picture

Great fleas have little fleas upon their backs to bite 'em: the author describes how the principle applies in the world of fishes

By Dr MAURICE BURTON

Seas

by eating the dead flesh around them, even to enter the gill-chambers and the mouth in their search. Moreover, as the cleaner moves towards one gill-cover the fish will raise it to let the cleaner in, then lift the gill-cover on the other side of its body when the cleaner moves over to inspect that gill-chamber.

A further feature of this cleaning work is that usually even a fish that preys on smaller fishes, of the size of the cleaner, will allow a cleaner to enter and leave its mouth unharmed.

There is an obvious benefit in this to both parties. The cleaner obtains food and the fish being cleaned is thereby protected from parasites and disease. When fishes that normally seek the attentions of cleaner fishes are placed in aquaria they soon begin to show signs of infestation by parasites and of disease until a cleaner fish is put in.

Just as the barber in human society has some means of attracting attention to his shop, traditionally by

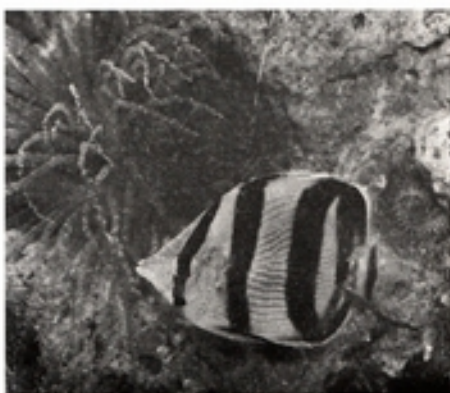
means of the multi-coloured pole, so the location of cleaner fishes is made obvious to fishes needing to be cleaned. To begin with the cleaner has its station, a particular crevice or other spot on a rocky or a coral reef. In addition, this spot is usually marked by a sea-anemone, a sponge, or some other sessile organism. And many cleaner fishes, especially in the tropics, have conspicuous colours or striking patterns as if drawing attention to themselves.

Inevitably, there are other fishes that exploit this situation, and one is reminded by their activities of the murderous activities of Sweeney Todd, the Demon Barber. These belong to species that mimic the colours, patterns, and habits of cleaner fishes, and when other fishes come to them to solicit their attentions they fall upon them and devour them.

Cleaning activities of a similar kind are performed also by a number of species of shrimp. These have been especially studied in the Gulf of California and in the Caribbean. These shrimps have unusually long antennae which are banded in different colours—once more recalling the barber's pole. Like the cleaner fishes, the cleaner shrimps take up station in a crevice or other precise location or live commensally with a sea-anemone or some other sessile animal. A fish approaching to be cleaned first ranges itself in front of the shrimp to be tickled by its antennae.

The cleaner shrimps will also perform their services on lobsters, which apparently, like the fishes, approach the shrimp's lair and solicit its attentions, coming away afterwards cleaned of parasites and looking spick-and-span. Even the fearsome moray eel will seek the ministrations of the cleaner shrimps, but with so large a body it requires more than one shrimp to do the work, so that we have the spectacle of the eel ensconced in a deep crevice with half-a-dozen shrimps walking over.

Quite remarkably, the presence of cleaner fishes can



influence the numbers of fishes in a given part of the sea. It has been found that when all the cleaners on a reef are removed as an experiment the shoals of fishes inhabiting that region migrate elsewhere: when the cleaners are put back the shoals return.

Some years ago it was found that dumping old cars into the sea to form a reef of wreckage off the Atlantic coast of Florida increased the numbers of fishes available to sport fishermen. It seems now that it was not so much the provision of nooks and crevices in which the fish could shelter that encouraged this abundance as the provision of places where cleaners could take up residence.

It is highly likely that cleaner fishes abound all over the world, although most of the information we have so far comes from studies made in the seas of tropical America. There is, however, a difference between cleaners in warm waters and those in temperate seas. The latter are less numerous, and they are also less obvious because they lack the brilliant colours and conspicuous patterns of the warm-water cleaners. Moreover, the temperate cleaners follow their 'customers' around instead of taking up station at a fixed spot.

A further interesting feature of this subject is that some fishes make relatively long journeys to be manured. Deep-sea fishes have, on occasion, been seen to come into shallow waters to be cleaned: the large ocean sunfish, with a body like a huge disc, has been seen to wander inshore where a small shoal of cleaner fishes have busied themselves over the surface of its body. Sharks also have been seen attended by groups of cleaners, which not only quarter their bodies but enter

their gills or even go into their mouths with impunity.

In some species it is only the young fishes that indulge in this practice, the parasites forming, apparently, an infant diet which is replaced by other methods of feeding as the fishes become adult. In many other species, by contrast, this is the main source of food throughout life. Correlated with these feeding habits, they have narrow or pointed snouts and tweezer-like teeth particularly suitable for extracting parasites from tiny crevices in their customer's skin.

It is easy enough to see why the cleaner should play its part—hunger provides a strong impulse for this. It is less easy to see what actuates the fish. We cannot suppose it says to itself: 'I'm lousy. I must get cleaned up'.

Perhaps, as so often happens, an abnormal situation helps to explain the normal. Off Barbados is a pistol shrimp which always lives beside a particular species of sea-anemone, yet is not a cleaner. Banded angelfish present themselves at what must look to them like a cleaning station and they so range themselves in front of the shrimp's antennae that they are tickled by them and apparently find something pleasurable in this. Presumably therefore they enjoy the sensation, and this no doubt is what draws them to the spot, guided by the combination of anemone and shrimp. Were the shrimp a cleaner the fish would enjoy its visit and also be relieved of its parasites. Since the shrimp is not a cleaner the fish merely enjoys the visit.

(Published by arrangement with THE ILLUSTRATED LONDON NEWS)

What's New?

Water Hardness Test Kit

A SIMPLE Water Hardness Test Kit by Rila provides three plastic containers of reagents (two liquids, one solid) and a test tube in a neat plastic case. Basis of the test is a count of the number of drops of one of the liquids required to develop a blue colour in the sample of water mixed first with the other two reagents.

Each drop required indicates a hardness of 10 parts per million and

the instructions give the conversion numbers needed to express the hardness in either grains per U.S. gallon or German DH. The complete kit costs 20s and refills for the reagents are available.

Marine Accessories

MARINE aquarium-keepers are beginning to have their specialised requirements for equipment met by manufacturers. In the Rila range there is a **Saltwater pH Test Kit**, which provides an indicator liquid capable of giving sharp colour changes when added to sea water in the range pH 7.5 to 9.0. Colour developed when four drops of the indicator are mixed with a sample of the aquarium sea water placed in a tube supplied can be read off as pH values from the Kit's colour chart. Price is 20s complete (16s for a replacement squeeze dropper bottle of the indicator). There is also a

Freshwater Test Kit by the same manufacturer, consisting of a bottle of solid bromothymol blue, measuring spoon and test tube, with colour chart and instructions (price 7s complete).

A **Combined Hydrometer and Thermometer** is an instrument likely to appeal to the keeper of tropical marines. The thermometer (red spirit scale) is included in the base of the hydrometer, total length of the whole instrument being 7½ inches. The value 1.025 is clearly marked in red on the hydrometer scale. Price is 12s 9d. This and the Rila products are distributed to dealers by South Coast Aquatic Nurseries Ltd.

Tubed Aquatic Food

'FROST-fresh aquatic food preserve' is how the makers describe the

Continued on page 25

How to Grow



Water Lilies

IN spite of their exquisite appearance, water lilies are the most obliging of plants. Extremely hardy, their blooms show a wide range of colours, appearing throughout the summer from May to October, and it is possible to obtain a lily entirely suited to the requirements of the individual pool from dwarf varieties that grow in as little as 6 in. of water to the really strong-growing ones that will grow in anything up to a depth of 3 ft.

It is important to consider this requirement of depth rather carefully when choosing your plant, however, and to remember that in general the stronger growing varieties produce leaves of a very large span. A vigorous grower that should only grace a really large deep pond will grow in a small pond—and grow and grow—until its leaves cover the entire water surface. While the water-lily leaf gives a welcome shade, too much leaf growth is unsightly; it also cuts off all the light required by the submerged oxygenating plants and prevents its own satisfactory flowering. The deeper-growing varieties produce leaf spreads up to 3 ft. across, compared with the 18 in. span of the dwarfs.

The lily can be planted directly into the bottom of the pool, but the

more usual procedure nowadays is to use a planting crate, a plastic container that makes for ease of lifting and also controls the root growth, while allowing, through its openwork lattice design, full circulation of water around the plant. Lilies are not too fussy about soil conditions but for maximum growth a fairly heavy loamy clay medium should be used for planting, packed down hard and topped with a layer of gravel to prevent disturbance of the surface soil.

Lilies require a good deal of nourishment and growers are usually enjoined to mix one part of old cow manure to six parts of loam. Such an instruction usually produces a state of nervous tension in the town dweller (not relieved by the added information that horse, pig or poultry manure will not do). And it is true that many synthetic fertilisers are also unsuitable. Coarse bone meal and dried blood are very good additives to loam. The planted lily should be placed just below the water surface. With plants that are to grow ultimately in several feet of water, this can best be done by placing the basket on a loose brick structure from which the bricks can be removed one by one as the plant grows.

The nourishment required by

lilies tends to become exhausted after 3 or 4 years, particularly when they are planted in baskets. Lack of sufficient nourishment begins to show in the quality of the flowers produced, which get fewer and smaller, and the leaf formation becomes deformed. It is as well to lift the plants then, in May or early June, to split up the root and retain just a couple of strong shoots with several inches of rhizome attached.

Do not expect the plant to reach its full beauty in its first season. When properly established the lily should produce an abundance of flowers from the end of May throughout the summer, and although each bloom is short-lived, another bud is always there to take its place. Lilies thrive in sunshine and will not do so well in a heavily shaded pond, but during a warm sunny summer will give anything up to 50 or more blooms.

The growers' lists of available plants read like pages from some tale of the Arabian Nights—*Nymphaea collosa*—enormous pale pink blooms, very free flowering; *N. gloriosa*—glorious crimson cerise; *N. James Breydon*—rich rose-red cup-shaped blooms—and choice must depend on the purchaser's own pond requirements and colour preference,

but these are some well-established favourites:

Water depth 12-18 in.: *N. candida* (small starry white blooms), *N. froebelii* (rich wine-red blooms), *N. graziella* (coppery orange), *N.*

sieur (yellow turning to reddish copper, mottled foliage).

Water depth 18-24 in.: *N. caroliniana* (blush pink, strongly scented, coppery foliage), *N. Firecrest* (deep pink with orange stamens),

N. William Falconer (deep ruby-red with golden anthers).

Water depth over 2 ft.: *N. marliacea albida* (large fragrant pure white flowers), *N. Attraction* (deep garnet-red with white petal tips); *N. massinello* (large peony-shaped rich rose blooms).

Plants for the Water-Gardener

Name	Comments	Flowering season
SUBMERGED PLANTS		
Canadian pond weed <i>Elodea canadensis</i>	Excellent oxygenating plant. Grows vigorously and needs controlling. Plant in bunches in deeper water	Growing season, spring and summer
Milfoil <i>Myriophyllum verticillatum</i>	Fine divided leaves growing in whorls. Good oxygenating plant and provider of cover during spawning time	Growing season, summer
Water crowfoot <i>Ranunculus aquatilis</i>	Surface leaves differ from submerged ones. Plant in shallower water	June-July. Small white flowers
FLOATING PLANTS		
Fairy moss <i>Azolla caroliniana</i>	Gives a very pretty carpet-like effect. Moss-green colour turning reddish in autumn. Dies away in winter to reappear next spring	
Water hyacinth <i>Eichhornia crassipes major</i>	Only semi-hardy in this country. During winter should be planted in a pot, kept moist and away from frost. Can be floated mid-May. Glossy green foliage with stems like bladders that keep plant afloat. Long purplish roots in which fish spawn	June-September. Delicate pale violet-pink blossoms on spikes. Each separate bloom very short-lived
Frogbit <i>Hydrocharis morsus-ranae</i>	Likes fairly shallow water and sun. Multiplies quite quickly by buds at end of runners. Buds drop off in autumn, sink to bottom, reappear in spring	June and July. Little white flowers
Water soldier <i>Stratiotes aloides</i>	Pale to dark-green or reddish leaves, very elongated and sharply pointed. An interesting plant, it disappears to bottom of pond during winter and after flowering. Appears at surface in midsummer to flower and again in August with side shoots that break off and form separate plants	June and July. White flowers
MARGINALS		
Water forget-me-not <i>Myosotis palustris</i>	Plant in 1-3 in. water. Likes medium amount of sun, some shade	May-June. Small blue flowers. Height, 9-12 in.

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Bog bean

Menyanthes trifoliata

Olive-green smooth leaves. Plant in up to 6 in. water

May-June. Scented pink and white flowers. Height to 9 in.

Arrowhead

Sagittaria sagittifolia

Plant from 3 to 18 in. water. Very hardy, needs controlling

June-July. White flower, dark purplish centre. Height, 1-2 ft.

Water mint

Mentha aquatica

Plant in shallow water. Likes plenty of direct sunlight. Aromatic blue-green leaves. Strong grower, needs controlling

July-September. Heads of lilac flowers. Height, over 1 ft.

Marsh marigold or kingcup

Caltha palustris

Plant in 1-3 in. or at water's edge

Early flowering, April-May. Bright golden flowers. Other varieties include alba with white flowers and the giant *Caltha polypetala* (2 ft.). Height, 9-18 in.

Pickereel weed

Pontederia cordata

Plant in 2-3 in. water. Dark green spear-shaped leaves. Likes full sun

July-August. Blue flowers, Height, 2 ft.

Sweet scented rush

Acorus calamus

Plant in up to 6 in. water. Sword-shaped leaves. Var. variegatus has green and white striped leaves

June-July. Small green-yellow flowers. Height, 2 ft.

Bulrush (correctly reed mace)

Typha

Plant in up to 3 in. water. Grass-like leaves. Dwarf variety *minima*

July-August. Flower spikes. Height from 1½-4 ft. depending on variety.

Transatlantic TOPICS

LOOK out Loch Ness, you have a rival 'monster'. It was first sighted by the two-man crew of the submarine 'Deepstar' in a deeply submerged valley known as the San Diego Trough near the Pacific islands of Los Coronados. The observers saw an enormous shadow 'fish', 30 feet long and with eyes like dinner plates; the tail was described as being 5 feet high. Fearing that their sighting would be taken as yet another 'fisherman's tale', they said nothing. Two days later the matter was taken out of their hands when scientists from the Scripps Oceanographic Institute photographing in

the same area also saw the monster and what's more obtained pictures. They believe it to be an oversize version of a sleeper shark. If I was ever unfortunate enough to meet up with this creature I hope it would be ASLEEP!

Moving house is difficult enough but when that includes all the paraphernalia of the hobby, tanks, fish etc., moving assumes the rank of Exodus. American hobbyists can take comfort in the fact that the cost of moving their set-ups can be deducted from their income tax.

I hope a certain Englishman by the name of Callaghan reads PFM?

Short of plants? Or are those available too costly for your budget? Then the next time you have grapefruit for breakfast save the seeds and plant them in a shallow pot filled with soil. When the plants are about 2 in. high, remove them gently from the pot, wash the soil away from the roots carefully and re-plant them in the compost of your aquarium. The adult plant has dark green leaves not unlike *Ludwigia mulleri* in appearance. If your plant is thriving it should grow about an inch per month in the tank.

J.K.

What's New?

Continued from page 22

new **TetraMin Tube Food 66**. It is intended to be used as a complementary food to dry foods to give variety to the diet of aquarium tropical fishes. Ingredients are derived from animal sources in the main and the mixture is squeezed

from its toothpaste-type of tube container at feeding time. The tube holds 1 ounce and its price is 3s 3d.

Garden Lighting

LIGHTING the garden at night is something that has grown in popularity with the advent of out-of-doors parties and barbecues. A set of 20 coloured lamps specially designed for this purpose is now

available in the Philips **Fiesta Lamps**. These are set in rubber moulded lamp-holders forming an integral part of the 17 ft. length of flexible cable that can be suspended in trees or on trelliswork. In the vicinity of a pond this lighting gives particularly attractive effects in the reflections obtained from the water. Price is £2 19s 6d the set and spare lamps are 1s 2d each. Highland Water Gardens are offering these as part of their range of water-gardening accessories.



THE MAIN item for discussion at the A.G.M. of the **EASTBOURNE A.S.** was the very unusual one of the taking over by the society of the local public aquarium, the Blue Grotto. This contains 16 tanks (the largest being 12 ft. by 6 ft.), and the problems that this venture would bring, together with the conversion and decoration of the club's new meeting room supplied by the management of the Blue Grotto, invoked a great deal of discussion. It is hoped that, with keen aquarists running the aquarium, it will be a great attraction to all visiting fishkeepers. The society plans to put on a really fine display of coldwater, tropical and marine fishes, and also to run Aquatic Study classes for the local schools.

The president's report on the first 12 months' progress of the club was very encouraging with 22 paid-up members and several newcomers to join. Officers elected were: president, Mr M. Saunders; vice-president, Mr E. Meredith; treasurer, Mr M. Ruddman; secretary, Mr C. George (6 Hurst Road, Eastbourne, Sussex); show secretary, Mr R. Rogers; committee, Mr A. Clark and Mr J. Lane. The club meets twice monthly and full details can be obtained from the secretary. Local fishkeepers who are interested can be assured of a warm welcome and a very interesting year ahead of them.

HOUNSLOW & D. A.S. are still enjoying a very successful year culminating in their winning the A.S.L.A.S. Knock-out Trophy for the second year running. The final with **KINGSTON & D. A.S.** was a very lively affair that resulted in a win for Hounslow by 849 points to 834. Judges were Mr Kemp and Mr Thomas and results were: 1, Mr R. Biggs (Kingston, *Rasbora jacobsoni*, 75 pts); 2, Mr D. Woodward (Hounslow, chequer barb, 74 pts); 3, Miss P. Greenhalf (Kingston, *Platy variatus*, 73½ pts); 4, Mr D. Love (Hounslow, combtail, 73 pts). During the evening an interesting talk on various aspects of the hobby was given by the chairman of A.S.L.A.S., Mr John Thorne, and Mr Dave Ellis of Kingston A.S. conducted a lively auction of surplus tanks.

Table shows have been getting better and better support. Recent results have been: characins: 1,

Mr John Thorne (78 pts); 2, Mr Alec Hastings (77½ pts); 3, Mr Alan Fleming (77 pts). Cichlids: 1, Mr Barry Abbot (79 pts); 2, Mr Jackie Chandler (78 pts); 3, Mr John Thorne (77½ pts). A.o.v. tropical fish: 1, Mr Keith Mason (79 pts); 2, Mr Keith Mason (78 pts); 3, Mr Christopher Bunce (77 pts). Labyrinths: 1, Mr Dave Love (82 pts); 2 (joint), Mr Dave Love, Mr John Thorne (81 pts); 3, Mrs Brewer (78 pts).

SOUTHEND, LEIGH & D. A.S. would like to inform all aquarists in their area that they are now using a new meeting place at St Andrews Church Hall, Westborough Road, Westcliff-on-Sea, Essex. Cups competed for during 1966 were recently awarded to: Southchurch cup (highest points table shows), Mr B. Dunn; Brookes shield (mini-tank), Mr E.

Local clubs are asked by **WARRINGTON A.S.** to note that Mr Norman Mason-Smith from Cambridge is giving one of his extremely popular aquatic film shows on 11th April. The society has again hired a room at the local Railway Social Club. Donations will be 2/- only. Tickets and programmes are available and clubs interested should contact secretary Mr Ron Tench (288 Manchester Road, Warrington, phone Warrington 31635). Mr Tench tells us that attendance will be restricted to 250 so don't delay in booking your place.

Thompson; Brookes shield II (second mini-tank), Mr P. F. Capon; Giles cup (third mini-tank), Mr J. Baron; Barnes-Oak cup (breeders egg-layers), Mr B. Dunn, who also won the Coonation cup for breeders livebearers; Jones cup (best fish of the year), Mr A. J. Mason; Duboisson cup (best black widow), Mr P. F. Capon. The Saunders cup has also to be awarded from among members not having achieved a first prize in 1966.

Talks by Mr Capon and Mr Cheswright on rasboras, danios and white clouds and by Mr V. C. Pickett on electrical wiring for the aquarium have recently been enjoyed. Winners of the table show for danios, rasboras and white clouds were: 1, Mr D. Cheswright (white cloud); 2, Mr C. Ward (sorrentail); 3, Mr D. Cheswright (*Rasbora hetergeli*); 4, Mr E. Thompson (*Brachydans affolimatus*). New members can be assured of interesting meetings and can obtain details of membership from the secretary,

Mr M. J. Willis (17 Arundel Gardens, Westcliff, Essex).

A PAID-UP membership of over 50 has enabled the newly formed **BEDWORTH AQUARIST & POOL SOCIETY** to start on a sound financial footing. It is planned to use the money to buy equipment for the club and £10 has been allotted to start a library, which is being added to by book donations from members. As many of the members are beginners at fishkeeping, it is intended that these shall be specifically catered for with lectures on the fundamentals of the hobby, as well as talks on more advanced aspects of it. At the two general meetings already held slide lectures, loaned by **RUGBY A.S.** and entitled 'Setting Up an Aquarium' and 'Aquatic Plants', have been shown.

At the inaugural meeting the following officers were elected: president, Mr R. Mayer; chairman, Mr K. Jones; vice-chairman, Mrs M. Simpson; secretary, Mr D. Delves (47 Mill Farm Caravan Site, Marston Jabbett, Nuneaton); assistant secretary, Mr W. Bromage; treasurer, Mr R. Zedds; show secretary, Mr B. Scally; assistant show secretary, Mr J. Vaughan; librarian, Mr H. Coombes; publicity officer, Mr R. Shakespeare (9 Rugby Road, Bulkington, Nuneaton). All fishkeepers in the Bedworth area are invited to join in and attend meetings.

GUEST speaker at **LYTHAM A.S.** January meeting was Jim Kelly, who gave an informative and enthralling talk illustrated with colour slides of his tour of America to an audience of 65 members and friends from societies from as far afield as Ellesmere Port, Lancaster and Blackpool. The question put after the talk provoked many interesting discussions. One particularly important point made by the speaker was that any society was only as strong as its members and that it was therefore up to all members to take an active part and not leave it all to the officers.

The table show at this meeting, for guppies (male) and rasboras attracted a good entry. The judge was Brian Simmonds of the Blackpool Society, who gave a short talk on the quality of the entries. Results were: Guppies: 1, Eric Smith; 2 and 3, Colin Langridge. Rasboras: 1, Colin Langridge; 2, Shirley Matthews; 3, William C. Matthews.

New members will be made most welcome at meetings held on the



Smiling faces of the Tottenham & D. A.S. indicate the success of their Haringey Tropical Fish Show held in March. Prizes and awards were presented by the Deputy Mayor of Haringey (right). There were over 400 entries and more than 1000 people attended during the afternoon. Full results will be given in PFM next month



first and third Wednesdays in the month at the Church Hall, Albert Street, Lytham at 7.30 p.m. Further details from the secretary, Mr William C. Matthews, 42 Dodney Drive, Lea, Nr Preston (Preston 26549).

Results of the home furnished aquarium competition were: seniors: 1, Myra Matthews; 2, Bill Matthews; 3 (joint), Keith Willett and Don Thomson. Juniors: 1, Wendy Farr; 2, Shirley J. Matthews; 3, Susan and Linda Thompson.

FIRST HONOURS in **MIXENDEN T.F.S.** challenge match with **KEIGHLEY A.S.** went to the home team with 38 points to Keighley's 32. The best in show was won by Mr M. Stray with a red-tailed black shark. Meetings are held every two weeks at the Mixenden Community Centre, Clough Lane, Mixenden. The secretary, Mr J. H. Brown (9 Clough Bank, Mixenden, Halifax, Yorks.) will be pleased to give further details to any fishkeeper in the area. Other officers elected at the A.G.M. are: chairman, Mr S. Leedham; treasurer, Mr B. Winters; show secretary, Mr L. Thompson and librarian, Mr G. Garforth. At

The invaluable assistance of the ladies often tends to get restricted in our hobby to the tea-making side of things at club functions. Now Mrs Joyce K. Smith has changed all that. She has been elected the new chairman of LEAMINGTON & D A.S. and we wish her a most successful term of office.

this meeting also the Baldwin Trophy was presented to Mrs F. Thompson for receiving the highest number of points at table shows throughout the year.

WIMBLEDON & MERTON A.C. are going all out this year to raise funds and to widen club activities by holding more inter-club and club table shows and more lectures. The new show secretary, Mr J. Elliot (127 Pelham Road, Wimbledon, London, S.W.19), would be glad to hear from fellow show secretaries of clubs within easy travelling distance of Wimbledon with a view to arranging interclub shows; the secretary, Mr J. Garbutt, 82 Cecil Road, London, S.W.19 (phone 01-540 1263), would be glad to receive the names and addresses of lecturers on all aspects of the hobby. Club meetings are held at Holy Trinity Hall, The Broadway, Wimbledon, on the first and third Thursday of each month at 7.30 p.m.

THIS YEAR UXBRIDGE & D. A.S. celebrate 21 years of expanding activities and hope for even better things to come. The reports of the chairman and secretary at the A.G.M. spoke of well-supported club activities, a membership of 85, a record number of table show entries from members in 1966 and a sound financial position. The last-named had been achieved partly by a subscription increase but the extra monies gained had been put to good use to increase library stock and purchase a slide projector and screen. Club officers chosen for the year are: chairman, Mr H. Moore; secretary, Mr R. Foeder (2 Field Heath Lane, Uxbridge, Middlesex); assistant sec-

retary, Mr C. Funnell; show secretary, Mr P. Ginger (2 Clovelly Avenue, Ickenham, Uxbridge); asst. show secretary, Mr N. V. Lee; treasurer, Mr J. Peters.

Club trophies were presented to Mr J. Summers for gaining most points throughout the year (80) (2, Mr D. Brunson, 32 pts; 3, Mr D. Tovell, 11 pts). The plaque for breeders egglayers went to Mr J. Peters and Mr Fitzwalter won the breeders livebearer class. The home furnished aquarium competition was won by Mr Parker (2, Mr Thompson and 3, Mr R. Foeder). Pairs class winner was Mr McGaw.

A judges' instruction class is to be arranged for the early summer, by the MIDLAND ASSOCIATION OF AQUARISTS' SOCIETIES. The venue will be announced in due course. Any aquarist can join in.

A NEW class of membership, that of fellow, to the **DUDLEY & D. A.S.** allows an ordinary member, on payment of an extra fee, to exhibit at club table shows without payment of an entrance fee and to make free use of the library. The club reports with pleasure that Mr Grace, managing director of Dudley Zoo, has accepted their invitation to become president of the society.

Recent table show results are: true pairs, egglayers experienced: 1, Mr J. Vickery (yellow rasbora, 72 pts); 2, Mr N. Newman (giant danio, 70 pts); 3, Mr G. Rothin (kissing gourami, 68 pts). True pairs, livebearers experienced: 1, Mr G. Rothin (velifera mollie, 77 pts); 2, Mrs Croft (tuxedo swords, 72 pts);

3, Mr D. Frost (green swords, 69 pts). True pairs, egg-layers novice: 1, Mr Ford (bronze catfish, 70 pts); 2, Miss I. Bull (flame tetras, 68 pts); 3, Miss S. Bull (bleeding-heart tetras, 66 pts). True pairs, livebearers novice: 1, Mr R. Newman (red swords, 72½ pts); 2, Mrs G. Smith (red swords, 72 pts); 3, Mr R. Dickson (red swords, 71 pts). The special award for the experienced class was won by Mr G. Rothin, and that for the novice class by Mr R. Newman.

DURING THE INTERVAL of the **HARLOW A.S.** first social and dance the annual prizes were presented by Mr J. Colman, chairman of **ENFIELD A.S.**, to the following: home furnished aquaria cup Mr J. Soanes (silver medal for second place to Mrs V. Duncan and the bronze medals for third and fourth places to Mr G. Larwell and Mr M. Panton). The table show trophy went to Mr R. Kerridge (silver medal for second to Mr J. Soanes, bronze medal to Mr M. Panton). The breeders cup was presented to Mr J. Soanes and the black widow trophy to Mr R. Kerridge.

At the club's A.G.M. officers elected were: chairman, Mr J. Soanes; vice-chairman, Mr R. Oliver; secretary, Mr J. Duncan (28 Long House, Bush Fair, Harlow, Essex); show secretary, Mr R. Kerridge; auditor, Mr J. Shine; public relations officer, Mr J. Jarvis.

A PEA AND PIE SUPPER is one way members of **AIREBOROUGH & D. A.S.** ensure friendly and welcoming club nights. On this occasion there was also a 'Take Your Pick' quiz when volunteers (?) from the audience were required to answer three questions correctly to gain a prize of fish food or equipment.

To try to dispel some of the apparent misconceptions currently found in the field of marine fishkeeping, the Marine Study Aquatic Society of Great Britain proposes to offer a slide lecture, for expenses only, to all societies, on the modern advances that have been made. This service will initially be restricted to societies in and around the London area but it is hoped to enlarge this field of activities shortly. Those who would be interested in making use of this offer should contact the general secretary, Mr T. R. Hall, for further details (23 Cranfield Gardens, Hampstead, London, N.W.6).

AT the February meeting of the **LIVERPOOL** section of the **FANCY GUPPY ASSOCIATION** 45 really top-top fish were entered for the table show. The competition was so keen in some classes that the judge, Leslie Peet, had a difficult task placing the cards. A lecture by Roy Holt on guppy breeding for the beginner and a demonstration of Gro-lux lighting by Allan Smith evoked a great deal of interest.

The treasurer reported, with great regret, the untimely death of Mr Henry England, one of the founder members of the section and members' representative, who will be greatly missed.

LEAMINGTON & D. A.S. recorded a most satisfactory year during their A.G.M. More members, more fish at shows, more money! The new committee is: chairman, Mrs J. K. Smith; secretary, Mrs S. D. Underwood (22 Westlea Road, Leamington); treasurer, Mr P. Thomas; show secretary, Mr F. Underwood; asst. show secretary, Mr T. Dobson; newsletter editor, Mr D. G. D. Lucas; committee member, Mrs C. Beard. Trophy winners were also announced at this meeting: Member of the year: 1, Mr F. Underwood (82 pts); 2, Mr T. Dobson (80 pts); 3, Mr D. Lucas (72 pts); 4, Mrs F. Edden (66 pts). Show trophy: 1, Mr T. Dobson (126 pts); 2, Mr F. Underwood (110 pts); 3, Mr D. Lucas (84 pts); 4, Mrs F. Edden (83 pts). Breeders trophy: 1, Mrs F. Edden (16 pts); 2, Mr F. Underwood (15 pts); 3, Mr J. Beard (6 pts); 4, Mr K. Russell (6 pts). Furnished home aquaria: Mrs J. K. Smith; breeders egg-layers, Mr K. Russell; breeders livebearers, Mr F. Underwood; furnished jar, Mr F. Underwood.

YORK & D. A.S. table show results for livebearers and a.v. single fish were: open class, section 1, livebearers: 1, Mr Pygott (yellow wagtail platy); 2, Mr Cooper (black swordtail); 3, Mr Parlebean (green swordtail); Mr P. Carey (red swordtail). Novice class, a.v. single fish: 1, Mr Dearing (*C. aeneus*); 2, Mr P. Carey (tiger barb); 3, Mr Plows (three-spot gourami); 4, Mr Dearing (paradise fish).

MEDWAY A.S. held an inter-club show at the end of February with guest clubs **ERITH**, **CANTERBURY**, **SITTINGBOURNE** and two new clubs, **MALESTONE** and **NORTH KENT**. There were 140 people present, the largest gathering yet at the society's new meeting place, Dane Court School, Gillingham. A talk on ponds and water

*So well did the councillor for the defence (Mr Dave Baker) and the councillor for the prosecution (Mr Eric Smith) present their cases that the **LYTHAM A.S.** jury at their recent 'Perry Mason' night were equally divided on the subject of the guilt involved in the keeping of cold-water fish to the detriment of tropicals. The judge, Mr Eddie Cronther, ruled that the coldwater species be acquitted and that both species should be kept in harmony in the future. Oscars for performances were awarded all round.*

lilies from an expert, Mr N. Bennett from Weymouth, preceded the table show, at which 87 fishes were benched. The catfish class held a surprise for the judge, Mr G. H. Jennings, who came across a *Chuchus chucha* owned by Medway's show secretary. A demonstration of this fish's docility and ability to live out of water for a short period was given. Best fish in the show was a large female red platy owned by Mr P. Christian of Sittingbourne. A very full programme is planned for the rest of 1967, and new members would be welcomed. Further information can be obtained from Mr D. Brown, secretary (5 Allison Avenue, Gillingham, Kent).

FISH HOUSE construction should present no problems to members of **BRADFORD & D. A.S.** in future. Club meetings in February dealt fully with the subject. At one, Mr H. Foden from Huddersfield described the conversion of his integral garage into a new fish house, and a splendid place it is! At a second meeting, Mr Lawrie Haley spoke on 'How I first started keeping tropical fish', which gradually worked its way round to a discussion on the why and wherefores of fishhouse construction, with all sorts of ideas on the subject being put forward by members present. The results of the table show at the first meeting, judged by Mr Winterburn, were: livebearers: 1, Master J. Brown (male guppy); 2, Mr R. Smith (wagtail female); 3, Mr D. Parkin (black mollie). A.o.v.: 1, Mr A. Healey (glass catfish); 2, Mr K. Williams (red-tailed black shark); 3, Mr G. Orchard (blue gourami).

TABLE show results for Scott trophy—characins A, B, and C—at the **DUNDEE A.S.** meeting were: characins A: 1, Mr R. Brown; 2, Mr W. Carstairs; 3 and 4, Mr G. Reid. Characins B: 1, Mr A. Insch;

chairman, Mr V. Hunt; treasurer, Mr M. Mason; secretary, Mr S. D. Forse (118 Cuthbert Road, Fratton, Portsmouth); show secretary, Mr W. Ryder; committee, Mr M. Marks, Miss W. Ryder, Miss M. Webb.

... **WINNERS** of the February table show held by **LEEDS & D. A.S.** were: Marney trophy (guppies): 1, Master S. McCourt; 2, Mr G. Orchard; 3, Mrs P. McCourt. Society plaque (catfish and loach): 1, 2 and 3, Mr K. J. Bateman. At this meeting Mr W. Emmett of Swillington gave a most instructive talk and demonstration on 'Filtration'.

... **NEW** headquarters are announced for **YATE & D. A.S.** Meetings are now held at the White Lion Hotel, Yate, at 7.30 p.m. on the first Monday of each month. New members will be made very welcome and should apply to the secretary, Mr M. Pegler (82 Highworth Crescent, Yate, Glos.), for further details.

... **RIVERSIDE A.S.** re-elected Mr F. Sanders as chairman at their A.G.M. Mr C. F. Backland (4 Flora Gardens, Hammersmith, London, W.6) was re-elected secretary (phone RIV 9380) and Mr R. Sibbons was elected show secretary.

... **MIDLAND ASSOCIATION OF AQUARISTS' SOCIETIES.** elected the following officers for 1967: chairman, Mr T. L. Dodge; secretary, Mr A. E. Allsopp (50 Cubley Road, Hall Green, Birmingham, 28); treasurer, Mrs W. Edden; services secretary, Mr W. Edden (18 Coppice Road, Whitnash, Leamington Spa); judges panel convenor, Mr D. Emery (61 Cobham Road, Halesowen).

... **100 MEETINGS** were celebrated by **TIPTON & D. A.S.** by a social evening at their headquarters at the Leopard Inn, Great Bridge, Tipton, Staffs. New members and visitors are always welcome and the assistant secretary, Mr F. Schofield (21 Amberly Way, Streetly, Staffs.) can supply any other information required.

... **CLUB officials for 1967-68** elected by **WEYMOUTH & D. A.S.** are: chairman, Mr D. Rogers; secretary, Mr C. Eason (Ivy Bank, The Grove, Portland); treasurer, Mrs D. Rogers; committee, Mrs Massey, Mr Hatton, Mr Ware, Mr Rawlinson, Mr Cox, Mr Hobbs, Mr Studley. New members are welcomed at club meetings at the Labour Hall, Park Street, Weymouth on the first Tuesday of each month. Mr F. Brown of Bristol and Mr V. Capaldi of Bristol will give lectures

in April and May respectively and an annual show is planned on a date in September at the Labour Hall.

... **DERBY REGENT A.S.** meet on the last Thursday in each month at the Engineers Club, Osmaston Road, Derby and welcome new members. Further information from secretary Mr T. Jerram (36 Almond Street, Derby). Other officials elected at the club's recent A.G.M. were: president, Mr K. Hallam; chairman, Mr T. Ridgeway; vice-chairman, Mr Witney; assistant secretary, Mr P. Kenderick; treasurer, Mrs R. Hallam; show secretary, Mr A. Widdowson; librarian, Mr Morely; committee, Mr Stanton, Mr Hazeldine, Mrs Elliott.

... **10 NEW MEMBERS** were welcomed into the **PONTEFRAC T & D. A.S.** at its February meeting, when all present greatly enjoyed the lecture given by Mr K. Barraclough, who also judged the table show. Results were: Fighters: 1, Mr B. Cohen; 2, Mr D. Cohen; 3, Mr T. Tranter. Anabantids: 1, Mr J. Thompson; 2, Mr D. Cohen; 3, Mr

B. Cohen. Three-in-a-jar: 1, Mr B. Cohen; 2, Mr J. Thompson; 3, Mr T. Tranter.

... **A NEW** society has been formed in North Wales—the **BANGOR & D. A.S.** Meetings are held at the Penguin Café and at the first meeting the following officers were elected: chairman, Mr F. Gorton; vice-chairman, Mr K. Williams; treasurer, Mr S. C. Antoniazzi; secretary, Mr I. L. Thomas.

... **37 ENTHUSIASTIC** fish-keepers attended the inaugural meeting of the **NORTH KENT AQUARIST SOCIETY** at the Swanscombe Community Hall, Milton Road, Swanscombe, and the following committee was elected: chairman, Mr T. Flint; secretary, Mrs B. Hunter; assistant secretary, Miss M. Kent; treasurer, Mr C. Hunter; committee, Mr A. Randell, Mr R. Bird. Meetings will be held on every other Tuesday and further details may be obtained from the secretary at 80 Stanhope Road, Swanscombe, Kent.

... **MEMBERS** and friends of **FREELANCE A.S.** were entertained recently with a slide show and talk on tropical marine fishes given by Mr T. Ravensdale. Aquarists in the

Mr J. Edwards

It is with regret that we record the death of Mr J. Edwards, honorary show secretary of the Midland Aquarium and Pool Society. He was taken ill suddenly on 24th February whilst at a M.A.P.S. exhibition forming part of the Bingley Hall Boat Show and died shortly afterwards. Mr Edwards was 36 years old. The heartfelt sympathy of all who knew and had worked with him to advance the public interest in aquarium-keeping will go to his widow and their four children.

Dr J. N. Carrington writes:

Jim Edwards must have been known to many thousands of aquarists in his capacity as hon. show secretary of the Midland Aquarium and Pool Society. They will all be as grieved as I am to hear of his sudden death.

When I heard of this tragedy, I looked back through correspondence with the M.A.P.S. It appears that it was in 1960 when Mr Edwards started to apply his organising genius

to the annual show at Bingley Hall.

It was obvious from his application to the job that he found great satisfaction in using his talent to the benefit of his fellow aquarists.

It has always amazed me how Jim Edwards could devote so much effort to his hobby, yet remain essentially a family man. He personally wrote hundreds of letters each year and started planning the next show almost before the present one started. He arranged his holiday to coincide with the show to ensure that he could devote maximum attention to it. He was very proud to see the successful growth year by year.

Many of us must have experienced the uncanny methods which Jim Edwards used to make people help his cause. He was quite unashamed to ask favours from everyone in sight. He had a forceful manner to get his own way—but one could not take exception to such a dedicated approach.

All hobbyists, particularly those connected with the Bingley Hall Show, will extend their sympathy to Mrs Edwards and her young family. We shall all miss this great personality.

Perhaps the best tribute we can extend to him will be to ensure the continued success of his Midland Show.

New Cross and Brockley areas interested in joining the society can contact the secretary, Mr J. E. Howat (36 Vicars Hill, Lewisham, London, S.E.13).

... AT THE MID-HERTS A.S. table show for cichlids and mini-furnished aquaria, judged by Mr G. H. Jennings of the F.B.A.S., the large number of entries in the cichlid class made it necessary to divide it into dwarf and ordinary cichlids. Notable among the exhibits in the cichlid class was a fine speci-

men of a *Pseudotropheus transcarnae*, the Lake Nyasa cichlid, which was judged best fish in the show. The next table show on 18th April will be for characins and toothcarps.

... JUDGE-IT-YOURSELF was the procedure adopted at a recent table show at the WORTHING T.F.C. Results were 1, Mr E. Cox (lace gourami); 2, Miss T. Orpwood (angel); 3, Miss M. Scott (guppy). Afterwards, Mr P. Waring gave the expert point-of-view in choosing a fish for a show.

... THE NEW committee elected at the GUILDFORD & D. A.S. A.G.M. are: chairman, Mr R. Aylott; secretary, Mr D. Nightingale (57a Gt Goodwin Drive, Bushy Hill, Mewow, Guildford, Surrey); treasurer, Mr L. Basall; committee members, Mr P. Lee, Mr E. G. Venton, Mrs Everett. The club meets at the British Legion Hall, Quarry Street, Guildford on the second Wednesday of every month and new members are very welcome.

Dates for Your Diary

2nd April. BRADFORD & D. A.S. Open Show, Unity Hall, Rawson Square, Bradford. Enquiries to Mr G. Goodson, 3 Sherwill Rise, Alerton, Bradford.

2nd April. VALLEY A.S. first Open Show, Civic Hall, Rampton, Leics. Details from the secretary, Mr J. Butterworth, 25 Brookside Crescent, Greenmount, Bury, Leics.

8th April. GOLDFISH SOCIETY OF GREAT BRITAIN annual general meeting, Conway Hall, Red Lion Square, Holborn, London, 2.30 p.m.

9th April. WHITE ROSE AQUARISTS' GROUP first Open Table Show, Sheepshead C.P. School, Wilmington Grove, Leeds 7. (16 Sections and 35 classes including a class for native British fish). Judging at 2.15 p.m. Bending 1-2.0 p.m.

16th April. MIDDLESBROUGH & D. A.S. seventh Open Show, Berwick Hills Community Centre, Middlesbrough.

29th April. BATH A.S. Open Show, The Weston Hotel, Bath. Bending from 10.00 a.m. until 1.30 p.m. 23 Classes.

10th April. ASSOCIATION OF YORKSHIRE AQUARIST SOCIETIES Open Show (please note change of date from that reported in PFM, January 1966). The Railway Institute, Ashby Road, Hull. Bending 1-2.15 p.m. Judging 2.30 p.m.

6th May. TROWBRIDGE & D. A. & P.S. Open Show, Newtown Junior School. Details from Mrs P. Pearce, 69 Alfred Street, Westbury, Wilts.

7th May. OSRAM A.S. Open Table Show.

17th May. FREELANCE A.S. second Open Show at the London College of Printing, Elephant and Castle, London, S.E.1. Show schedules from Mr A. Hovers, 25 Rabona Street, Canford, London, S.E.6.

14th May. LANARKSHIRE A.S. Open Show, Community Centre, Airdrie, Scotland.

16th May. MIDLAND ASSOCIATION OF AQUARISTS' SOCIETIES Annual Convention, Lockhead Hydraulics Ltd. Works Centre, Leamington Spa (LOCKHEED A.S. will be acting as host society).

20th May. MIXENDEN T.F.S. second Open Show, Mixenden Community Centre, Clough Lane, Mixenden.

21st May. MIDLAND AQUARIST LEAGUE assembly. Hosts are COVENTRY POOL & AQUARIUM SOCIETY, Wyken Community Centre, Belgrave Estate, Coventry.

21st May. LIVERPOOL SECTION OF THE FANCY GUPPY ASSOCIATION Open Show, Norris Green Boys Club, Townsend Avenue, Liverpool. Bending 1.30-2.30 p.m. Enquiries to Mr Bill Armitage, 12 Orrell Lane, Liverpool 9.

27th May. READING & D. A.S. are staging the 1967 THREE COUNTIES AQUARIST SHOW at The S.G.B. Social Club, Gas Lane, Reading. Bending from noon, Friday 26th May. Show schedules from Mr C. Masters, 16 Morcombe Avenue, Caversham, Reading, Berks.

2nd June. FEDERATION OF BRITISH AQUATIC SOCIETIES Assembly.

2nd June. CATFORD A.S. Open Show. Full details from show secretary Mr Ken Owen, 42 Elmor Road, Canford, London, S.E.6.

2nd and 4th June. International Tropical Fish Exhibition organized by the FANCY GUPPY ASSOCIATION, Manchester.

4th June. PONTEFRAC & D. S.A. Open Show (provisional).

10th June. LLANTWIT MAJOR A.S. annual Open Show.

11th June. LYTHAM A.S. first Open Show at the Lowther Pavilion, Lytham.

17th June. UNRRIDGE & D. A.S. Open Show. Venue to be announced later.

18th June. GLOSSOP A.S. Open Show. Details from the secretary, Mr J. Ingram, 37 Charlestown Road, Glossop, Derbys.

22nd, 23rd and 24th June. BRISTOL T.F.C. Open Show. Club secretaries are asked to forward addresses to Mr W. Holland at 415 Whitehall Road, St. George, Bristol 2 so that full show schedules can be circulated to all.

25th June. DIDCOT & D. A.S. Open Show, Didcot Labour Club. Schedules and entry forms from Mr F. Tuckey, 2 Moreth Close, Didcot, Berks.

1st July. HUTTON GRAMMAR SCHOOL A.S. second annual Open Show, Preston, Lancs. Details from show secretary, Mr D. J. Radcliffe, Kindu, Todd Lane South, Lonsack Hall, Preston, Lancs.

2nd July. LEAMINGTON & D. A.S. second Open Show.

8th July. GOLDFISH SOCIETY OF GREAT BRITAIN quarterly meeting, Conway Hall, Red Lion Square, Holborn, London at 2.30 p.m.

5-12th August. PORTSMOUTH A.S. fifteenth annual Open Show. Bending, 5th; judging, 6th; open to public 7-12th; prize-giving, evening of 12th.

21st-26th August. MIDLAND OPEN SHOW (the 24th). Bingley Hall, Broad Street, Birmingham.

25th and 27th August. OSRAM A.S. Two-Day Show.

2nd September. HIGH WYCOMBE A.S. annual Open Show, The Rye, High Wycombe, Bucks. This will include a Guppy show put on by the THREE COUNTIES section of the FEDERATION OF GUPPY BREEDERS SOCIETY. Details from Mr C. E. Pike, 16 Ashley Drive, Tylers Green, Penn, Bucks.

2nd September. FEDERATION OF BRITISH AQUATIC SOCIETIES Assembly.

2nd September. YATE & D. A.S. first Open Table Show. Schedules from show secretary Mr J. B. Powell, 114 Cranleigh Court Road, Yate, Glos.

2nd September. BRIGATE & REDHILL A.S. first Open Show. Details from show secretary Mr G. Bass, 2 Caroline House, Rees Road, Redhill, Surrey.

9th and 10th September. NOTTINGHAM & D. A.S. Open Show. Further details awaited.

10th September. HUDDERSFIELD TROPICAL FISH SOCIETY Fifth Open Show.

17th September. BRADFORD & D. A.S. Open Show. Venue to be announced.

21st September. BRACKNELL & D. A.S. Open Show, Victoria Hall, Bracknell, Berks. Details and show schedules from Mr B. Johnson, 18 Highfield Close, Cove, Farnborough, Hants.

24th September. BLACKPOOL & FLYDE A.S. annual Open Show, Harrowside Solarium, South Promenade, Blackpool.

7th October. MID-HERTS A.S. Open Show, St. Pauls Church Hall, St. Albans, Herts. Further information from Mr D. R. Leitch, 19 Prospect Road, St. Albans.

17th October. STONE A.S. Open Show (provisional).

11th November. GOLDFISH SOCIETY OF GREAT BRITAIN quarterly assembly.

2nd December. FEDERATION OF BRITISH AQUATIC SOCIETIES Assembly.

2nd December. LEEDS & D. A.S. Open Day Show.

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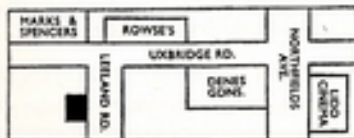
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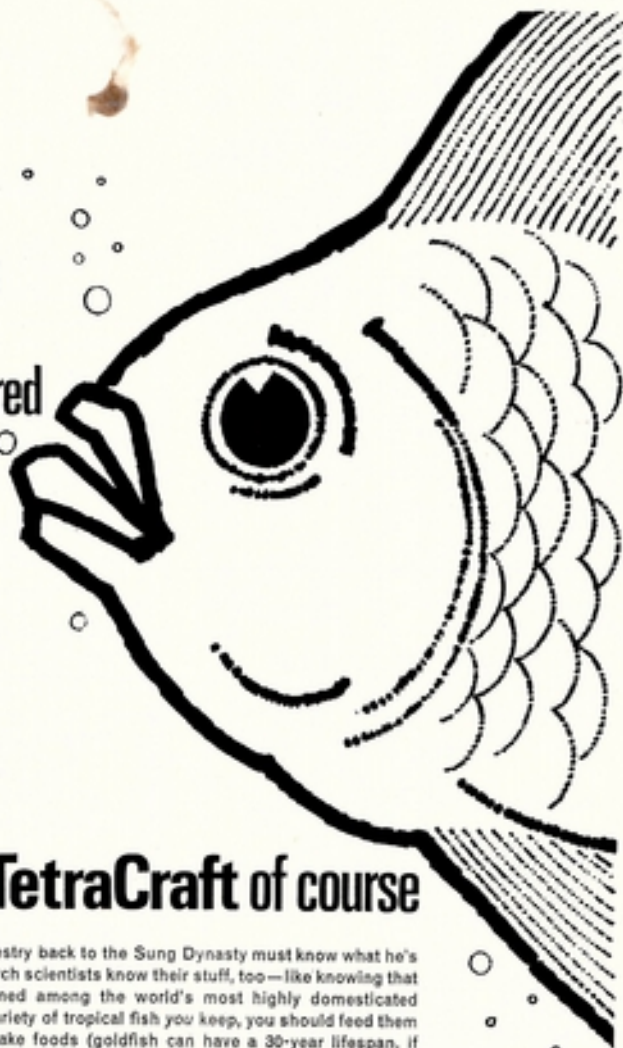
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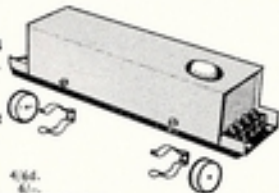
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Under the Sea (Burton)	25 0	feeder	7 0	Hobby Leaf green flakes	2 0, 7 0
Tropical Fish in the Aquarium (Lodewick)	18 0	Wardleys Fish Foods	15 0	Hobby Yolk Flakes	2 0, 7 0
Freshwater Tropical Aquarium Fishes (Hervey & Ham)	15 0	Visualiser mix (8 foods in one)	2 3	Hobby Fish Food (Breeders Pack)	7 0
		Supremix Conditioner	1 3	Hobby 'Blue Daily'	3 3
		(Fins, Med., Coarse)	1 3	Wonderbar	3 4, 6 9, 12 4
		(Fins, Med., Coarse)	2 4		
		Superna Homogenised	2 4		
		Micro Pellets Food	1 3		
		(Fins, Med., Coarse)	1 3		
		Ex. Coarse	8 0		
		Vitalise (Fins, Med., Coarse)	1 3		
		Hi-Glyce "30" Colourfood	1 3		
		(Fins, Med., Coarse)	4 4		
		Community	4 4		
		Fry Fare Guppy Food Lge.	2 4		
		Molly Fare	2 4		
		Fancy Guppy Food	4 4		
		Guppy fare	4 4		
		Small 1 3	2 3		
		Large 2 3	2 3		
		Dried Daphnia	2 3		
		Small 1 3	2 3		
		Large 2 3	2 3		
		Salman Eggs	2 3		
		Small 1 3	2 3		
		Large 2 3	2 3		
		Liver Meal	2 3		
		Small 1 3	2 3		
		Large 2 3	2 3		
		Beef Meal	2 3		
		Small 1 3	2 3		
		Large 2 3	2 3		
		Fish Meal	2 3		
		Small 1 3	2 3		
		Large 2 3	2 3		
		Crab Meal	2 3		
		Small 1 3	2 3		
		Large 2 3	2 3		
		Brine Shrimp Kit	8 6		
		Tri Pellets	4 6		
		Hi Proteon	4 6		
		Brine Shrimp Pellets	5 3		
		TETRAMIN FISH FOODS			
		Tetramin Staple Food for			
		Tropicals			
		Size 1	1 11		
		Size 2	3 3		
		Size 3	7 6		
		Size 4	24 6		
		Size 5	87 3		
		Large Flakes	7 6		
		Tetramin Staple Food in			
		Tablet Form	3 0		
		Tetramin Conditioning Food	4 3		
		Colour Pride	4 3		
		Growth Food	4 3		
		Guppy Food	4 3		
		Marine Staple Food	4 6		
		(for Marine fish)	4 6		
		Tetramin Staple Food for Gold-			
		fish			
		Size 1	1 10		
		Size 2	3 10		
		Size 3	12 4		
		SunGold	1 4 & 4 0		
		Biol Plankton Culture	5 3 & 2 6		
		ELITE FISH FOODS			
		For Tropicals	2 0 & 5 0		
		For Goldfish	2 4		
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