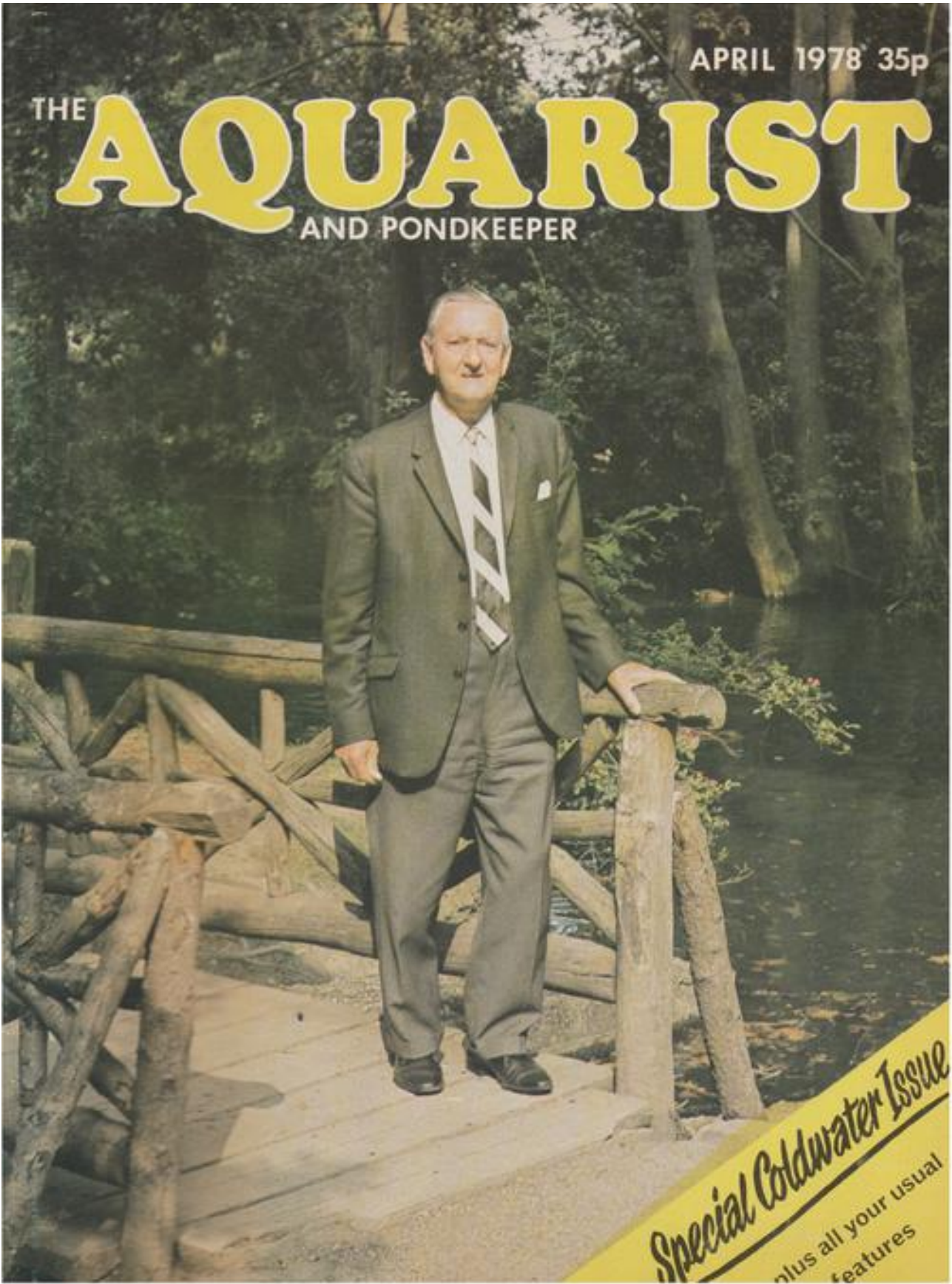


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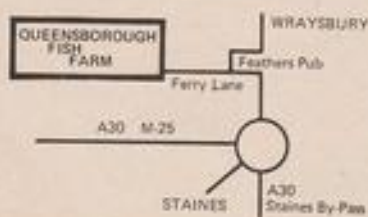
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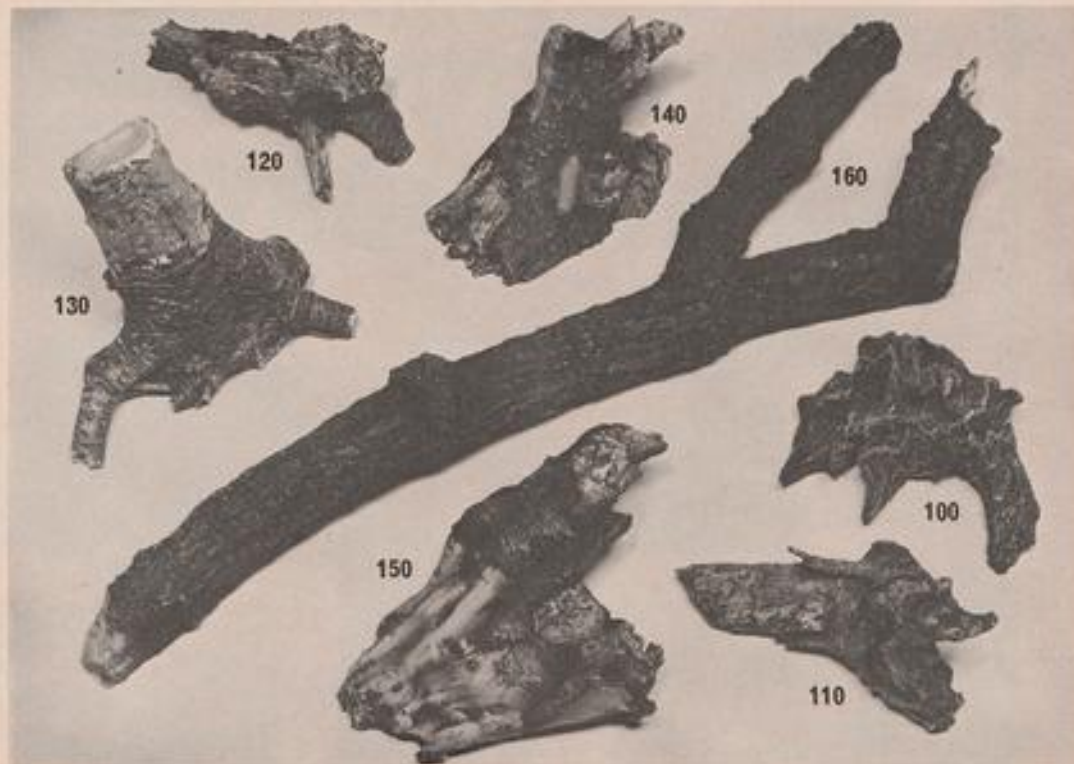


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.....	Cryptocoryne Beckettii	25	1				
.....	Ciliata	25	1				
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.....	Lutes	20	1	5	Bacopa		
.....	Nevillii	20	1	5	Vallisneria		
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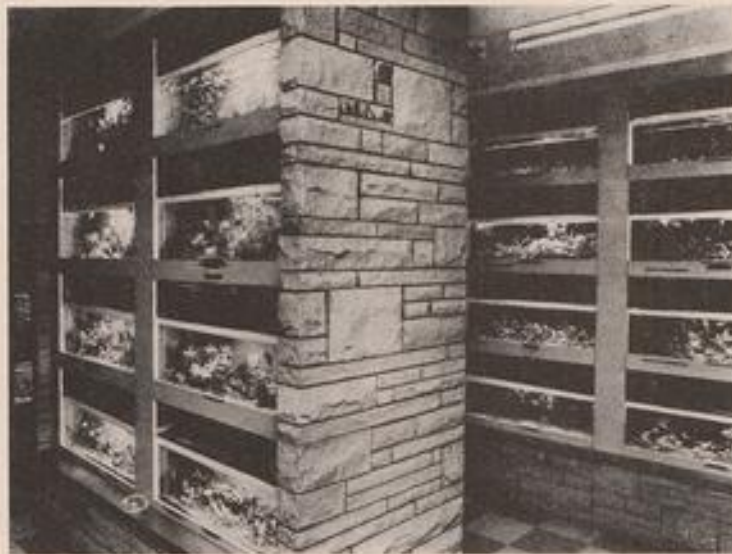
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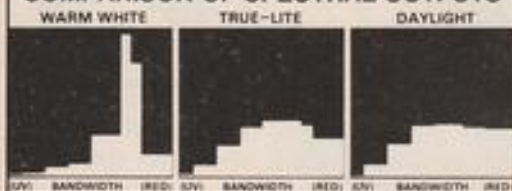
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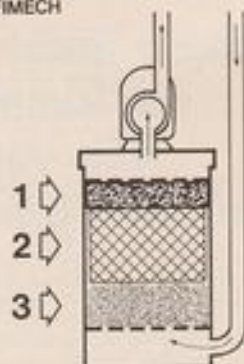
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# aquarian

## advisory service bulletin No. 3

### Water Quality

The most important part of a fish's environment is the water in which it lives, and yet it is usually the most neglected part of the aquarium. Poor water quality will give poor quality fish. You must study the requirements of your particular species and adjust the water to their needs. Even

worse than poor quality water are sudden changes in that quality. *The worst possible conditions for the fish are to leave a tank until it is filthy and then scrub it out and refill with pure tap water.*

### Tap Water

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hardy fish until the water matures. It helps to seed a raw tank by adding old aquarium water from another set-up, or from a clean garden pond. Use clean rain water wherever possible.

### Mature Water

Once your aquarium has matured (seen by sweet-smelling, crystal clear water with a soft feel) never throw all that valuable water away. Only do partial (1/5th weekly is best) changes to dilute the excreta. Use soft (rain or distilled) water to top-up but keep this evaporation low by using a cover-glass. If you or the fish move house, move the water as well.

*David Ford*

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The Editor accepts no responsibility for views expressed by contributors.

# LIVE FOOD ON THE HOOF

by Bob Purdy

NO AQUARIST can deny that live foods can play a most important rôle in the growth and well-being of aquarium inmates. Some time ago now, *tubifex* worms were quite plentiful and cheap but now they cost anywhere from twenty-five pence a portion and that is only when a dealer can acquire a stock to sell, not an easy thing to do. Brine shrimp eggs were also very plentiful and fairly inexpensive a few years ago but suddenly they refused to hatch and most dealers have given up selling them for the time being. *Daphnia* (sometimes called water-fleas) when purchased at a dealers' are usually quite expensive and only sufficient to feed one tank of fish for one meal. Aquarists who live in the Midlands seem to have the best deal where *daphnia* is concerned as they seem to get about three times the amount of water-fleas per bag than anywhere else I've been. Collecting *daphnia* from its home waters can be messy, time consuming and possibly fatal for aquarium inmates if insect pests are introduced to the tank as a result of the operation. All these reasons are a good basis for wanting to culture live foods in the home or backyard, but what foods and how to culture them?

## 1. *Tubifex*

Aquarists have often been heard to blame *tubifex* worms for a whole spectrum of illnesses that have ailed their fishes, for fouling water, for daring to live under the under-gravel filter and for just about anything that goes wrong in the aquarium. *Tubifex* worms, if used properly, can only do good by providing living protein in a form most accepted by aquarium kept fish. The arguments for and against the use of *tubifex* worms are not for this article but suffice it

to say that the author is strongly in favour of using them and in four years of use has never experienced any problems.

Writing about the culture of *tubifex* worms and actually culturing them is two different things. I have read very few accounts of the culture of the worms and the following method has proved to be the only successful one for me.

Fill a shallow container with about four to five gallons of water and place a large strip of dried and aged oak bark at one end. The oak bark must be submersed so stones can be used to weight it down. Put an airstone at the other end of the container and then place about one pound, in weight, of *tubifex* worms on to the bark and start the airstone. It should go without saying that the water should be reasonably well aged as the following cycle will be broken by the inclusion of chlorine gas in solution.

Potatoes are used as a base food but I rather suspect that the *tubifex* worms feed upon the bacteria produced by the rotting potatoes or upon small animals that live upon the bacteria. Either way, a cycle is set up and once in balance must be kept that way. The amount of worms produced depends upon a great number of factors but foremost of these must be the amount of potato added to the culture per week. This amount is governed, in turn, by the volume of water available to support the breakdown products of the potato until the *tubifex* worms can devour them. Too much potato will foul the water and kill the *tubifex*; too little *tubifex* will cause the potato products to build up and have the same result. Too much *tubifex* or too little potato will produce starving worms which will die and foul the water. From the foregoing it can be

seen that it is of great importance to feed the right amount of potato and harvest the right amount of *tubifex* worms. Because so many factors can vary, it is impossible to give any measured amounts for the culture but the keen aquarist can soon fix these for himself by using trial and error and a little common sense. Don't be afraid to harvest as much as fifty per cent of the worms once a week ONCE THE CULTURE IS ESTABLISHED.

## 2. Brine Shrimp

The culture of brine shrimp entails the use of a thirty to fifty gallon tank placed somewhere indoors and filled with a fairly strong brine solution. Marine salts can be used at a slightly weaker strength than normal but a combination of rock salt and a bottle of trace elements are just as effective and much cheaper to use. Brine shrimp eggs are placed in the tank and left to hatch; no aeration must be used. As soon as the eggs hatch, yeast (any kind) is added to the tank and this will cause the water to go milky; each time the water clears add more yeast but don't overdo it. When the brine shrimp mature, at about three-eighths of an inch, they will mate and lay eggs. The eggs do not need to be dried out and if left in the tank will hatch in about two to six weeks depending upon water temperature. Always harvest this culture with a net coarse enough to allow the newly hatched brine shrimp to pass through it. Again, I can give no exact measures and the above must be used as a basis to work from, until the correct conditions are obtained.

## 3. Daphnia

Providing a small patch of ground is available, where a thirty to fifty gallon pond can be constructed, *daphnia* is the easiest and most productive of live foods to culture. One of the few things that most aquarists agree on is the use of *daphnia* as a live food; it is not associated with the filthy conditions in which *tubifex* exist and it does not give any build-up of salt as brine shrimp sometimes can. *Daphnia* is not a laxative as is sometimes claimed and has never killed any of my fish even when fed in such quantities that there are still some fleas to be seen twenty-four hours later.

A culture pond can be constructed in next to no time by using the thickest grade of builder's polythene sheeting and approximately three-dozen bricks, if you are prepared and able to dig a hole the bricks won't be needed. By using a square of builder's polythene sheeting measuring five foot square a pond of approximately fifty gallons can be produced in the following way.

Measure one foot in from each side of the polythene sheet and fold up at an angle of ninety degrees, it will be found that this produces a small triangle at each corner of the sheet. If each of these triangles is taped to a side, a trough, one foot deep and three

foot square, is formed. One of two things can be done to support the sides of this trough as follows. The sides can be supported by placing house bricks around them but in order to have a good support a number of bricks must be placed at right angles to the sides. This method is very useful for constructing semi-permanent ponds on a concrete or stone base. If a wall can be used to support one or two of the sides, all the better. If you are prepared to dig a hole one-foot deep and three-foot square then it will provide a natural support for both the base and the sides of the pond. Either way will work equally as well but care should be taken not to drop stones or sharp objects into ponds constructed in this way as they will cut the polythene and very rapidly drain the pond. For the same reason the polythene sheet should be checked for holes before use and if any are found they can be taped over, quite successfully, using a good quality masking tape.

Once construction is finished, the pond can be filled straight away and checked for leaks, etc. Tap water will be the most convenient and obvious sort to use and is, in fact, better than pond or stream water because it contains no living organisms that can contaminate the culture. If pond or stream water is used it is possible that insect pests could be introduced as eggs or larvae. When the pond is full add four or five heaped spades full of cow or horse manure (not sheep, pigs, and especially not chicken manure if you like your neighbours to speak to you) and stir in well. The larger particles in the manure will settle on the bottom of the pond and form a perfect substrate while the rest of the manure will go into solution and form the basis of the food for the *daphnia*.

After allowing the pond to "mature" for a week or so add a small culture of *daphnia*, about five bags if purchased from a dealer or one gallon or so if collected from the "wild." Check the *daphnia* carefully for any other insect life before adding it to the pond and then leave for about four to six weeks before starting to harvest the culture.

As growth is temperature-dependant, harvest less in cool weather and more in hot weather. *Daphnia* are capable of the most incredible population growth so do not be afraid to harvest the culture quite heavily during the summer months; a fifty gallon pond should provide enough *daphnia* to service twenty odd tanks once a day. It is also of great importance to keep the food source constant so as soon as the pond clears add another spade full of manure, keep on doing this as long as the culture is being harvested.

Under optimum conditions, *daphnia* is a livebearer giving birth to females only (this accounts for its ability to populate small areas of water almost overnight). This pattern changes, however, with the onset of colder weather at about the end of October. At such times, when frosts become common and ice

*Continued on page 6*

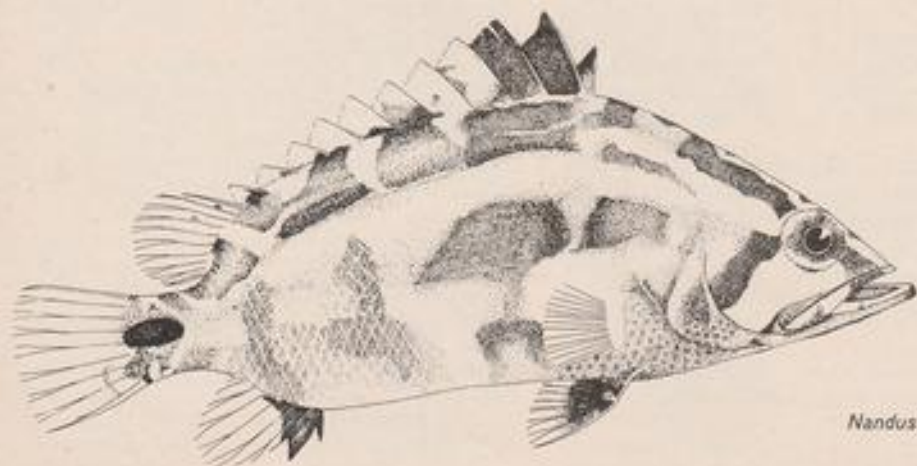
# LEAF FISHES

by C. Mattison

LEAF FISHES are members of the Nandidae, a family with a world-wide distribution, but surprisingly few species. They should not be confused with certain of the African Climbing Perches, *Ctenopoma* spp, which exhibit a similar body shape and way of life. All of the Nandidae are predatory fish which will stalk and swallow other fishes almost as long as themselves. They are entirely unsuitable for the normal community tank because, in addition to their anti-social feeding preferences, they suffer badly from shyness if kept with more boisterous species. In spite of this, there is a good case for keeping them in single species groups because they represent one of the most extreme forms of behavioural adaptations to be found amongst aquarium fishes.

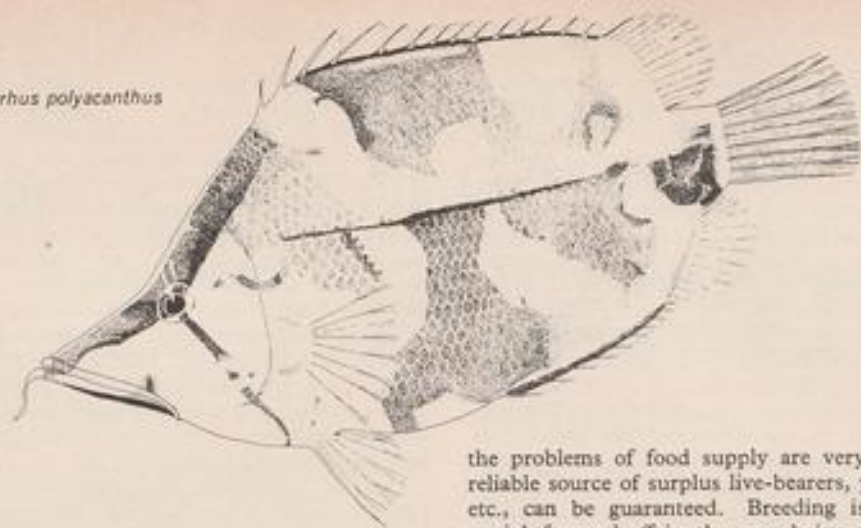
The outline of the fish is roughly leaf-shaped to begin with, and the resemblance is enhanced because the pectoral fins, as well as the outer lobes of vertical fins, are virtually transparent, thus eliminating possible irregularities when viewed either from the side or front. When stalking prey all species of leaf

fish become darker in colour except for a prominent white stripe which passes between the eyes and up to the leading edge of the dorsal fin—this serves to break up the outline from the viewpoint of intended prey, and is also found in other predatory species, including some marine examples. When swimming, and especially when hunting, the leaf mimicry is perfectly maintained by the fish as the only fins that are moved to any extent are the crystal-clear pectorals, and these guide it in a simulated drifting fashion, often on its side or with head directed downwards, looking exactly like a dead leaf being swept along willynilly by the current. It is unfortunate that in the practically motionless water of an aquarium this effect is somewhat lessened; when hunting in the sluggishly moving, detritus-carrying streams which it inhabits, the ruse must be almost perfect. Once the prey is within striking distance, the large mouth is extended suddenly and the prey is engulfed. Should it be unsuccessful with its strike, the fish refuses to forego its disguise and slowly manoeuvres itself back into position and



*Nandus nandus*

*Monocirrhus polyacanthus*



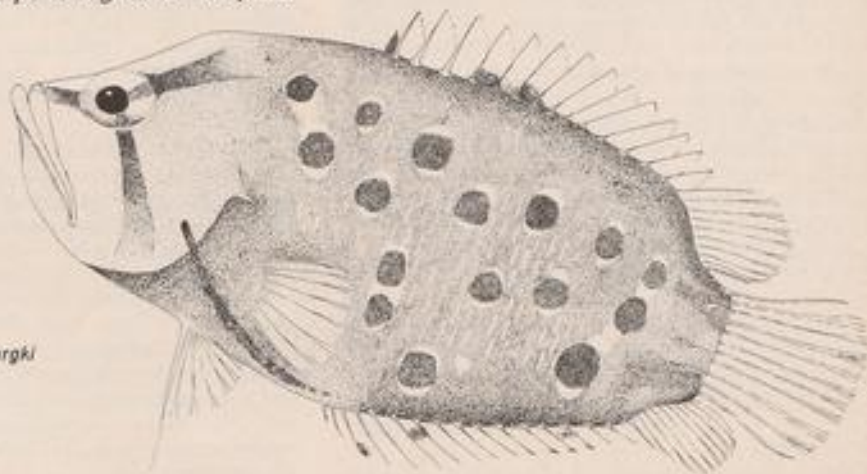
recommences the hunt. (At this time the doleful expression, resulting from the downward-pointing mouth and the slightly bulbous eyes, seems particularly appropriate, suggesting an attitude of extreme annoyance, perhaps tinged with embarrassment). The prey is swallowed whole, almost always head first, the fish remaining motionless except for two or three "champing" movements, and its alertly swivelling eyes.

The most leaf-like species are the two hailing from South America, *Polycentrus schomburgki* and *Monocirrhus polyacanthus*, especially the latter, which in addition to the deep-bodied, clear finned features common to the other species, its already pointed snout has a single barbel, attached to the tip of the lower jaw which is erected when hunting to resemble the stalk of a decaying leaf. This species subsists entirely on live fishes of which it requires a great number, and

the problems of food supply are very real unless a reliable source of surplus live-bearers, young cichlids, etc., can be guaranteed. Breeding is apparently a straightforward affair, the eggs being attached to the underside of a leaf, the biggest problem being that of conditioning the parents. I know of no way to sex these fish, all of my specimens appearing to be identical except for the usual variations in markings.

Its South American relative, *P. schomburgki*, is the Leaf fish most likely to be seen in dealers' tanks, apparently being less delicate, and certainly being simpler to feed, since it will not refuse *Tubifex* and other living invertebrates, including worms, when live fish are not available. This species is certainly not difficult to breed, once a pair has been found, an achievement which can be difficult not to say frustrating. A large group of adult fish will usually appear to contain but one male, distinguished by his darker colour (almost black if in breeding condition), and more prominent silver spots, the remainder of the population being dull yellowish brown, the typical

*Polycentrus schomburgki*



female markings. However, the chances are that a proportion of these "females" will also be males who have reacted to the presence of a more dominant male by "dressing-up" as females, so avoiding a confrontation with the more powerful animal. (This "pseudo-female" behaviour is found in several other species, for instance some cichlids, although in most other cases there are alternative methods of sexing the fish, such as fin size and so on). This is often the reason why in spite of every effort to achieve the correct conditions for breeding, the aquarist fails to breed from an apparent pair. The anal papillae of the male and female are of differing size, but this feature is not very obvious unless the fish are approaching full size, which like the preceding species is around three inches. This species also spawns under the leaves of broad-leaved plants or, in the aquarium (but not in the Amazon!), inside flowerpot caves. The male guards and fans the eggs and young fish, and as Professor Barlow of Berkeley, California, has very neatly shown, cannibalism does not occur between adults and fry although it seems quite likely that the growing fish will eat each other in the absence of sufficient food which should consist of *Daphnia*, *Cyclops*, etc., supplemented with the fry of other species as soon as possible.

In Africa the best known of the Leaf fishes is *Polycentropsis abbreviata*, which is somewhat similar in appearance to *Polycentrus*, but with an even more drawn-out snout. This species occasionally arrives in small numbers with shipments from Central Africa, but so far I have never been lucky enough to obtain any, but it would appear to be at least as interesting as the other members of the group and is unusual,

according to Sterba, in building a bubble-nest, particularly strange in a species which does not possess a facility for air breathing as do most, if not all, other bubble-nest builders.

Finally, the species which gives its name to the family, *Nandus nandus*, which over the last few years has been imported almost as regularly as *Polycentrus*. This mottled, bronze-coloured fish is not as leaf-like in appearance as some nandids, but its habits are similar. It occurs in South-east Asia, and grows to about twice the size of the South American species, although those usually offered for sale are youngsters of approximately one inch in total length. Its breeding has not to my knowledge been achieved in captivity, neither is it possible to sex when young, although adult males may have slightly larger fins than females. *Nandus nebulosus* is similar but with larger scales—I have never seen an example for sale.

Care of the South American, and presumably African, species centres around slightly peaty water, dim lighting and plenty of cover, particularly water-worn roots, stumps and so on. Owing to their retiring nature, they will thrive only in a settled tank with no disturbance from other more active fish. *Nandus* comes from slightly brackish water, and although it can live in fresh water it appears to be sensitive to water impurities, probably ammonia, so tanks with biological filters would appear to offer an advantage. This species will take *Tubifex* and other live foods quite willingly although in my experience growth, which is slow anyway, is further retarded if live fish are not included in the diet. It too should have plenty of hiding places and, if possible, a good layer of floating plants to subdue the lighting.

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## LIVE FOOD ON THE HOOFF continued from page 3

forms on the pond, *daphnia* will lay "resting" eggs which will not hatch until the spring. The life cycle of the *daphnia* is more complex than this but the details are not necessary to be able to understand what occurs next.

At the end of October or the beginning of November it is quite in order to strip the pond of the remaining *daphnia* and feed them to your fish. Once the *daphnia* are removed the pond can be left dormant through the winter until the first warm spell in March or April when an inspection will show a healthy batch of *daphnia* from the resting eggs, all ready to be harvested.

There are other methods of *daphnia* culture, either using yeast or green algae as a food source and although both of these foods are fairly successful, neither works as well for me as the one outlined above.

### Conclusions

*Tubifex* is relatively hard to culture and, in most

cases, is more easily purchased from a dealer. Fish thrive on *tubifex* and providing it is correctly washed, kept and fed, no disease can arise from it. *Tubifex* has often been unjustly accused of various fatalities which have turned out to be, in most cases, totally unfounded.

Brine shrimp is just as hard to culture and even more time-consuming than *tubifex* and coupled with the fact that it is cultured in a brine solution (making it useless as a food for such species as corydoras) it is far removed from an ideal live food.

*Daphnia* is a perfect live food for freshwater tropical fishes and the manner in which it is cultured is easy and demands little time from the aquarist. As a bonus, such goodies as bloodworm and mosquito larvae are often harvested along with the *daphnia* and these provide a nourishing alternative for most fish. An outdoor *daphnia* culture will improve the results in any indoor, freshwater aquarium so why not try one soon?



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### TROPICAL QUERIES

I should appreciate some information about a cyprinid formally known as *Danio aequipinnatus*.

*D. aequipinnatus* is another scientific name—maybe the right one—for the giant danio from India usually described under the formal or technical name of *D. malabaricus*.



*Rasbora vaterifloris*

Please give me the names of a few small rasboras suitable for a tank of peaty acid rain water.

*R. maculatus*, *R. vaterifloris*, *R. urophthalmus* and *R. hengeli* (a smaller edition of the harlequin fish or *R. heteromorpha*) should meet your requirements.

My dealer has a squat-looking and bristly catfish which he tells me does not exceed a length of 4 in. and is known as a blue chin. I wonder whether you can give me the scientific name of this interesting species?

The technical name of the blue chin catfish is *Xenocara dolichoptera*.

In an old aquarium magazine, I came across a reference to a tropical freshwater fish called a pretty pike head. What information can you give me about this species?

The proper name for the pretty pike head is *Luciocephalus pulcher*. It is a species of the family *Lucio-*

April, 1978

by Jack Hems

*cephalidae*. From all accounts the family is represented by this single species. The pretty pike head is native to Malaysia and Indonesia and reaches about 6 in. It has an accessory breathing organ but no swim-bladder. It has seldom appeared on the market though it has been known to serious aquarists in this country and abroad for more than 40 years.

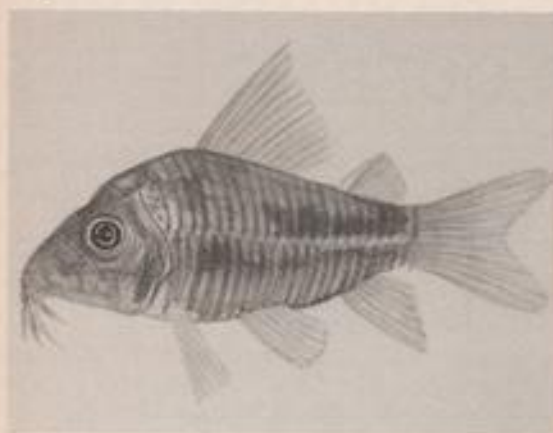
I should like to know whether the introduction of a catfish called *Farlowella acus* into my community tank will have any untoward effect.

The only untoward effect noticed might be the wasting away of the catfish rather than the decline in numbers of the other fishes; for species of *Farlowella* are nocturnal feeders that demand a lot of soft vegetable matter such as mossy algae or blobs of cooked spinach or scalded lettuce included in their diet if they are to survive. Besides greenstuff frequent feedings of whiteworms and a first class flake or granular dried food are called for. As the farlowella prefers to remain in thickets of plants or buried in the compost until after dark, it is best to introduce some food for it last thing at night.

I have quite a number of books on aquarium keeping and all of them recommend coarse sand or washed river grit as a planting medium. One book even states that the particles of river grit should be 2 mm across. As I have not enjoyed any success in growing plants in the irregular-sized compost sold by my dealer do you think I should change to a coarse sand or try and find a shop which sells river grit roughly 2 mm across?

It makes little or no difference whether the grit used as a planting medium is 2 mm or 4 mm across. All that is required is a compost that is neither too open nor too fine. Furthermore, a compost that is not calcareous is an added advantage if you are keeping fishes that flourish best in soft and acid water. In all probability the fact that you have not been successful

with plants can be attributed to inadequate light (duration or brilliance or both) and the wrong choice of species.



*Brochis coeruleus*

I have a catfish called *Brochis coeruleus*. Please let me know the name of the family of this fish, its maximum size, and where it is found in nature.

*B. coeruleus* is a member of the family *Callichthyidae*. It attains a length of about 2½ in. and is native to the Amazon river system around Iquitos.

I should like your opinion on the golden tetra as a community fish.

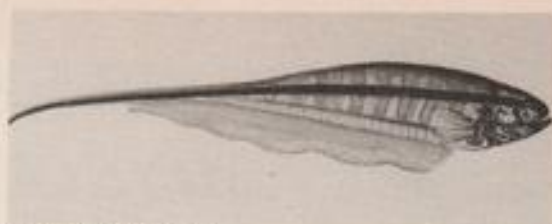
This 1½ in. tetra makes a first-class addition to any community tank stocked with peaceable fishes of about its own size. Ordinarily the golden tetra is long-lived, swims in the lower to middle levels of the water, is very active, does not adopt threatening attitudes towards other occupants of its tank and eats all the regular dried, flesh and live foods.

How powerful is the electric current discharged by the electric eel and similar 'shocking' fish?

The electric eel (*Electrophorus electricus*) can deliver a shock sufficiently powerful to fell a mule. The Dutch writer, J. J. Hoedeman, in his *Naturalists' Guide to Freshwater Aquarium Fish*, states that the electric ray (*Torpedo torpedo*) can discharge 200 volts with a stunning power of 2,000 watts. The well-known electric catfish (*Malapterurus electricus*) is capable of delivering a shock strong enough to make a man stagger on his feet.

I should appreciate some advice on the likes and dislikes in the matter of food, aquarium set up and temperature of the knife fish called *Eigenmannia virescens*.

The green or glass knife fish, as the species is



*Eigenmannia virescens*

commonly known, prefers a soft to rather dim light, with access to shade, and a temperature in the neighbourhood of 75°F (24°C). Subdued lighting is easy to arrange if the surface of the water is well-carpeted with aquatic vegetation such as pygmy bladderwort, floating fern, warmwater varieties of hornwort or the ribbon-like foliage of *Vallisneria spiralis*. Regular livefoods are taken as well as finely shredded meat.

What is a chanchito?

Chanchito is an outdated popular name once used to cover a number of South American cichlids of the genus *Cichlasoma*. A few of the chanchitos you will find in books published in days gone by are the flag chanchito (*Cichlasoma festivum*) the barred chanchito (*C. severum*) and the chameleon chanchito (*C. facetum*).



*Aphyosemion bivittatum*

I should like some information on the care and breeding procedure of *Aphyosemion bivittatum*.

*A. bivittatum* or the two-striped aphyosemion thrives best in matured soft water giving an acid reaction. Temperature should be in the neighbourhood of 75°F (24°C). Live foods such as brine shrimps, gnat larvae, whiteworms, day-old livebearers go down well. Although the species is peaceable, it lives longest and best when kept with its own kind. A pair will breed if installed in a smallish tank filled or almost filled with thickets of fine-foliaged plants. The light should not be too bright, so plants such as Java moss are indicated. It is as well, too, to have some well-soaked peat debris on the bottom. The female deposits her eggs, every so often, in the plants or peat debris. The eggs take about a fortnight to incubate. The fry are capable of taking live food such as brine shrimps, micro worms and micro eels right away.



## COLDWATER QUERIES

by Arthur Boarder

**I have a coldwater tank, 36 x 15 x 12 inches; I have an under gravel filter with 3-4 inches of gravel over it. I have *Elodea*, *Vallisneria*, *Cabomba*, *Ludwigia* and Amazon sword plants in the tank. Overhead lighting is from three 15 watt lamps, kept on for 6 hours a day. My trouble is that the water plants will not grow and the whole tank is smothered with Algae. Where am I going wrong?**

The short answer is, 'everywhere!' To give a more definite answer, the Algae is thriving because the water plants are not growing. In the first place the *Cabomba* and Amazon sword are used in tropical tanks and so are not likely to thrive in your cold water. Then you have them in gravel. There is absolutely no nourishment in gravel for your plants. You have an under-gravel filter which is removing any waste matter from the fishes, presuming you have some in the tank. You did not state how many or how large any fishes were. As to your lighting, this is quite inadequate. You need about twice the wattage and the lamps should be on for twice as long each day.

Now to cure the trouble. Place some potting soil, about an inch to two inches deep at the back of the tank, reaching to half way. Cover all the base with inch and a half of gravel. If you must use a filter, try to keep it to the front half of the tank only. Add to your plants without the two mentioned: *Egeria densa*, Hornwort, (*Ceratophyllum demersum*) and *Lagarosiphon major*. Then increase your lighting as suggested. Once you get your plants growing well they will choke out the Algae. The Algae will always grow when there are insufficient growing water plants to deprive the Algae of light and nutriment.

**We have just had restored a pond or lake approximately half an acre in area and 2-3 feet deep. This will be about 500-600 feet above sea level and exposed to all weathers. What do you advise for planting the pond and which fishes will be suitable? We have your book, "Coldwater Fishkeeping" but it seems to cater for much smaller ponds generally.**

It is true that my book was written for the very large majority of fishkeepers who have a much smaller pond than yours. Nevertheless, all that is in it could apply to any sized pond. Any of the under-water oxygenating plants mentioned in the book will be satisfactory but of course you will either have to plant a large number of them or be prepared to wait two or three years before they spread too much of the

pond. Choose water lilies from the range recommended for water two feet deep. Any of the waterside or marginal plants will be suitable. Plant these at intervals around the edge and then you will soon be able to divide them to supply as many as you want. Which ever plants you use will soon grow as they will never be short of water as might ordinary garden plants.

As for fishes, you have a good choice and the one I can recommend which will thrive in your pond is the Golden Orfe. This fish thrives well in a large pond and does not mind any cold. It can soon grow to eighteen inches long and as it is a surface swimmer and feeder so is usually to be seen. It also shoals well and so is very attractive. You can add some Tench, (*Tinca tinca*) and Rudd, (*Scardinius erythrophthalmus*), two very suitable native fishes. For added colour you can have plenty of common goldfish. Do not use any of the fancy varieties of goldfish as most of them would only cause trouble in a pond as exposed as yours. For the same reason do not use any Koi, although they are mostly handsome fish, they may not be happy in very cold water in the winters. The fishes I have mentioned should be enough and should thrive well and breed. Do not, of course, put in any Perch (*Perca fluviatilis*), or Pike (*Esox esox*) as they are carnivorous and would eat other fishes. Should you require any further information, I shall be pleased to advise.

**I have bought a fish called a Bowfin. Can you tell me anything about it and what it feeds on?**

The Bowfin, (*Amia calva*), is also known as the Dogfish. It ranges in many lakes from L. Superior in North America to Florida and Texas in the south. It is a fast growing fish and can reach ten inches long in its first year. It is very pugnacious and canabalistic and so must not be kept with smaller fishes. The natural food consists of small fishes, snails, aquatic insects, and crustaceans. In captivity it can be fed on garden worms, small fishes, chopped raw meat or ox heart, or any live foods.

**I wish to set up a number of large coldwater tanks and shall use some soil in the bottoms as you suggest. However, I am confused about the J.I. potting composts. What are they and can I mix them myself?**

You can certainly mix the composts yourself. I have made up many bushels in the past and having lectured and written about them can remember their components. There are two main types, the J.I. seed

compost and the J.I. potting composts. They are the result of extensive experiments at the John Innes Horticultural Institute, Merton, when many tests were made with seed raising and potted plants.

The seed composts are made with two parts loam, one part peat and one part sand. To each bushel is added an ounce and a half of Superphosphate and three quarters of an ounce of ground chalk or limestone. The J.I. potting compost No. 1 is made up from seven parts loam, three parts peat and two parts sand. To each bushel is added, an ounce and a half of hoof and horn grit, an ounce and a half of superphosphate and three quarters of an ounce of sulphate of potash. This represents the J.I. base fertiliser and to this is added three quarters of an ounce of ground chalk or limestone.

The J.I. potting compost No. 2 is the same bulk mixture but with twice the amount of additives. The J.I. No. 3, has three times the additives of the No. 1. The loam should be the top spit of an old standing meadow, something hard to find these days, and this to be rotted down for at least six months. The sand should be sharp, not soft. If you only require small quantities it will be easier to purchase some at a horticulturalists. Use J.I. No. 1 for your tanks.

**I have a fair sized, well planted tank with some goldfish in it. They occasionally flick their fins and rub against the rocks or glass. Is this a sign of flukes?**

It may be so but it is not the only thing which can make them act in that way. If the water is not to their liking they will also act as you describe. Check up on the state of the water. It may need a good change as if there are too many dissolved minerals in the water the fish can be upset. Make sure there is no copper or lead in the tank. It has been known for a tank to become dangerous when many strips of lead have been used for anchoring plants. Usually if a fish is infested with flukes there will soon be some signs that all is not well. The fish may mouth at the surface and become sluggish. They will go off their food and later on, blood streaks will appear on the body. It is usually the very small fishes which are attacked by flukes as older fishes have plenty of mucus covering to protect them.

**The water in my garden pond has become brownish in colour. What has caused this, please?**

This state is usually caused by the presence of a type of *infusoria*. This could be through decomposing uneaten dried food in the pond. You had better empty as much water as possible and when you refill, do not feed for a time. In fact, do not feed when the temperature of the water is 45°F., or below. The fish

will be quite all right and the water should remain clearer.

**When should I divide my water lily?**

There is no need to disturb the lily if it is doing well and flowering. It is time to divide the lily or lessen its size when it takes over too much of the pond's surface. Any pond with at least half its surface area covered by water lily leaves is almost certain to have clear water. This is because the leaves shade out much of the sunlight and so Algae is not encouraged to grow. Obviously if too much of the surface is covered the fishes may not be seen.

The time of year to divide a lily is when several leaves have grown up on to the surface. This is a better guide than giving a date, such as late April or May. So much depends on the spring, whether late or early. If the lily is in a basket it is an easy task to remove it for treatment. The root-stock is very thick, more like that of rhubarb. On any established plant there will be small shoots or off-sets on the root and these can be cut off and set to make fresh plants. Lilies are very easy to propagate and the grower who supplies them is on a good thing as I have never known a shoot to fail to grow. One important point to remember is that when first set the shoot should be in shallow water as this encourages growth. Once a fair growth is seen the plant can be placed in the pond. I consider that no pond of about 25 feet square or more is complete without a water lily, as they not only provide some shade but their roots can help to use up the waste matter from the fishes and so keep the water pure. When buying a lily make sure that you get one suitable for your pond. Types can be bought for very small ponds, such as the Pygmaea kinds to the very large, the latter being of no use in a small pond.

**How can I make my fishes grow? I have Fancy goldfish, Tench, Rudd, Bitterling, Loach and Koi in a water temperature of 73°F. I feed them well but they do not grow.**

I suspect that the reason why your fishes are not growing is because they have insufficient growing or swimming space. It is as simple as that. Your fishes are usually classed as coldwater ones and are not usually kept under tropical conditions. Not that the fishes mind this as many have such temperatures in open ponds or lakes during the summer. In warm water the fishes will eat more and so should grow faster. However, unless they have plenty of swimming space they will cease to grow once the stocking rate is reached. This is 24 square inches of surface area for each inch of length of fish not counting the tail. Another factor is the amount of oxygen present in the water. As you are using heaters there will be a constant movement of water as long as the heaters are on. The warmer water rises to the top and spreads over the surface, thus becoming oxygenated. You did

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not state the size or sizes of your tanks and so I cannot tell if you are over-stocking with fishes.

**I have a tank, 26 x 14 x 12 inches, and have two fantails, one red-cap and one calico fish in it. They are 2½ in. body length. Can I add another red-cap of about the same size without doing any harm?**

Your tank will hold about 15 inches of body length of fish and once this rule for stocking is reached the fish are not likely to thrive or grow. You could add the extra fish but you should always allow space for growth.

**I have found one or two very small wounds on three of my pond fish. They are about a quarter of an inch in diameter and appear to be rather inflamed. What is the cause, please?**

From the size of the wounds I think that they are caused by fish lice, *Argulus*. Examine the fish carefully especially where a fin joins the body. You may see the lice, like miniature plaice, no more than a quarter of an inch across. They are transparent and rather difficult to see on the body of a fish. They may be picked off with tweezers or if the fish is dipped into a solution of a half teaspoonful of Dettol to the gallon of water, the lice will leave the fish immediately. Do not leave the fish in the solution for more than a few seconds.

**I am soon to make a garden pond and am not sure about what I should put in the bottom for the plants to grow in. Shall I use gravel or soil?**

There is no need to place anything in the bottom of your pond for plants. It is very much better to leave the base clear and to set all water plants in containers. By this means it will be easier to clean out the pond annually. The plant containers can be lifted out at any time for attention or when the pond needs to be cleaned. If you have anything on the base, either gravel or soil, the plant roots will soon become matted in this and any removal of plants becomes not only difficult but is sure to upset the state of the water. The best type of container is in the form of a basket, which could be plastic. If a turf is placed in it and the lily securely planted, it will be found that as the plant grows, roots will grow out of the sides over the bottom to use up any mulm. There is one important point to remember when setting the lily, and that is to make sure that the plant is well tied into the basket and that some form of weighting is used to prevent the whole from rising to the top of the water when growth is made. Once a water lily becomes well established and many leaves spread on the surface, the whole plant including roots and soil can float up to the surface. It is then difficult to get the plant back into a good position without badly disturbing all the leaves. I have known cases when it is necessary to

throw a plastic cord attached to two pieces of concrete slab, over the whole plant to get it down into its proper place again.

**I am hoping to breed some fancy goldfish this summer and would like your opinion as to whether it is wise to use aeration for hatching and rearing?**

Although I do not use aeration for tanks of adult fancy goldfish, I certainly think that it is well worth while to use some for hatching and rearing. I consider that a good supply of well oxygenated water over the eggs assists in the hatching of the eggs. In nature this may not happen except in such cases like the Sticklebacks, which fan their eggs. Normally cold-water fishes lose all interest in their eggs once they are laid and fertilised. The case of the Stickleback is different as the male makes a form of nest, which, by its construction is inclined to prevent fresh water from flowing over the eggs, hence the action of the male fish in fanning.

Most other coldwater fishes lay their eggs at the side of pond or lake where there is shallow water. This is always likely to be better oxygenated than deeper water. When you have eggs in the hatching tank, see that a good supply of air is directed over them. If you have a base heater in the tank, this will help to keep the water oxygenated as the heater will create a steady movement of water from base to surface. The warmth will also give a far quicker hatch and enable the fry to eat and thrive better. A good temperature to aim at is about 70°F. Goldfish eggs will hatch in 3-4 days at this temperature whereas at 60°F., hatching can take over a week. A quick hatch means that the eggs are not exposed to possible pests for as long as they could be with a longer hatch.

**In a recent number of *The Aquarist* you mentioned the use of a rubberised paint for sealing the surface of a concrete pond. What is this paint called?**

The paint I had in mind is 'Pondseal'. Most fish stockists will be able to supply you with this. The surface to be treated must be quite dry before the paint is added. There is also a primer for using first and to make a very good job, two coats of the paint can be used.

**What can I feed an American Pumpkinseed Sunfish with?**

This fish is carnivorous, more like our native Perch. In the wild these fish eat small fishes and any other live foods they can find. You will find that your fish will eat garden worms, maggots, etc., and strips of raw meat or ox heart. You may be able to get it to take flake food if prepared as I have stated several times before.



# MARINE QUERIES

by Graham F. Cox

## READERS' SERVICE

All queries **MUST** be accompanied by a stamped addressed envelope.

Letters should be addressed to Readers' Service, The Aquarist & Pondkeeper, The Butts, Brentford, Middlesex, TW8 8BN.

I am having a problem feeding my anemone. I can't seem to find any reference to correct foods for these creatures. I would be grateful if you could advise me on the care and feeding of them.

The very special requirements of the anemone family are shared by all the phylum *Coelenterata*, i.e. the anemones, living corals, hydroid polyps etc., and are as follows:—

A. **LIGHT.** You must provide at least 2.5 feet of fluorescent tube lighting per square foot of tank surface area. Thus, if we imagine a 48 in. × 15 in. × 15 in. marine aquarium containing invertebrates, the following lighting is required:—

Surface Area:—4 ft. ×  $\frac{5}{4}$  ft. = 5 sq. feet.

Therefore we need 5 × 2.5 = 12½ feet of tube. This means we would use 4 × 36 in. fluorescent tubes (= 3 × "NORTHLIGHT" and 1 × "GRO-LUX") or even better, 5 × 36 in. tubes.

This rule of 2.5 ft. of fluorescent tube per square foot of tank surface area holds good for all marine aquaria up to 18 in. deep. Beyond that depth 3.5 ft. tube/sq.ft. would be more satisfactory.

The failure of all early marine aquarists (—myself included) to appreciate the enormous significance of correct lighting in the invertebrate aquarium, has resulted in almost overwhelming body of belief that marine invertebrates cannot be successfully kept for more than a few months. Nothing could be further from the truth. I have a 48 in. × 18 in. × 18 in. absolutely full of delicate invertebrates and algae—many of which have lived in this same brilliantly-lit aquarium for the last 4 years!

B. **Feeding.** (A regards their feeding). All invertebrates could be split up into three principle categories as follows:—

(i) *Gross particle feeders*—in this group would come the animals such as anemones, the cephalopods and most of the crustaceans (but *not*, for example, the barnacles). These animals entrap by various means large, easily-visible food particles which are either drifting in the current (e.g. anemones) or are already settled on the sea-bed (e.g. crustaceans).

(ii) *The "scrapers" or "scourers"*. Most of the molluscs fall in this category, e.g. the cowrie which rasps algae from rocks. However, beware the exception which proves the rule, e.g. the octopus is an active predator eating gross (usually *living*) particles and most of the bivalve molluscs are filter-feeders see below.

(iii) *The filter-feeders*—these are invertebrates such as the feather-duster worm, living-corals, tunicates, flame-scallop, clam etc., which extract living plankton from the seawater by an effective process of filtration.

Now anemones, as marine aquarists understand the term, belong to Group (i) above, and they must be fed with an appropriately-sized sheet of squid-tissue (postage stamp up to 4 sq.ins. depending on the size of the anemone) which has been soaked in a complete vitamin solution for 3-5 minutes before feeding. Additionally, the seemingly insatiable appetite of the *Coelenterata* for vitamins may be satisfied by adding the vitamin drops direct to the seawater. This feeding regime, together with the high intensity illumination described above as "indirect feeding" will maintain an anemone in a good state of health for several decades.

# KEEPING KOI

by Hilda Allen

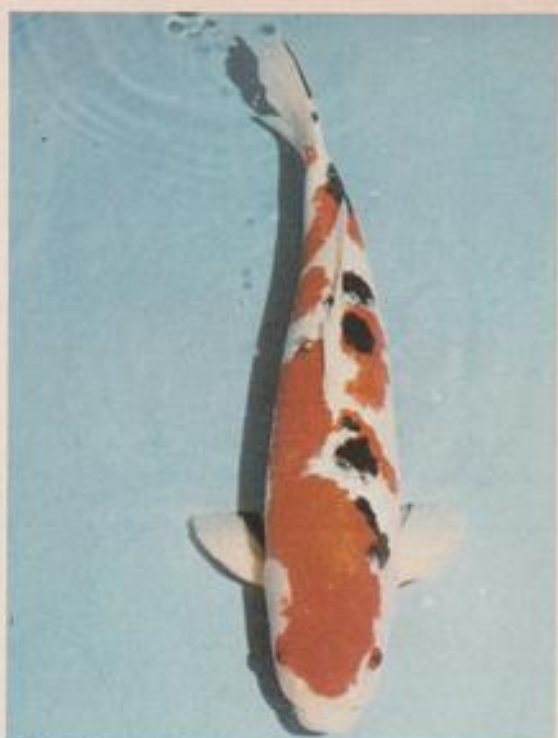
With the longer days, thoughts inevitably turn to gardening, ponds and may be the pleasure or problems of keeping Koi. There is certainly a difference between keeping those Koi one has had for several years and those that may have been newly-imported.

At the time of writing (late February), my own Koi in two ponds are remarkably active and feeding well since the sudden thaw and a fairly rapid rise in temperature which occurred about a week ago. These established Koi had endured an over-long cold spell under freezing conditions when they remained almost motionless for 6 to 7 weeks. Of course, no feeding took place during this period of inactivity and the water stayed in good condition, clear and well-oxygenated by the constant return flow from under-gravel filters operating in both ponds. As usual, this effectively kept large holes open in the ice and the most I had to do was to make a daily inspection to make sure all was well, as far as could be seen through the snow and ice without disturbing the fish.

This period of inactivity in the winter is entirely natural and nothing to worry about.

With the thaw, helped by partial changes of water, the Koi soon began to roam the ponds in search of food as though it were already summer.

This is always a heartening sight and I believe in offering small quantities of food when the signs indicate that food might be welcome. I do not go by the Calendar but by the Koi. To avoid any confusion at this point (especially for beginners), I will explain that generally (a) Koi experiencing their first long British winter are usually far less active



Taisho Sanke. This magnificent specimen, 20" long and 3½ years old, won the B.K.K.S. Grand European Championship of 1977. The owner is Mr. Malcolm Hardy.

at colder temperatures than those already established and (b) none are likely to die of starvation if otherwise healthy.

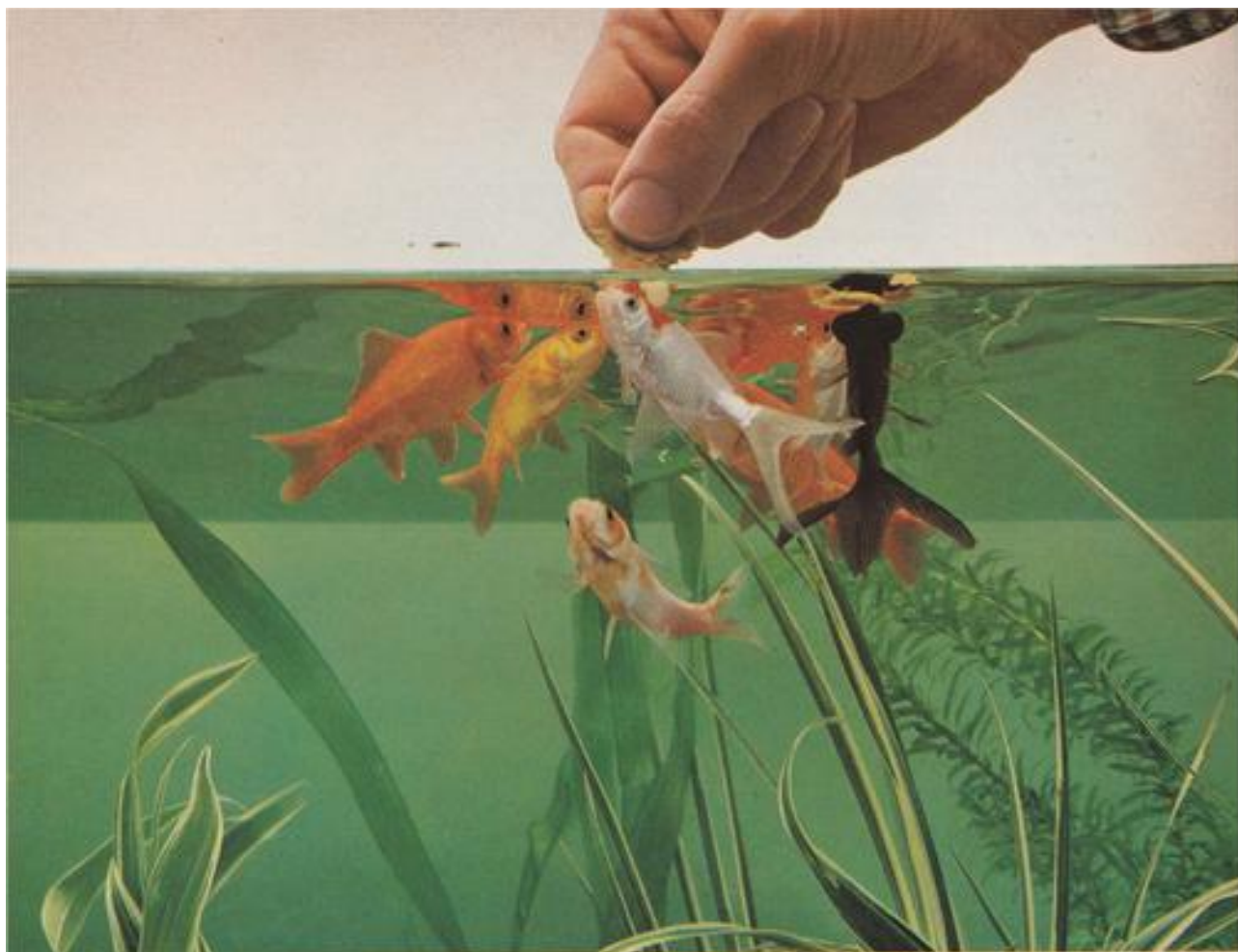
Well-planted ornamental ponds may well provide sufficient live food to maintain goldfish, etc. through the winter but relatively bare Koi-ponds are unlikely to be self-sufficient, especially if Koi are large, healthy specimens.

Having kept goldfish, shubunkins, orfe, etc. for many years before the arrival of Koi I have been able to make comparisons and arrive at certain conclusions. I am confident that none of my Koi would starve if they were not fed between November and April but I am satisfied that a little feeding keeps them in better condition and leads to fewer problems in spring.

I am aware of the dangers in advising beginners to feed Koi during winter due to the temptation to over-feed but it is stressed that only small amounts must be given and only when the Koi are "foraging." The fish should be observed to make sure that all is eaten in a reasonably short time. Winter food should include earthworms, soaked wholemeal bread, boiled brown rice or wheat, and mashed vegetables. These all sink, floating pellets are for summer, not winter feeding.

*Continued on page 16*

THE AQUARIST



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The long-range weather forecast for March warns of more cold spells on the way and the Koi will show their usual good sense in retiring to the deep areas during each change to lower temperatures.

People have worried that Koi appear to waste precious energy by swimming about in winter or because Koi remain almost motionless for long periods. There is usually no cause for concern in either case, Koi will generally behave according to the water temperature.

Readers may be buying their first Koi this year and these may be home-bred or imported, and if shopping around a difference in health and quality may be apparent. It must be accepted that problems are ever-present as with humans and other animals, but certain problems can be reduced if care is taken over the purchase of Koi. Mysterious losses can



Koi pond.

occur for a whole variety of reasons, and some complaints are difficult to notice until it is too late for treatment.

I believe that many of the losses among newly-imported Koi can be attributed to stress. This is a convenient word to use but specifically means overcrowded conditions of travel, changes in water conditions, rapid temperature variations and probably an overall lack of care. Any such setbacks will lower the resistance to disease and it is important to avoid Koi that show symptoms of stress or disease.

Indications are, general lassitude with closed fins, dull or sunken eyes, blood congestion in fins, tail or body, hollow back or wasted appearance of the body

in relation to a large head, raised scales, fin or tail rot, gills not working, fungus or any bruising. Parasites such as anchor-worm, fish-lice or white-spot may be obvious.

In general terms Koi are active fish and should swim easily with all fins extended although it is often difficult to judge the effect of being confined to display tanks.

The introduction of any disease or parasite into a pond will cause enormous problems and the rule applying to all new fish must be strictly observed. It is amazing that people ignore the vital need for quarantine and are happy to add new purchases to established stock. They should not wonder if their whole stock becomes sick at a later date. Koi can be upset by being moved or may be affected by changes in water. When kept separately they can



Goldfish pond before structural alterations made if the Koi pond shown on the left.

be easily observed and treated when necessary. In my opinion health is more important than perfection of colour or pattern and caution and quarantine is strongly advised. I am often asked the price of Koi but this is an impossible question to answer. It is obvious that price will depend upon size and quality, some varieties may be cheaper than others and suppliers may be breeders, importers or retailers.

Koi are magnificent and once seen are overwhelming competition for other fish. Please abide by the rules of quarantine, space and sufficient volumes of clean, healthy water if you wish to enjoy the pleasure of keeping Koi.

I would like to thank the reader in Sussex who wrote to tell me of his six largest Koi now 26 in. — 28 in. long, obtained twelve years ago when 6 in. The largest of his own breeding (mainly ohgons) are now 12 in. and spawned when the parents were six years old. I have also heard of Hi-goi up to 15 years old and orfe between 20 and 25 years in Surrey.



# Returning to the Fold

by Peter Burns

STRANGE isn't it? Somehow, just as you begin to make progress in an interest, something happens to set you back to square one. So it was with me and my tropical fish. It was in the mid-sixties when I was still a lad at school that the fascination of tropical fish first took hold. It followed quite naturally from a pretty thorough absorption in all things reptilian which, of course, entailed the continual haunting of pet shops and fish shops. The lure of such attractive and lively animals as tropical fish could not long be resisted! Even on pocket money of only ten bob a week, one 18 in. tank inevitably led to a further three and before too long young Guppies swimming jerkily in a floating jam-jar led on to young Zebra Danios and so to other egg-layers. All seemed set fair, despite the occasional disaster, until the date of departure to university loomed ever closer. It had to be faced that the fish 'had to go' and they were duly found suitable homes. I promised myself, however, that as soon as I was settled in one place again the reappearance of fish tanks would be high on the list of priorities.

One year ran into another (as they do) and six years later the worries of passing examinations had been superseded by worries of electricity bills and mortgage repayments. However, I was once again with a permanent roof over my head and after a surreptitious but steady campaign to win over my wife to the attractions of fish, I judged the time right to recommence my fish-keeping activities. When a week or two later I bumped into a three foot tank with all the trimmings (including Gro-lux lighting and a respectable stand) in a second-hand shop at a very reasonable price, the opportunity was too good to pass by. The tank and a tube of aquarium sealer were bought, the numerous leaks were attended to and half a hundred-weight of gravel was assiduously washed.

Then came the really interesting stage—planning the first tank-full of plants and fish. This is where the six full binders of *The Aquarist* kept from those early days proved their worth. Several absorbing evenings were spent leafing through these, reading articles, jotting down notes and generally undergoing a crash refresher course. The advertisements in the current issue supplied a more than adequate

range of plants from which to choose and of course no opportunity of diving into a 'tropicals' shop was missed. I had long had in mind a number of species of fish for the main community tank. These included both old favourites such as Glowlight Tetras, Guppies and *Corydoras* and others which I had not kept but which held a definite appeal and these included Leopard Danios and Honey Gouramies. It was in the course of this preliminary scouting around that I became aware of some of the changes that had taken place in the hobby since last I was acquainted with the world of fish-keeping.

One fish I particularly liked, *Copeina arnoldi*, that I used to know as the Splash Tetra is now generally known as the Spraying Characin and seems rather hard to come by. The same also applies to the little sucking catfishes (*Octocinclus* species) that perhaps have been ousted in the popularity stakes by the ubiquitous *Gyrinocheilus aymonieri*. A dramatic and welcome change is the increased availability of the African Cichlids and it might be my imagination but some of the more interesting varieties of Angels seem more common. In fact, I was quite impressed by the variety of fish available and considering the appalling rate of inflation that marked my absence from the hobby, the prices are pretty reasonable.

Meanwhile back in the aquarium, things were beginning to take shape. The plants had arrived and had been carefully arranged in the tank. Being an ardent advocate of plenty of greenery, this, the light and the crystal clear water already added up to an attractive feature in the room and stocking with fish began a little while afterwards. The first batch included Guppies, Neons and Ramirez's Dwarf Cichlids. As we do not have a television, the fish had no competition for attention and accordingly chairs were drawn up every evening to watch the incessant courtship of the male Guppies, the territorial squabbles of the 'Rams' and all the other activity. Needless to say, this large and brightly-lit addition did not escape the notice of the two feline members of the household! The tank is quite safe from their possible predations and it still provides them with endless hours of fascination.

Continued on page 31



Bristol type Shubunkins

## BREEDING GOLDFISH

by Arthur Boarder

I SUPPOSE that it would be true to state that most aquarists and pondkeepers have an ambition to breed at least a few fishes. The usual start at fishkeeping takes the form of one tank with two or three fish. After a time the urge to expand occurs and an extra tank or two is obtained. The next step could be a pond in the garden and then before long the added interest of breeding. The usual kind for the beginner is the common goldfish, and there is nothing wrong with that. It is better to gain some experience with them than to start right away with an expensive variety of fancy goldfish.

After all, there is nothing at all difficult in breeding goldfish; providing the fish are healthy there is no reason whatever why they should not spawn. Many goldfish spawn in ponds and their owners may know

nothing of it until later in the year they see a few small youngsters in the pond. However, if one wishes to breed a good number of fish or any of the fancy varieties of goldfish, there is much more to it than to let the fishes carry on with no supervision. The chief reason why so few are reared in a garden pond is that the parent fish will eat the eggs soon after they have finished spawning. It is not during the actual spawning that the parent fish may eat the eggs, but after the excitement of the chase has died down, some of the fish may browse about among the water plants and eat any eggs they can find. Also, there may be one or two fish, usually unripe females, which have not been spawning and they can be the culprits.

Naturally the first step will be to make sure that

*Continued on page 22*

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# IRISES FOR THE WATER GARDEN

by Philip Swindells

THE GENUS *Iris* is a vast and complex one which embraces an immense number of plant types from the diminutive bulbous *I. reticulata* and *I. danfordiae* through the rhizomatous *I. germanica* varieties to coarse tufted perennials like the native Stinking Gladwyn, *I. foetidissima*. Between, or to one side, of this spectrum of the plant kingdom are the moisture-loving and aquatic species which are a further and much valued departure of great diversity and usefulness in the water garden.

Most pool owners are familiar with the native Yellow Flag, *I. pseudacorus*, a stout prolific grower with broad sword-like leaves and attractive reddish seed capsules. However, it is rather too coarse for the smaller pool and better replaced by one of its varieties such as the soft primrose var. *bastardi* or the golden and green foliage cultivar 'Variegata'.

*Iris versicolor* is the North American counterpart to our Yellow Flag and is a splendid fellow with violet blue flowers veined with purple and a conspicuous patch of yellow on the falls. Its variety 'Kermesina' is even more lovely, the blooms being of a gorgeous deep plum shade with the same distinctive markings.

Like the previous two species, the handsome blue *I. laevigata* is a true aquatic, but until recent years much confusion existed amongst pool owners as to the status of this species, for both *I. laevigata*, *I. kaempferi* and hybrids between the two were unscrupulously collected from the wild by the Japanese for export. To the uninitiated they appeared to be one and the same plant, but when planted in water only those that were true *I. laevigata* survived the winter thus giving rise to a lot of uneasiness amongst the early growers of these plants as to their usefulness as aquatics. Fortunately, some wide-eyed botanist discovered the existence of the two species in importations—which can be separated by the presence of a prominent mid-rib in the leaves of *I. kaempferi* and its absence in those of *I. laevigata*—and both kinds then began to achieve the popularity they deserved.

The true *I. laevigata* is the blue iris of the Asian paddy fields and produces typical sky-blue flowers

during June. Many cultivars are commonly available and even if of slightly dubious origin enjoy much the same conditions as *I. laevigata*. *Iris laevigata* 'Alba' which is white, 'Monstrosa' (syn. *Colchesteri*) violet and white, and 'Rose Queen' are the most outstanding, together with the handsome cream and green variegated foliage form with soft



blue flowers which is known variously as 'Elegantissima' and 'Variegata'.

Apart from the truly aquatic irises there are a multiplicity of species and varieties that do well in moist ground and are eminently suited to bog garden culture. The most outstanding of these is undoubtedly *I. kaempferi*, the Clematis flowered Iris of Japan. When established it forms strong tufts of broad grassy leaves surmounted by large clematis-style blooms like huge resplendent tropical butterflies at rest. Dozens of cultivars of Japanese origin have been imported over the years, but the majority now have westernised names and are freely available. Some of the best varieties currently offered are 'Blue Heaven', rich purple-blue with a yellow throat,



'Hokkaido', pale blue lined and veined with maroon, 'Mandarin', deep purple-violet and 'Landscape at Dawn', lovely double blooms of pale rose-lavender and the snow white 'Apollo'.

Another useful group is *Iris sibirica* and its hybrids. These have the same grassy foliage and are possibly easier going, not resenting an alkaline soil as *Iris kaempferi* do. The sky blue variety 'Perry's Blue' is universally known, as are the purple 'Caesar' and the pure white 'Snow Queen'. 'Perry's Pigmy' is a dwarf growing kind of deep violet, while 'Ottawa' is of medium height and bright purple.

Apart from these two important groups there are

several natural species of similar disposition. *Iris aurea* is a robust species quite four feet high with flowers of deep golden yellow. *Iris bulleyana* is a small Chinese species with grassy foliage and delicate flowers of rich blue, similar in many ways to *I. setosa*, but lacking the lush broad foliage of that species. *Iris chrysographes* with deep purple flowers appreciates an open sunny position, while the giant yellow and white *I. ochroleuca* will tolerate anything as long as its roots are kept moist. All the named varieties of aquatic and moisture loving irises are readily propagated by division, while the species are easily raised from seed as well.

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## ANOTHER USE FOR BRINE SHRIMPS?

by Dorothy Mason

TO THE fish-keeping public at large, the brine-shrimp is synonymous with the feeding of baby fish. I have always had a sneaking sympathy for Artemia; Nature goes to a great deal of trouble to ensure the survival of these little creatures, even providing for them, in the event of their environment drying up. Most of the eggs we buy, have been gathered from the dried-up habitats of these crustaceans. They are still viable after months and even years of storage. Just how large brine-shrimps grow however has probably never been realised by fish-keepers, since the poor wretches never survive the myriads of greedy fry.

It has taken an American concern (and it HAD to be American, of course) to realise the potential of the fully-grown Artemia as an amusing and interesting aquarium-dweller. Packeted and marketed under the somewhat fanciful name of "Sea Monkeys" they come in a "kit" comprising: instruction booklet, a packet of "Instant-life-ready-to-hatch-Sea Monkeys," a packet of "water purifier," one of "Living Plasma" (brine, to you and me) and one of "growth food." This latter appears to be some secret formula, for without it we cannot feed our monkeys and there is unfortunately no simple way of ordering more.

"You'll gasp with amazement," says the introduction, "when you see the actual birth of dozens of adorable sea-monkeys. Brought to life before your eyes . . . in your own home, a live sea-circus . . . astonish your guests by making them appear to obey your every command. We even show you how to

make them look like (sic) they're dancing to real music, performing loop-the-loops, and other 'daredevil' stunts."

The tragedy of all this is that every fish-owner knows the miracle of the hatching of brine-shrimps, but unfortunately this is not usually viewed with the delight appropriate to the acquisition of a "sea-circus" of "adorable sea-monkeys" but to a goodly crop of fry food. None of us have ever regarded them as worthy of rearing for their own sakes.

I have no doubt that a tube of ordinary brine-shrimp eggs, hatched and fed with something approaching the 'secret' formula would merit the title of sea-monkeys, "sealed in Time-capsule eggs to produce the cutest pets you've ever seen" etc. etc.

The fanciful illustrations are covered against any Trade descriptions acts by the comment "caricature not intended to depict Artemia Salina" which is a good thing really.

Rearing these seems to have become a cult in the USA (and really where else could it?) with special "electric Micro-Vue Ocean Zoo" tanks offered, which have built-in magnifiers, built-in stereo viewers (all for five dollars) plus extra vitamin food, and to help the cult on its way, we are assured that "the President's are doing just fine."

I am trying out the "kit" of 'Instant Pets' even if I do not attempt to 'train' them to perform "endless stunts at my command, to everyone's astonishment."

But one thing's sure—I'll never again be able to feed these innocent creatures to baby fish.

## BREEDING GOLDFISH

*continued from page 18*

you have the two sexes in the pond. When in breeding condition the male fish will usually show small, white, raised tubercles on the gill-plates and perhaps on the front rays of the pectoral fins. The females should look fatter in the body when viewed from above. Much has been written about getting the fish into breeding condition, but providing they have been properly fed during the previous summer and autumn, it is almost certain that the fish will spawn when conditions are right. It has also been stated that fish breed better when they have been subjected to a cold winter. I do not think that there is much truth in this as there is little doubt but that during the previous late season, eggs or milt will have been forming in the fish. I have never been able to test the theory as my parent fish have always spent the winters out of doors in the garden pond.

Providing that the fish are in good condition the pondkeeper should make provisions in the early part of the year so that all is ready by the spring. Knowing that many eggs will be eaten unless precautions are taken, it is imperative that bunches of fine



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Above: Veiltail Goldfish

Below: Fantail Goldfish

leaved water plants are available to act as nests for holding the eggs. It is also necessary to get ready one or two hatching tanks for receiving the eggs when laid. I have always used Hornwort for making up bunches for receiving the eggs, as I find that the fine masses of leaves are excellent for holding many eggs. Also, as this plant makes no roots, a bunch can keep alive in the pond when anchored near the side and also when removed with eggs to the hatching tank.

The hatching tank can be any receptacle and need not be deep. A plastic washing-up bowl is very good for this purpose as there is no need to have deep water. Shallow water usually contains more oxygen than would a deeper one. The ideal breeding pond is one where there are not many oxygenating plants all over it. It is then almost certain that the fish will spawn on the nests which have been supplied. Over many years of breeding fish in a garden pond, I can state that the fish always came to the shallow end, where the nests were anchored, in order to spawn. Most fish will spawn in shallow water where no large fish is likely to swim normally and so the eggs are safe. Also the water in the shallows is usually much warmer than that further out.

As for conditioning the spawners, a few garden worms will always be taken avidly but there is no need to feed specially at this time, as long as enough is given to keep them happy and not too hungry. What actually spurs the fish on to spawn is rather a mystery. I cannot state definitely what actually starts them off, but I know what will prevent them. Most fishes will only spawn when the water is very fresh and well oxygenated. As for the weather and the temperature of the water, I do not think that this makes as much difference as does the state of the water. As for the temperature of the water necessary to obtain a spawning, I do not think that this is as important as some might believe. Over many years

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of breeding fish in a pond I have found that I have had spawnings at temperatures as low as 52°F, and as high as 78°F. Over many spawnings the average has been 61°F. It must be remembered that the warmer the water the less oxygen does it contain, which is not as likely to encourage the fish to spawn as would colder water with more oxygen. I have heard opinions that the fish spawn best on a growing moon period or in certain types of weather but I still adhere to the opinion that the fish will spawn when the

vigorously, but just a gentle follow up. The next morning, quite early, spawning may commence. There should be no doubt as to whether the fish are spawning as the males chase and nudge the females towards the bunches of plants. The females may lie for a time on the nests and then with a sudden and violent thrashing of tails, the whole bunch of fish force through the fine leaved plants and eggs are released and fertilised. Another chasing will then take place until the female is again among the nests.

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## ARTHUR BOARDER

### Doyen of Goldfish Breeders

NO ONE would argue that obituaries fulfill a right and proper function but it can be supposed that everyone would agree that anything to be written to an individual's credit is better published during that person's lifetime. So it is that we have elected to include in this issue an appreciation of one of our most popular contributors whose writings within these pages go back thirty years.

Born in June of 1895, Arthur Boarder left school on his fourteenth birthday. Joining Kitchener's Army in August, 1914 he served in the Middlesex Regiment being demobilised in 1919 as a Company Sergeant Major Instructor of the Army Gymnastic Staff. Service in the Metropolitan Police Force then followed until his retirement in 1946. Life now began for Arthur so far as his varied recreational interests and pursuits were concerned.

His older brother and father were both keen anglers and he was brought up within a conversational aura slanted towards fishes. He started on his goldfish keeping career with a small tank when he was five years old and by the age of thirteen years was writing a monthly article on coarse fishes for his school magazine.

By 1937 Arthur Boarder was specialising in breeding a strain of red-scaled fantail goldfish and was a very

successful exhibitor during the period 1946 to 1950 by which time he had started judging and lecturing.

As an all-round student of Nature, Arthur participated in the culture of other life-forms. He bred and exhibited Norwich canaries early in 1920 and had started growing cacti in 1905, building up a very large collection. He was a founder-member of the Cactus and Succulent Society of Great Britain in 1931 and served on its committee for many years until becoming Chairman.

No name can be more widely known among fish keepers, especially coldwater fish fanciers, than that of Arthur Boarder. He has written many scores of articles on fishes and cacti and many books including *Coldwater Fishkeeping* (Buckley Press), *Garden Ponds* (Foyles), *Starting with Cacti* (Collingridge) and others as a "ghost-writer."

Best known now for his *Coldwater Queries* in this magazine which he commenced answering just after the end of last war, Arthur has given enthusiastic encouragement to many thousands of tyro fishkeepers and especially those who have met him and who, unavoidably, have been infected with his love of his subject.

We are pleased to wish him continuing involvement with the hobby and with us, his fellow hobbyists.

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condition of the water is right, and not when the weather suits them.

There is one point on which I am certain and that is, when a spawning is required, if a quantity of water is removed from the pond and fresh tap water run in, this is more likely to encourage the fish to start than anything else I know. The night before the actual spawning the male fish may be seen following the females round the pond. Not actually chasing

When a fair number of eggs are seen on the nests a fresh bunch should be supplied and the eggs removed to the hatching tank. If bunches of plants have been in the pond for a week or two, before spawning takes place, it is advisable to wash the nests up and down in the water to remove any mulm or dust which may have settled there and which might prevent the eggs from adhering safely. The eggs are laid in numbers but are not attached to one another,

and they adhere to the plants quite strongly. They are about the size of a pin's head. When in the water they do not show up very well and look like tiny bubbles but if the bunch is lifted from the water the eggs show up more plainly with a slight amber colour.

The eggs will hatch in time according to the temperature of the water. If one of 70°F. can be maintained, a hatching will occur in three and a half days. At a lower temperature the eggs take longer, as much as ten days if lower than 60°F. When spawning is taking place a watch should be made if there are young female fish spawning, as if several largish males are chasing, the female may become distressed and have to be moved to safety. Some liquid fry food should be dropped into the hatching tank a couple of days before hatching is expected. There will then be some food for the fry when they are free swimming. This can be about a day after hatching with a warm water. This liquid food will encourage the formation of infusoria for the fry. A gradual increase in the size of food can be made as the fry grow.

The type of fish to breed will be the choice of the pondkeeper but shubunkins and scaled fantails are the ones I recommend. These are hardy in the pond all the year round and quite attractive. The shubunkin (either the London or the Bristol type) are very finely coloured fish, with a blue ground and markings of red, yellow and black. The London type is better for a pond in a cold district as the flowing fins of the Bristol type could be badly affected by fin-rot in a severe winter. The fantail is a hardy fish, with an egg shaped body and a double tail. The tail should be wholly divided and held out from the body and not hanging down. A red colour is preferred but these handsome fish can be found in Calico and even with telescopic eyes.

The veiltail is a very handsome fish but because of its long slender finnage is not to be recommended for the pond in any cold district. It is, however, an excellent fish for anyone who wishes to breed fancy goldfish indoors. This fish has a rounder body than the fantail and should be the colour of the shubunkin,

with no hard scales to be seen. Like the shubunkin, the gill-plates should be transparent and any visible scales would result in a loss of points at an exhibition.

If one is able to supply some warmth to the hatching tank, there will be a much quicker hatching and the fry will grow far more quickly. The advantage of this is that the fry will be able to grow fast enough for them to be able to go through the winter out of doors in the pond. The youngsters need to be at least two inches long overall before the winter sets in, to be safe in the pond. A lot may depend on the amount of plant life in the pond as to whether the young fish will survive the winter there.

It should be realised that to breed either the shubunkin or fantail in the pond to get good youngsters, it is important to make sure that there is only the one variety in the pond. All of the varieties of goldfish will breed together and the resultant fry can be of little value. If one has more than one kind in a pond, it is always possible to catch a particular pair to put into a tank with plenty of water plants so that they can spawn and not have their eggs fertilised by males which are of a different variety. If one uses a special corner or spot of the pond for the nests, it is well to make a screen to fit over this place to prevent cats from catching the fish as they lie on the surface when spawning.

If a pair of fish have been taken from the pond for spawning in a well planted tank, it is necessary to remove them back to the pond before night. The tank could become dangerous through lack of oxygen during the night resulting in death of the fish. Heavy aeration might be a safe method, but I have known fish to have been killed by being left in a heavily planted tank, especially if the water is warm.

Spawns usually take place during the morning and may cease by midday although. Sometimes they can go on during early afternoon. Healthy fish can spawn about every month during late spring and summer. To keep the fish healthy and strong, plenty of food should be given during such times.

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# From a Naturalist's Notebook

by Eric Hardy

It is well known that small, colourful red damsel fish live in the protective association of stinging sea-anemones. Other fish like remoras stick to sharks and *Nomeus* lives with the long stinging tentacles of Portuguese men o'war, though these are not often kept in aquaria. In British waters the pelagic recently-hatched larval codling, up to about an inch, is often associated with large jellyfish. Drifting near the surface the bell-like jellyfish often has small larval cod, and other gadoid fish, clustering beneath for shade or protection, a form of commensalism.

Small colourful, coastal British suckers or clingfish, red and yellowish *Lepadogaster* cling to stones in rock-pools, the sides of the aquarium, or to one's finger. Off Torquay, you will find the Cornish sucker, and despite the Connemara sucker's name it ranges through the English Channel to the Mediterranean. There are 2-spot and small-headed suckers in British coastal waters. The clingfish or *Gobiuscidae* are small fish scattered over the coastal waters of both hemispheres, living in stone crevices. In the Old World they are called sucker-fish, but don't include the lumpsucker or hen-fish whose adhesive disc is below the shoulders rather than formed at the widely separated pelvic fins. In the Indian Ocean, Pfaff found a new genus which take refuge among the spines of sea-urchins. Originally considered confined to Guadalupe Island, another, *Gobiesox eugrammus*, has recently been found to range from southern Californian to Mexican waters in association with the sea-urchin *Strongylocentrotus franciscanus*.

Somewhat flattened, especially at the head, with the nostril just above the eye, it has larger canine teeth and a fleshy adhesive pad at the base of the pectorals. Orange, spotted brown with 7 vertical bands, it darkens on darker ground. 50% of the sea-urchins on rocks were found to shelter it under their protective spines.

In captivity, Greenfield and Wiley of California State College fed these on frozen brine-shrimp and small isopod crustaceans which also live commensally with the sea-urchin. Night, when it leaves this protection of the sea-urchin, is its main feeding time, feeding on polychaete bristle-worms, crab, snails, cowries and limpets, but mostly isopods. Cottids, ronquil, and klipfish also live in close proximity. Other *Gobiesox* live in West Indian and Pacific waters.

Also associated with long-spined sea-urchins are schools of long, narrow shrimp-fishes, *Aeoliscus strigatus*, which swim vertically, head-down among the spines. The trouble of keeping sea-urchins in the aquarium is that they sometimes climb up the side.

In the Red Sea, a new genus of clingfish, *Lepadichthys lineatus* was found in 1963 associated with crinoids in the coral reef in shallow water at Eilat, at the top of the Gulf of Aqaba. These too were active at night and when kept in aquaria showed a change of colour pattern. When resting undisturbed they were reddish brown with long yellow-orange stripes. When aggressive the dominant fish's dark patches became prominent, leaving only 3 dorso-lateral yellow lines clearly seen. The recessive fish in these aggressive disputes turned pale brown, not reddish when they left their coral host for open water. Their yellowish spots turned white.

## Declining Amphibians in Europe

The Council of Europe is concerned over the continued decline of continental amphibians and reptiles, with 47 out of 110 species endangered. In 6 years, great crested newts have declined by 75% around Zurich, and other Swiss species in danger include yellow-bellied toad, green toad, tree-frog, Italian frog, green lizard, the aesculapian snake (*Elaphe longissima*), the asp and the adder. In Germany, 66.7% of reptiles and 63.2% of amphibians

are endangered, especially the pond-turtle, the green lizard, the aesculapian and the tassellated (diced) snakes, and the asp. Formerly common grass-frog, toad and sand-lizard have declined considerably, mainly due to destruction of their habitats and drainage of spawning haunts. One new highway in the Chur Rhine Valley destroyed 66% of the breeding waters of alpine and common newts. Many were killed crossing the road. DDT and other pesticides are also blamed. An affected grass-frog has been found to spend more time in the open than a normal one, and thus more easily falls prey. At Hyeres one year, where I have studied these creatures on the south-east coast of France, 5,000 tree-frogs were found dead after a single anti-mosquito spraying campaign. Edible frogs imported from Turkey to Swiss restaurants had a mercury content of 0.2 ppm and lead 0.15 ppm. Large numbers of the rarer amphibians and reptiles are traded from Yugoslavia and Turkey. In only half of 1976, Switzerland imported more than a million green frogs weighing 167 kg from Turkey, Bulgaria, Hungary and Yugoslavia, for eating. In 1976 Greece exported 2.2 million green frogs for the food trade and, between 1968 and 1970, Italy exported more than 47 million frogs and toads in the trade to schools and scientific institutions states the Council of Europe's centre for nature conservation. In 1971, Yugoslavia alone exported 400,000 European tortoises.

#### Harmful Aliens

Another problem is the introduction of harmful aliens. *Gambusia*, the mosquito-eating fish, almost exterminated a sub-species of common newt near Venice and the Sardinian mountain newt. Sunfish wiped out great crested newts in the Saar. American bullfrogs seriously threaten the survival of native amphibians and reptiles in the Po Valley of Italy.

Bounty paid for all Schweizer's Lebetina vipers on the Greek isle of Milos endangers this snake with extinction. But conservation efforts need caution and prior ecological experience. When marsh-frogs threatened by wetland reclamation near Zurich were indiscriminately transferred to new haunts, they developed into the dominant species at the expense of the originals there. In Louisiana, 1,500 surplus alligators were captured and put into former haunts in Mississippi and Arkansas.

To save the endangered Atlantic race of Ridley's turtle, Mexico has been asked to make a sanctuary of their breeding beach by excluding shrimp-trawlers, which entangle them in their nets and drown them. The American bog-turtle is now restricted to 9 northeastern states of the U.S. and is subject of a current behaviour survey to stop its demise.

#### Dragonflies

Though expensive at £9.75p for 115 pages, Cyril

Hammond's new specialist's book *The Dragonflies of Great Britain and Ireland* (Curwen Books) is the only one giving the body-pattern clues of male and female of all 44 species, in 24 colour plates, as well as keys to genera and species and their aquatic larvae. Duplication of the distribution maps could have spared room for more information on habits, for though it mentions the migrations of red-veined *Sympetrum fonscolombi* and the declining ruddy *sanguineum*, they are not mentioned with Europe's greatest dragonfly-migrant, four-spotted *Libellula quadrimaculata*, or 5 other migratory species. The status of these fascinating aquatic insects varies greatly. The hawkler *Aeshna isosceles* is confined to the Norfolk Broads, like the once abundant *Libellula fulva*, now scarce from pollution. Once known only as an immigrant, *A. mixta* now breeds annually in the Southeast. The northern damsel, *Caenagrion hastulatum*, northern emerald *Somatochlora arctica* and the blue hawkler *A. caerulea* are confined to Scotland. The brilliant emerald *S. metallica* is increasing its range in the South of England and the scarce blue-tailed damsel, one of several New Foresters and once believed extinct, was in North Wales recently.

There has been no recent record of the orange-spotted emerald, *Oxygastra curtisii* formerly on Moors River in Hants, while the small, dainty damsel, *C. scitulum* hasn't been seen since its Essex site was flooded 25 years ago, or the Norfolk damsel *armatum* since its haunt near Stalham was polluted 20 years ago. The variable damsel *pulchellum* and the southern broad-bodied *Libellula depressa* are also declining.

#### Conservation Reserve

Freshwater habitats from Tring's Wilstone reservoir's record European catfish, and with locally rare orange foxtail grass, round-fruited rush and mudwort at Startopend, to Great Ouse river management's biological conservation effects on fish, and the Stort Valley's Sawbridgeworth Marsh Reserve, are among items in the 54 page *Research and Management in Wildlife Conservation*, published at only 17p by Herts and Middlesex Trust for Nature Conservation, Offley Place, Great Offley, Hitchin SG5 3DS. The papers are from a symposium on mainly water resources for wildlife. Different species of water boatmen bugs for instance are distributed around the Cheshire meres according to variable amounts of salinity.

The only known south Lancashire haunt of bearded tassel weed, *Ruppia maritima* in Southport marine-lake is to be eradicated with herbicides this spring owing to its abundance affecting yachting and angling. Some roots will be transplanted to nearby marshes first. Its nearest haunt is across the Ribble at Lytham St Annes. Until 1939-40, the related wigeon-grass *spiralis*, still grew on Cuedley Marsh by the Mersey at Widnes.

# AQUATIC CHEMISTRY

## FIRST OF A SERIES OF ARTICLES ON AVAILABLE TECHNIQUES AND FACILITIES

by Dr. P. A. Lewis

DURING the past seven years I have been very active in Aquarium Society circles giving talks on many aspects of fishkeeping and disease treatment. Inevitably, since the audience knew me as a chemist as well as a keen aquarist, the questions raised on conclusion of a talk "homed in" on the topic of water conditions and treatment of diseased fish. Questions would range from the simple "How do I increase the pH of my tank water?" to the more complex—"How can I tell if my marine fish are being poisoned by heavy metals?". In short, whilst giving talks to Societies ranging from Bristol in the South to Scarborough in the North, I have come across many wide ranging questions concerning Aquarium husbandry and it is with this in mind that I am writing this series of technical articles directed at aquarists with a view to increasing the hobbyist's awareness of the techniques and facilities at his disposal.

### Definition of pH

The first of my series of articles is concerned with the subject of pH, its definition, measurement and control.

In the early days of chemistry an acid was defined as a substance which "had a sour taste" as experienced if one tasted citric acid (lemon juice) or acetic acid (vinegar). However, if the same test was applied to a stronger acid as sulphuric acid (battery acid) a second reaction, that of an acute burning pain, was also experienced by the person "testing" the acid. Similarly an alkali was defined as a substance which was "soapy to the touch". This effect was caused by the alkali reacting with the natural oils present in the skin to form a soap. Once again constant "testing" by this method resulted in damage to the person carrying out the test since strong alkalis soon destroyed skin tissue and caused severe burns. Despite the obvious disadvantages of this method of testing there is the added fact that these empirical tests gave very little guide as to what to expect if a substance was neither acidic nor alkaline.

The credit for the most widely used definition of pH

goes to a Scandinavian named Sørensen who proposed that the symbol pH be used as an abbreviation for "pondus Hydrogenii" and that the pH value would define the acidity or alkalinity of a liquid. Literally translated the phrase "pondus Hydrogenii" means weight of hydrogen and an expression of pH serves to give a measure of the hydrogen ion ( $H^+$ ) content of the water as compared to the hydroxyl ion ( $OH^-$ ) content, pH does NOT serve as an abbreviation for "positive hydrogen".

### Range of scale

The pH scale ranges from 0 to 14. A solution which is highly acidic will have a pH of 1, a solution which is highly alkaline will have a pH of 14. A substance, for example hydrochloric acid, which dissociates when dissolved in water to give rise to hydrogen ions ( $H^+$ ) will create acidic conditions and conversely a substance, for example sodium hydroxide, which gives rise to hydroxyl ions ( $OH^-$ ) will create alkaline conditions. Pure, deionised water at room temperature will be neutral and as such have a pH midway between 0 and 14 i.e. pH7.

A most important point to grasp when dealing with pH is that the scale is "logarithmic". That is to say that a change of pH from 7 to 6 is equivalent to a 10 fold increase in acidity, from 7 to 5 to a 100 fold increase, from 7 to 4 to a 1,000 fold increase etc. This arises from the fact that, by definition, water at pH7 contains one ten-millionth of a gram of hydrogen ions per litre, at pH6 the hydrogen ions have increased to one-millionth of a gram per litre and at pH5 to one hundred-thousandth of a gram per litre (i.e.  $10^{-7}$ ,  $10^{-6}$  and  $10^{-5}$  respectively).

In the above explanation I have used the term "ion" and for those who are not familiar with the term perhaps a short explanation may help. For a substance to dissolve in water to any appreciable extent it must be capable of dissociating into an electrically charged atom or group of atoms. Water itself is composed of hydronium ions ( $H_3O^+$ ) and hydroxyl ions ( $OH^-$ ) and these ions will associate with other ionic species dissolved in the water. For example if

common salt, sodium chloride, is thrown into water it will gradually dissolve by dissociating into positively charged sodium ions ( $\text{Na}^+$ ) and negatively charged chloride ions ( $\text{Cl}^-$ ), each of these ions will associate with oppositely charged ions from the water to form what is termed a "hydrated ion". A point to note is that, irrespective of the source of the ion dissolved in the water, all ions of the same species are equivalent to each other. That is to say, in an aquatic environment, fish will not differentiate between chloride ions from magnesium chloride, sodium chloride, calcium chloride or hydrochloric acid.

#### Narrow Band

Unfortunately the aquarist is only concerned with a range of pH values from pH 5.5 to pH 8.6. I say unfortunately, since it is in this narrow band around neutral at pH 7 that minor changes in internal or external conditions can result in major changes in the fishes' environment. A neutral pH, pH 7, is almost impossible to obtain in practice due to the fact that carbon dioxide from both the atmosphere and as a result of plant action will readily dissolve in water to form carbonic acid, a weak acid, which leads to a decrease in pH. If the water is rich in toxic ammonia, present as a result of bacterial action or food decomposition, and the water becomes acidic then this ammonia will be converted into the relatively non-toxic ammonium ion thus decreasing any danger to the fish. If, however, the converse occurs and an acidic environment rich in ammonium ions is made alkaline, the toxic ammonia is liberated and fish will die. Fish tolerance to ammonia varies with several factors but, generally speaking, an effect will be noticed if 1 ppm of ammonia is present. I hope to say more on the subject of ammonia and its effects in a later article dealing with the "Nitrogen Cycle" in depth.

The pH value of natural water depends largely upon the amount and chemical composition of compounds dissolved in it. Generally speaking water which is rich in calcium and magnesium, hard waters, are alkaline whereas waters rich in organic compounds as derived from moorland or peat bogs, often soft as a consequence, are acidic.

#### Measurement

To turn now to the measurement of pH as may be accomplished by the aquatic hobbyist. Basically the most effective measurements for the least expensive can be carried out using pH indicators either as papers or as a liquid. If papers are used the aquarist must be careful to purchase "Narrow Range" papers which give an easily recognised colour change over the pH range of pH 5 to pH 9. The papers covering the range from 1 to 14 are useless from the point of view of the aquarist since the colour change from pH 5 to pH 9 is not precise enough for his requirements. The

papers are merely soaked with an acid-alkali indicator, dried and cut to a realistic size for economical use. An indicator may be defined as a substance which by its colour indicates the presence or absence of some other substance. In the case of an acid-alkali indicator the colour varies dependant upon the hydrogen ion content of the environment i.e. the pH. The most common indicator is litmus which is a blue powder derived from various lichens, notably *Variolaria lecanora* and *V. roccella*, and is red at pH 4.5 and blue at pH 8.3. The most commonly used indicator in freshwater aquarium chemistry is Bromothymol Blue which is yellow at pH 6 and blue at pH 7.6. To use this as an impregnated paper merely dip the paper in the aquarium water and compare the colour developed with the colour on the book of papers. To use Bromothymol Blue as a solution place 5-6 drops of the solution in a small tube, add 5-6 millilitres of the water under test and examine the colour developed under natural light, NOT artificial light. A yellow colour denotes pH 6 and below, yellow-green denotes pH 6.2-6.7, green denotes pH 6.8-7.0, green-blue denotes pH 7.0-7.4 and blue denotes pH 7.6. Use the indicator solution sparingly as addition of excessive amounts will not improve the testing and will merely waste the chemical. Store the indicator solution in the cool and dark, NOT in the open in a fish house.

#### For Marine Aquarists

An ideal indicator for marine aquarists consists of alpha naphtholphthalene and phenolphthalein mixed in a 1:2 ratio and 6 gram of this mix dissolved in 1 litre of 96% alcohol. This indicator changes as follows with the change in pH:—

pH below 7.5	almost colourless (may be yellow)
pH 7.5-7.8	green
pH 7.9-8.1	pure turquoise
pH 8.2-8.3	light blue
pH 8.4-8.5	dark blue
pH 8.6-8.7	violet
pH above 8.8	dark violet

With this mixture it is almost impossible, even by artificial illumination, to confuse the colour changes since the reflection ability and colour intensity also changes. Since indicator solutions often contain alcohol as solvent it is a good idea to store them away from children and pets. NEVER carry out the test by adding the indicator direct to the water in the aquarium.

As an alternative to the use of indicators there are available in the hobby pH instruments which measure pH directly. This measurement is based upon the determination of the potential of a galvanic cell as compared with a standard hydrogen electrode. Since these instruments are relatively expensive and their use is mainly confined to commercial establishments they need not concern us here. Suffice it to say that they are available and very accurate.

### Buffers

Having described how pH may be defined and measured what can we do about altering it to suit our needs. Here we come across the term "buffer". A buffer may be defined as a substance to which large amounts of acid or alkali may be added without causing any appreciable change in pH value. The addition of a suitable buffer to the aquarium water will result in the establishment of a pH which will alter very little as a result of minor internal or external changes. In nature the pH of sea water rarely exceeds 8.4 or falls below 7.5, this value being regulated by a series of chemical reactions involving carbon dioxide, carbonic acid, sodium bicarbonate and sodium carbonate which forms a buffer mechanism that requires very large additions of acid before the pH is lowered. A marine aquarist will maintain the pH of his aquarium between pH 8.0 and pH 8.4 by the addition of sodium bicarbonate (baking soda) or by using quantities of some form of calcium carbonate such as oyster shell, marble chips, coral sand or calcite kept in contact with the circulating water.

Conversely a person who keeps fish that require a slightly acid environment for their well being, as for example do discus, cardinals and the greater majority of killifish, will require to maintain the pH between pH 5.5 and pH 6.0. To achieve these conditions the aquarist may add a 2:1 mixture of sodium dihydrogen phosphate and disodium hydrogen phosphate, which is a very effective buffer, or he may prefer the more "natural" method of using peat or peat extracts.

### Peat

Peat is humus which has lain in very damp conditions for centuries without air circulation, it consists mainly of Sphagnum moss. Peat is rich in humic acids which give the peat its brown colour, and in tannins. Tannins are derived from partially decomposed plant substances such as bark, tree trunk, roots and possibly leaves. Some tannins are very important from a biological standpoint since they may inhibit multiplication of certain bacteria and protozoans. The dark waters of the tropics are rich in tannins which serve to protect the fish from the excessive settlement

of bacteria on the skin and in open wounds. (How many aquarists have seen or heard of the addition of dry banana leaves to the tanks of newly imported fish in an effort to accustom them to the water change?). Not all peat is suitable for use in aquariums; in fact, contrary to popular opinion, not all peat is acidic. Ideally peat from old moorlands should be used since the moss cushions of these moors have been compacted over the years to form a deep bed of peat moss which is poor in calcium and acidic. The peat obtained from low lying marshland which is not densely packed and still has air circulating through the fibres is rich in calcium and nitrogen and useless for aquarium use.

Peat which has a coarse-fibred, matted texture besides not being suitable for the aquarium may actually contain chemicals which restrict plant growth. Peat which has a close-packed, crumbly structure may contain growth substances and fungus destroying chemicals which actually promote plant growth. A test for the suitability of the peat purchased for use in aquariums is to soak a portion of the peat in a quantity of distilled water overnight. The next day measure the pH of the water above the peat. The pH should be just below pH 5. Next aerate the water for a few hours and re-measure the pH. If the pH has risen appreciably the peat contains readily volatile acids and is unsuitable. Acid peat water will maintain its pH even when aerated and this type of peat is an ideal acid buffer, even the most complex man-made chemical buffer could not take its place.

### Warning

One word of warning before leaving the subject of acid buffers. It is very easy to alter the pH by the addition of tannins purchased from the local chemist. This may present a hazard due to the tolerance of fish to varying amounts of tannin. Killifish such as the *Aphyosemon* can tolerate far higher concentrations of tannin than can many Barbs and with live-bearing fish even small amounts may prove fatal. Finally, always carry out any change in the pH of your aquarium water SLOWLY. My advice is to alter the pH by a maximum of 1 unit over 8-10 days. Remember pH is a logarithmic scale and 1 unit represents a factor of ten.

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## Returning to the Fold *continued from page 17*

The number and variety of fishes grew, the plants became established and the tank generally began to settle down. A second tank appeared on the scene, was planted out and stocked with Tiger Barbs. Things were going too well and it could not last. Within the space of a week, I had a road accident, ended up in hospital with a broken leg and the Tigers got White Spot. By this time my wife was a full convert to the joys of keeping tropical

fish but despite the loving ministrations of a trained nurse, all was in vain and the Tiger Barbs died long before I returned home.

The tanks have now increased to seven (somehow they seem to increase even more rapidly than Guppies); the original three foot tank seems healthy and several batches of a variety of egg-layers are eating and growing fast. It looks like progress at last but I am beginning to get that uneasy feeling that something unpleasant and unwanted is just around the corner! Strange isn't it?



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## WHAT IS YOUR OPINION?

by B. Whiteside, B.A., A.C.P.

Photographs by the Author



I FREQUENTLY wonder what some of my regular correspondents look like; in the case of John and Gwyneth Travis I don't have to wonder: they own The Seawood Hotel, North Walk, Lynton, Devon, and with their letter they enclosed a copy of their hotel brochure containing a photograph of the attractive couple. Mr. and Mrs. Travis write: "We have followed your feature with interest and thought it was time we wrote in. We would like to extol the virtues of the keyhole cichlid, an often underrated fish. Unlike many cichlids they are peaceful, they do not root out plants and, in our opinion, they are very attractive. Our two keyholes fortunately turned out to be a pair. Living on a diet of hotel scraps—cooked chicken liver, prawns, trout and cooked meats—they were soon laying eggs on the top of a plant pot in a community tank. They policed their first brood but then gave up the struggle and devoured them. We removed the other inhabitants from the tank and the keyholes soon spawned again. This time, on their own, they made devoted parents shepherding their youngsters round the tank by day, finding food for them and guarding them in a pit by night.

"We now have 108 x 10p sized keyholes to dispose of and we would be pleased to give some free, to 'good homes,' for anyone who can call for some of them.

"Our kribensis have now emerged from a plant pot with at least as large a brood of tiny, three day old fish and we are beginning to wonder if we shall be able to find homes for them all. Undaunted we are anxious to try our hand at breeding other dwarf cichlids and we wonder if any of your readers can supply us with some interesting fish.

"We should also like to share with you some of our experiences with plants. We believe that a well-furnished tank is the best setting for enhancing the beauty of the fish. Unfortunately at first our plants struggled to survive; or gradually faded away. Eventually we took out our U/G filters and put in a layer of garden peat covered by gravel. It was necessary to soak the peat well first to prevent it from floating. All our plants are now flourishing and multiplying. Our Amazon swords, *Cryptocoryne* plants, hornwort, *Cabomba* and *A. ulvaceus* are all doing well and for the first time we can plant out new

tanks with cuttings and off-shoots from established tanks.

"We find our tropical fish are always a talking point with our guests. We are always surprised at how many of our visitors are active enthusiasts or genuinely interested. Fishkeeping provides us with relaxation at the end of a busy day and is a hobby that all our family can take part in."

I rarely receive letters from aquarists who live in Northern Ireland; hence I was pleased to hear from Mr. S. Knight, of 7 Salisbury Terrace, Portrush, County Antrim. Mr. Knight had the following to say: "I went out the other day and purchased a new safety heater and thermostat. I found the heater was a little better because it won't be so easily broken by big fish, or if it gets a fall; but it could still do with longer wire. I got a bit of a shock when I saw the thermostat: it is still as dangerous as ever it was. Firstly, the wire is too short: there is only 9 in. of wire between the thermostat and the connector for the heater; so it has to be put at the top of the tank—which leaves the connection very near the metal frame of the tank; so if the top comes off or gets very wet someone could get a very bad shock; and I have seen the plastic connectors burn when water got into them.

"I am very surprised that the manufacturers could not think of a better way to connect these together. There are many ways, I am sure, but I have my own way of doing it. First I put a new, long wire into the thermostat and most times into the heater so that the thermostat is at the bottom of the tank; and the wires go down to a 13 amp. socket, and then the connection is made into a 13 amp. plug top. I am enclosing a diagram of how it is done; but I must stress that the heater and 'stat must be sold with the longer wires so that this can be done because many people could not re-wire them themselves. You will appreciate that I do not think much of the safety regulations for the aquarist because the plastic they put around the 'stat is costing us almost £1 more, which, I think, is most unfair because we, the aquarists, pay through the nose for most things we buy. They took the Diatom filter off the market; they said it was dangerous and replaced it with the Diatomic filter which, to my mind, is about half as good as the old Diatom; but of course the government see danger where there is little, and

see none when it is staring them in the face. (Unfortunately I do not have enough space to reproduce Mr. Knight's diagram. I would urge readers not to attempt to re-wire heaters or thermostats; such units are carefully designed and sealed. I would agree that some brands could be—indeed, should be—supplied with much longer leads so that connections can be kept as far as possible away from aquariums and water. Combined units, with long leads, are possibly safest and easiest to set up. In either or any case, when buying a new heater, thermostat or combined unit go for one with a long lead of an appropriate length. It's up to the individual to ensure that he or she gets value and convenience for money. If your unit or units need to be connected to a 13 amp. plug top, make sure that you fit the appropriate fuse, i.e. the amperage should be that recommended by the manufacturer of the heater/thermostat unit. Many of us tend to buy 13 amp. plugs, fitted with 13 amp. fuses, and we don't take the trouble to have the 13 amp. fuse replaced by one of lower amperage, where necessary. The fitting of a correct fuse could help to save money and avoid danger.)

#### Fish Shows

Mr L. J. Collins had the following to say from his home at 23 Leylands Grove, Heaton, Bradford, West Yorkshire "I have been to only three fish shows recently and out of those only one lived up to expectations. That was KOI '77, held at Edgebaston, Birmingham. I went with a friend who is not in the least interested in fish, and I'm glad to say he really enjoyed it. The only thing that spoilt the day was the weather.

"The next show I went to was the annual B.A.F. at Belle Vue, Manchester. This was the fourth time I had been; but, I'm sorry to say, it might be the last. The show has been taken over by trade stalls. I'm glad to see that the B.K.K.S. are still going year after year.

"The last show I went to was the Bradford & District Open Show. This was one of the most pointless and disorganized shows I've ever attended. The thing that bugged me was seeing the auction: all those poor little fish cramped into small polythene bags. Some may have been there hours. I think, personally, that these types of auctions should be banned. What is your opinion?"

"Please print my letter as I am desperate for help," writes Mrs. Lorraine Hunt, who resides at 5 Church Road, Friday Bridge, Wisbech, Cambs. "I am a new reader of *The Aquarist* and I am writing to ask if anyone can help me with some information. Over the past four months I have purchased twenty-nine *Brachygnathus xanthozona* (bumble-bee fish). They have a tank of their own and are fed on live *Daphnia* as they will not eat flake food at all. I cannot find any

information on their breeding habits; but during the time I have had them some have filled out, the head and first yellow stripe have turned black, and a black spot has appeared near the opening of the vent. Does this mean anything? They like to stick on the glass, rocks and flowerpots—as some fish do as they lay eggs—but nothing appears to be there when they move. I have found your magazine very helpful." (Sterba, in *Freshwater Fishes of the World*, gives the following information about gobies in general: "Bottom-fishes which should be kept in slightly brackish water—1-2 tablespoons of sea-salt or common salt to 10 litres of water; not difficult . . . Temperature 24-30°C. Small live food of all kinds." Sterba goes on to say that with water changes and a proper diet the fishes will spawn—usually inside flowerpots or under stones. Eggs large; about 100-150 per spawning. Eggs hatch in 4-5 days; young guarded by male. The young swim in mid-water; they become bottom-fishes later.)

#### Euthanasia

Mr. Rupert Paul's home is at Shimpling Place, Shimpling, Bury St Edmunds, Suffolk. "I am writing about methods of killing fishes. In the October, 1977, *Aquarist* I read that R. Milnes used aspirin and nicotine to kill his fish. While I acknowledge the importance of killing hopeless fish I feel that his methods are both time-consuming and cruel. Surely there must be a kinder way to kill a guppy than to leave it to die for 15 minutes in a solution of nicotine. I have had to kill fish on several occasions because of dropsy. I always destroy fishes diseased in this way as soon as possible. The method I use is to net the fish and put it on a thick wad of newspaper, place another wad on top of it and crush it with great violence using my foot. Death is instantaneous and the whole process takes about 5 seconds once the fish is caught. I have killed fishes up to 3 in. in this way. Beyond that the method becomes more difficult and rather messy, but for small fish I can see no quicker or humane method than the one I have outlined.

"Many thanks for the Java moss (received last year). It is spreading slowly around my 27 in. tank and I have started a second growth in a second tank. I would also like to express my appreciation for an 'Exchange & Wanted' column. I would be a very worth-while article.

"Previously I wrote you a letter about decorative wood in aquariums. Since then I have set up another 27 in. tank with a 24 in. piece of wood in it. When the set-up matures it should be spectacular. The only fish in the tank at present are two fully-grown blue gouramies; but it is very impressive. One important point I missed out in my last letter was the type of wood used. The types in my tanks are probably a species of thorn tree—very dark wood—and alder (?). The latter has a violet tinge to it."

### Extremities in danger

"I should like readers to know about *Heteropneustes fossilis*, common English names: liver catfish, fossil catfish and walking catfish; my name is guppy eater," writes Mr. L. A. Belshaw, from 121 Allendale Avenue, Apsley Estate, Nottingham. "My *H. fossilis* is around 12-13 in. in length, 2 in. in belly girth and will grow to around 24 in. in my tank. I did not think of its potential size when I bought it from my dealer at 8 in.; we had no idea what kind of catfish it was—although I know most kinds of catfish on sight.

"Well, I started to clean out my tank that contained two large tinfoil barbs. I removed the cover glass and out jumped the catfish and started to walk on the floor. By the way, this catfish takes in air, i.e. comes up to the surface; and can live where tench cannot. I bent

mine had been 3-4 in. larger, I could have been in big trouble. If any reader has one, if he contacts me I can give him a feeding and care leaflet. Thank you for a very good magazine. I would be lost without it." (I trust Mr. Belshaw's warning will be heeded by all!)

Mr. R. S. Holmes writes from 5 Keals Croft, Lynton, Devon. "I hope, as I am sure many readers do, that you can continue to find room in your feature for the occasional surplus exchange item. On the day I received my January *Aquarist* I uprooted a clump of dwarf *Cryptocorynes* and posted them in response to a request from a Cheshire reader. Two days later, to the post office's credit, I received a letter of thanks with a big ball of Java moss and a bundle of Indian fern. For a cost of a few pence each we have both gained a generous supply of new plants, promised



down to pick it up, in a panic, because I am very proud of this fish. I felt a sharp stab in my thumb and first finger, which made me shout out, and a pain shot up my arm as though I had just picked up a wasp and been stung several times. It made my eyes run. My wife came running in; I think she thought I had dropped my power filter. I then netted the fish into the spare tank. I had to sit down for about 30 minutes; my arm felt as if I had been scalded.

"By the afternoon I had cleaned my tank out and got it running again; but all that day the pain in my groin was very great. As the night went on it started to fade away. I went down to the library and book shops and after three weeks I found it in Hamlyn's *Pictorial Book of Fishes*. *H. fossilis* grows to a length of 28 in.; habitat Vietnam and surrounding area; danger: if fishermen get one in their net they will cut the net away because the spines on the pectoral and dorsal, if they enter the blood stream, will cause partial or total paralysis of the extremities. So reader, if

future exchanges and, equally important, made a friend. It occurs to me that professional growers and dealers may be concerned at the development of plant swapping (sounds immoral, doesn't it?). In our case we both got something we would not have bought had your feature not existed.

"If this service is to be continued, I still have a surplus of *Cryptocoryne nevilli*, well-rooted, mature plants, and would appreciate *Cryptos* of any other species, however young.

"Readers sometimes complain—in fact, you have yourself—about the lack of sources of good-quality fancy goldfish. I found an excellent one, through one advertisement placed in *The Aquarist* last July. Reluctant to buy fish by post, the aquatic equivalent of pigs in pokes, I decided to test the claim that their fish were 'English bred from prize-winning stock.' They were priced in pence, not pounds, each. In fact, they were cheaper than retail prices of those ubiquitous, far-east imports which have deformed bodies and

single fins, and are prone to chills, fin rot and sudden death. I ordered eight each of orandas and calico veiltails. They arrived well packed and in superb condition; enormous for their age, beautifully coloured and with perfect bodies and fins. They went into outdoor tanks, which have since frozen twice. (In my defence: frost is very rare in my garden.) Despite this, they have continued to thrive and grow, with no sign of fin congestion or chilling. The orandas are developing splendid hoods, rather than the caps which disqualify so many imported 'orandas' benched at shows. If that supplier reads this, thank you, Mr. X." (Although we have failed to manage any kind of official 'Exchange & Wanted' feature, the limited amount of feedback so far suggests that, to date, numbers of readers have obtained pleasing results from responding to or sending a few lines to this feature. Samples of my Java moss appear to be thriving in obscure places; and last week I sent a piece to a reader in Central America. If there are any items you want, or wish to offer for exchange, send me brief details on a separate sheet of paper bearing your name, address and, if you have one, telephone number; I'll try to find space to publish such information—although its inclusion cannot be guaranteed.)

#### Plant keeping

Post Office Stores, Tittleshall, Kings Lynn, Norfolk, heads the following letter written by Mr. Ken Smith. "As I have been keeping tropical fish for less than 15 months I have little experience but bags of enthusiasm. I eagerly await the arrival of each month's edition of *The Aquarist*, turning to W.Y.O. first hoping to obtain some tips from others; and perhaps gain some consolation from the fact that I am not alone with my problems.

"Plant keeping was undoubtedly my biggest headache so I was interested to read a letter from another reader who suggested that this could be due to too few fish in the tank; the following month, however, another reader said too many fish; and I was back to square one. This prompted me to write and tell you of my first real success. Having removed all fish and plants from one of my tanks I proceeded to clean it by repeatedly stirring up the gravel and changing the water until it was reasonably clean; the tank was then filled straight from the tap and the heater, etc. re-connected. It was then left for two days to 'age' and warm up. I then purchased some new plants, including *Vallisneria*—which I have never before been able to keep for more than three weeks—which I planted more in hope than anticipation and awaited results. To my surprise, after a month not only was the *vallis* growing but also lots of new plants were growing from shoots off the main plants. All other plants were also growing satisfactorily. How many fish produced this result? None at all!

"Perhaps the number of fish was not so important after all as after a month was up I then put in about

a dozen fish of various sorts and the plants continued to flourish. The offshoots are now growing quite nicely in another tank which does have fish in it. Confusing—but keep the letters going as I still think they are the best part of the magazine."

Photograph 1 shows an attractive little pencilfish, *Nannostomus marginatus*. Have you bred any of the pencilfishes?

#### Universal Problems

Mr. John Sirkett's address is Norrway, Brentwood Road, Marden Ash, Ongar, Essex. He writes: "I am particularly interested to note that the problems aired in your feature appear to apply universally. The most recent of these is the problem encountered when trying to dispose of excess home-bred fish. The problem seems most prominent amongst those aquarists who keep and breed cichlids. This must surely be due to the undeniably aggressive nature of the more 'interesting' cichlids. It is a great pity that these surplus fish cannot be distributed to the various enthusiasts. I have at the moment a brood of *Haplochromis burtoni* which are going to be almost impossible to get rid of, let alone sell in order to recover some of the cost of rearing them. I am, however, quite sure that there are people who would be only too pleased to receive them. Anybody who would be interested in getting such a scheme off the ground should contact me. My intention is only to co-ordinate those people with surplus fish, and those who would like them.

"The other major problem is the growing or, rather, the non-growing of aquarium plants. I myself have hardly ever had problems with plants. I have had enormous success with many *Cryptocoryne* species, as well as *Vallisneria*, *Ludwigia*, *Aponogeton* and assorted odds and ends. The only problems I have had were due to an unsuitable choice of plants. *Gabomba* seems to thrive only in cool, very well oxygenated water. The most unsuitable plants, however, are the vast assortment of terrestrial plants, sold off to gullible aquarists by the unscrupulous. These plants invariably rot away in a very short time, leaving only a heap of decaying, brown slime to beautify your tank. This year in particular a large number of 'aquatic'—ha! ha!—plants have been offered. Among these plants are the well-known ivy leaf *Cryptocoryne* (not a true *Cryptocoryne*—*Syngonium podophyllum*), and the acorus rush (*Acorus gramineus variegata*).

"Many of the others would be better grown by the house plant enthusiast than by the aquarist. The species I have come across are: red leaf ivy (*Caladium species*), aluminium plant (*Pilea cadieri*), silver leaf (*Pilea 'Norfolk'*), white sails (*Spathiphyllum wallisii*), polka dot plant (*Hypoestes sanguinolenta*) and iresine (*Iresene species*). I can't say how many failures with plants have been due to these species, but I'm sure that a number of people have wasted their money on

them—and none of them is cheap. I can only hope that fewer of these plants are offered on the market next year" (Mr Sirkett's letter was written late last year. I should like to add the spider plant, *Chlorophytum variegatum* if my memory serves me correctly, to this list.)

Photograph 2 shows the algae-eating *Otocinclus vittatus*. How useful have you found this quiet little fish to be?

Like me, Mr. P. Denbigh is a schoolmaster. He resides at 4 Butts Terrace, Guiseley, Leeds, and was introduced to fish keeping by some of his colleagues. He writes: ". . . The rubber suction cup of my spirit thermometer recently perished. My dealer was unable to supply a replacement cup, so I had to buy a new thermometer and decided to try the new, digital type. I was rather dubious about it at first,



particularly when I discovered it had to be stuck on the outside of the tank. However, I have found it reliable, easy to read and accurate, having checked its reading with an expensive mercury-in-glass thermometer I use for photography.

"Another topic I would like to mention in this letter concerns the life span of fishes. The literature seems very sparse on this, apart from references to the 2 year life span of the guppy. (I recently lost my oldest female guppy, which was almost fully grown when I bought her in October, 1975, so I estimate she was at least 2½ years old.) Presumably the general rule is that the larger species have longer life spans than smaller ones. The problem is, of course, that unless you have bred the fishes yourself, or do have knowledge of their date of birth, the actual age is always something of a guess. Perhaps dealers could display the birth dates of their fishes, when known." (Mr. Denbigh's mention of photography brings to mind a question, of general interest, that I'd like to have answered. What are the effects of X-rays—such as

those emitted in airport machines designed to carry out X-ray examinations of passengers' luggage—on exposed and unexposed films? I know that such machines can ruin films; but what would the resulting prints be like from a previously-exposed film that had been subjected to X-ray examination? I should be pleased to hear from anyone who can supply an informed answer.)

#### Mongrels

No. 31 Parkhouse Road, Ardrossan, Ayrshire, heads a short letter—it makes a pleasant change!—I received from Mr. R. J. Paton. "In response to Mr. January's letter (December, 1977) mentioning the cross breeding of discus: in a local fish shop I have seen hi-fin black widows, hi-fin rosy barbs and hi-fin platties and, personally, I feel that what were beautiful fish have been wasted by these artificial appendages and that

no true aquarist would have them in his tank; and I agree with Mr. January that true strains should be conserved. By the way, should any of these fish be entered in shows would they be entered in the mongrel class?"

Defending the views they expressed in an earlier letter are George and Linda Middleton, who write from 31 Maltby Road, Chessington, Surrey. "We feel that we must reply to Mr. January's letter criticising our breeding procedure with discus. Had Mr. January read our letter correctly he would have observed that we emphasised that we breed with brown females because having kept discus for a good few years we have never been fortunate enough to get a coloured female.

"The majority of people who buy large discus do so in the hope of successfully breeding them; but if one adopted the policy of waiting for a good coloured female—royal blue, Lake Tefe, etc.—one might play the waiting game for a long time. Some of the loveliest discus we have ever seen have been crosses;

and to say they are sub-standard is rubbish. Some of the royal blue and brown have grown up like royal blues; and in fact those discus which have turned out like the royal blue father were also males, proving the point again of just how hard it is to get a coloured female whether it is wild or tank bred.

"Surely the most famous discus expert is Dr. Schmidt-Focke; he obtained a wild red discus and crossed it with a tank bred turquoise to make a turquoise and red. Could one accuse a man of his experience of just doing it for money? He has no need for it; just being a discus fanatic he was interested only in making a better discus. In fact, Dr. Schmidt-Focke wrote an extremely interesting article in the October, 1977, issue of *T.F.H.*; page 14 should be of particular interest to Mr. January as the doctor writes about the in-breeding of discus.

"We would not dream of criticising anyone about marines, killifish, guppies or any other type of fish for we know very little about them; but we spend a great deal of time with and learning about discus and this is something that we never tire of doing."

#### Nervous Discus

Mr. Derek K. Pattison's address is 1A Midland Road, Rushden, Northants, and he has the following to say about discus. "I have three discus of 3-4 in. and three of 2-2½ in. in a 36 in. × 15 in. × 12 in. tank. The tank contains one U/G filter covering half the tank. This is covered by 3 in. of gravel. Silica sand, which is lime-free, would be better. I have two large pieces of roofing slate lying along the back, behind which the fish can hide if they need to. I find that if fish can hide they will come out more. There are no plants as they are unnecessary—that will cause a controversy!—and the fish aren't bothered either way. I feed every morning with dry food; and feed *Daphnia*, blood worms, etc. in the evening.

"Discus are not delicate but do tend to be nervous when first bought. My three smaller fish hid for four days when first bought; whilst the large ones took two weeks before rushing forward to be fed. As with a lot of other species, discus soon find a 'pecking order,' i.e. one big boss, then a lower boss, and so on to the lowest in rank which everyone bosses. As long as the latter is feeding, leave him alone as one can't change things.

"One other point: discus recognise their owner after a few weeks. If the owner approaches the tank they rush up for food; but if a stranger approaches the tank they rush up for food; but if a stranger approaches the discus will hide. I wonder if other discus owners have noticed this. After 26 years of fish keeping, including a few as partner in a tropical fish shop, I think I can say that discus are as difficult to keep, for any length of time, as marines; but are getting easier due to the large numbers of home-bred discus on the market—which stand harder water than their wild-caught brothers. I should welcome any letters from other discus fans."

#### Lionfish

Mr. Kevin J. Appleton, of 57 Belmore Road, Thorpe-St-Andrew, Norwich, Norfolk, writes: "I keep a lionfish in one of my marine tanks and owing to the appetite of the other inmates have been unable to get him to feed on any form of dead food. I have even tried hanging prawns on threads of cotton but the other fish soon take a bite at this and the lionfish then ignores it completely. I therefore have to resort to feeding him on live food, i.e. fish, but my supply is rapidly coming to an end and I wonder if anybody has any unwanted fry or runt fish they might care to send me. I will gladly refund postage, etc.

"With regard to the plants in my tropical, freshwater tanks, I have good results with growing *Bacopa* and water wistaria and find that they can easily be divided by breaking the stem and replanting—the existing stem then re-grows very quickly—or, alternatively, by breaking off a leaf and allowing this to float. It soon shoots out a root and can be planted in the normal way. I have a 30 watt Gro-Lux tube on for approximately 13 hours daily, U/G filters and small pea shingle in the filter bed.

"I have some limited supplies of *Bacopa* and wistaria and should be glad to swap them for other plants, should anybody be interested."

#### Gold demise

My attractive goldfish, a photograph of which appeared on page 404 of the December, 1977, issue, died—or was killed—last week. I suspect it was killed by the fish photographed on page 405. The only additions to the tank, a couple of weeks before the fish died, were a small replica of the dead specimen and a moor of the same size. Both young fish are thriving. (Notice how careful I'm being, trying to disguise my continuing ignorance, lest Mr. Gordon West castigates me once again for my ignorance!)

#### From far and wide

*W.Y.O.* continues to attract letters from readers in far off parts of the world. The latest letter to reach me comes from Mr. Richard Townsend, whose home is at 59 Ironwood Drive, Vernon, Conn. 06066, United States of America. Mr. Townsend has the following to say: ". . . Many things happened today. I finished shovelling out of Storm 'Larry'—all 21½ in. of it. It was also the first time in four days that we received mail. One of the most noticeable pieces of mail just happened to be the December, 1977, issue of *The Aquarist*, mailed on 8/12/1977. I had been waiting patiently since last month's issue because there was to be an article on and pictures of the B.A.F. It was to be especially interesting for me to read because an Honorary Member of the fish society, of which I am Vice-President, the Exotix Fish Society of Hartford, Inc. (Hartford, Conn.), Dr. Peter Anthony Lewis of Huddersfield, England, had invited members of our society (when he visited with us) to attend the

B.A.F. He was to escort us if we were to go, and many of us planned to go until we realised that the B.A.F. was to be held the week before our Annual Show.

"Anyway, back to the point. When *The Aquarist* came I was very frustrated because each article was of particular interest to me: *The B.A.F. 1977, Discovery and Development of Swordtails and Platies, The Oscar, Starting with Top-Spawning Killifish* and, especially, *W.Y.O.* Each article dealt with a subject which means much to me. I decided that even this time, with all the other interesting subjects, I should read your article first as I have done with the past issues. Your column always deals with people in a personal setting. For this I am grateful; it is why, I believe, *The Aquarist and Pondkeeper* is better than the *Tropical Fish Hobbyist*. Anyway, congratulations on the very best issue of *The Aquarist and Pondkeeper* yet I enjoy most all the articles, and now that more colour pictures are being included it can only enhance the magazine.

"I would like to include my comments on what it cost me for heating and lighting my 5 tanks for the month of December—\$16.25—but I suspect that it would be immaterial in view of the fact that we use 115 volts for most appliances, and also the difference in currency. I do, however, intend to write not only once more in 1978, but perhaps several times as questions of interest to me, and on which I may be able to relate to your readers, come up. Please bear with me because it does take a few months for *The Aquarist and Pondkeeper* to reach me; and I'm not sure how long overseas, first-class mail takes to reach England and then on to you in Northern Ireland.

"One more thing, Mr. Whiteside, please. In view of the fact that it takes two months for the magazine to reach me, and not wishing to miss a single issue, could you intercede for me to determine how much a year's subscription in U.S. currency is required for—I believe the maximum subscription is one year—a year's subscription at 35p per issue. When I originally subscribed in August, 1977, the rate was 30p—\$12.00 U.S. I am including a self-addressed envelope for your convenience. I also would have placed a stamp on the envelope, because I feel that postage to your readers should not come out of your pocket.

"P.S.—I realise it may be unfair to me to ask you to intercede for me. If it would be a bother to you then please write to tell me that you are unable to do that. At least I would have your autograph to place in *The Aquarist and Pondkeeper*. Please don't send me any Java moss. Although I would love to try Java moss, I believe it would be too rough for it going through the mail. If, however, you know otherwise, then perhaps you could place me on your waiting list. On second thought, I should have stuck to my first statement. No; don't send me the Java moss. You have asked us in the magazine not to

request the moss until after you have been able to re-establish it. P.P.S.—I found out today that I can enclose postage. The postman said that you should be able to use the enclosed International Postage Coupon. Thank you." (I've just telephoned the Brentford offices of *The Aquarist* and have been told that the rate for surface mail is still \$12.00 U.S. As it states on the title page of *The Aquarist*, "*The Aquarist* will be sent by post for one year to any address for £6.00. Airmail quoted on request." Java moss is a plant that could travel, flattened in a polythene bag inside an envelope, quite safely by air mail—although an International Reply Coupon will cover only "the minimum postage for an unregistered letter sent by surface to a foreign country." Despite the cost of the phone call to Brentford, and the additional cost of air mail postage, I'll see if I can get a sample of Java moss to Mr. Townsend.)

My own aquarium plants seem to be taking over my six tanks again—despite my having cut down on artificial lighting, and the fact that there is little natural light reaching the tanks because it is freezing February. *Aponogeton* species have begun to sprout again—and one large Amazon sword plant has recently put out a runner that has divided and bears numbers of flower buds and, to date, thirteen young sword plants. The hornwort-like plant continues to grow apace, Java moss has formed dense thickets and Indian fern plants have covered water surfaces with thick layers of young plantlets that have sailed up from bottom-rooted specimens. I must clear some of the latter from my largest tank because the *Corydoras* and gouramies in the tank will soon be unable to reach the water surface, without difficulty, to obtain atmospheric air. Crystalwort has covered a large area of the water surface in another tank. Unfortunately I don't have as much time as I would like to devote to my aquaria; but, hopefully, when I get this feature finished, I should have a spare hour in which to clear out some excess plants and top up my tanks. I'm quite concerned about a couple of Amazon swords that are like cabbages: I suspect they'll soon be eating my fish. Oh well, I'll keep on taking the tablets and typing the letters!

My thanks to those who wrote to me this month. I look forward to receiving your letters, on the following topics, for future features: (a) propagating aquarium plants; (b) types of fluorescent lighting that promote good plant growth; (c) aquarium shows you visited recently; (d) obtaining spare parts for pieces of aquarium equipment manufactured in foreign countries; (e) cultivating live foods in the home; (f) breeding tetras; (g) sources from which uncommon livebearers may be obtained; (h) the places, in your home, where you have your tanks situated; (i) breeding anabantids. I hope you'll send me a letter—c/o *The Aquarist and Pondkeeper*, The Butts, Half Acre, Brentford, Middlesex, England.



## from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists societies for inclusion on this page should reach the Editor by 5th of the month preceding the month of publication.

IN the first of the February meetings **Merseyside A.S.** held an auction when a large number of members and visitors were able to purchase a wide variety of fish, tanks and various types of equipment at very reasonable prices.

At the second meeting 103 members of the society watched the film "World without Sun." This documentary by Jacques Cousteau concerned deep sea marine life and the night was greatly enjoyed by all who attended. The Society meets every alternate Tuesday evening at 8.00 p.m., at the N.U.R. Club, Deane Road, Liverpool 7. All newcomers are welcome.

**The Kings Lynn A.S.** had an above average attendance at the February meeting. Unfortunately the guest speaker, Dr. Ford had to postpone his talk until the March meeting but left another slide programme which was shown to members and then discussed.

The bench show was for Catfish, split into Corydoras and others. Results were as follows: Corydoras: 1, A. Freeman; 2, Mr. Brown; 3 and 4, V. George. Others: 1, A. Freeman; 2, C. Sumper; 3, G. Osler; 4, B. Wright. A. Freeman collected the monthly trophy for the fish with the highest points. Meetings are held at 7.45 p.m., on the second Thursday of each month, at the North Star Public House, Kings Lynn, and new members are always welcome.

**OFFICERS** elected at the annual general meeting of the **Walthamstow and District A.S.** were as follows: Chairman, D. Goodbody; Vice-Chairman, W. Moore; Treasurer, T. Needham; Show Secretary, A. Chandler; Committee Members, B. Cook; C. Peck; Secretary, G. Smith, Tel: 527 6303.

Meetings are held on the first Friday and third Wednesday of each month at the Grange Community Centre, Frederick Street, E17. New members are always welcome.

AN illustrated talk was given by Mr. Victor Cole on "Goldfish and Koi" to the **Bristol A.S.** in February. The speaker showed pictures of the pond he used to raise young Koi and Shubunkins as well as the ponds of fellow members and exhibitors. These, with some excellent pictures of some of his prize winning fish provided members with an excellent evening's entertainment.

**MEMBERS** and friends of the **Accrington D.A.S.** enjoyed a very interesting slide lecture given by Mr. C. Whittey at the February meeting. The topic was the layout and running of a fish farm from which members gained an insight into the running of this branch of the hobby and its problems.

The table show that followed gave the judges a hard time because of the high standard and a large entry. The results were as follows: A.V. Coldwater: 1, 2 and 3, B. Howarth. A.V. Tropical: 1, A. Scuttard; 2 and 3, I. Ashton. A.V. Pairs: 1, S. Lynne; 2 and 3, I. Ashton. The Best Fish in Show award went to A. Scuttard.

Also in February a dinner and dance was held. This was the first that the **Accrington D.A.S.** have ever held and was a great success. It is hoped to make this a regular feature of the Society. Credit for its success must go to the two members who were responsible for the

organisation, Mr. B. Howarth and Mr. C. Wallbank.

Speaker at the March meeting was Mr. A. Isherwood, who has been a member for many years. He gave a very interesting lecture on the breeding of Neons. He outlined the difficulties he had in the early years with these fish and how after many trials, with different waters and plants he had succeeded in breeding them. He also explained to the members the best ways to grow plants and also gave tips on breeding live food.

The table show results were as follows: A.V. Coldwater: 1, Mrs. Joan Foote; 2, B. Howarth; 3, M. Loftus. A.V. Tropicals: 1, I. Ashton; 2, Mrs. D. Webber; 3, P. Stuttard. A.V. Pairs: 1 and 3, I. Ashton; 2, S. Lynne. Best Fish in Show went to I. Ashton.

The Date of the **Accrington D.A.S.** Open Show is 4th June.

AT the March meeting of the **Thorpe and District A.S.** which was well attended the members were entertained by the club table show secretary T. Driver who gave an illustrated lecture on unusual livebearers. A raffle and large auction followed. Results of the table show were: Class 1 Barbs: 1, R. Miller; 2, T. Driver; 3, C. Pearnly. Class 2 Swordtails: 1, M. Ottoway; 2, K. Appleton; 3, T. Driver. Juniors, Barbs and Swordtails: 1, D. Hunn; 2 and 3, S. Fearnley. New members are always welcome at meetings held on the first Wednesday of each month at the Canary Public House, Heatrice, Norwich at 8 p.m.

THE first leg of the Three-Cornered Show held between **Novos T.P.C., Mount Pleasant A.S. and Priory A.S.** was staged by Mount Pleasant A.S. There were nearly 150 entries. Results: Barbs: Ba: 1, P. Best (Priory); 2, E. Conely (Priory); 3, P. Caddle (Novos). Barbs B: 1, A. Bloomfield (M.P.A.S.); 2, Mr. and Mrs. Embleton (Novos); 3, Mr. and Mrs. Risbridge (Novos); 4, A. Campbell (M.P.A.S.). Characins Ca: 1 and 3, Mr. and Mrs. Risbridge (Novos); 2, K. Ring (M.P.A.S.); 4, A. Campbell (M.P.A.S.). Characins C, Cb: 1 and 3, W. I. Grant (Priory); 2, R. Kirkup (M.P.A.S.). Dwarf Cichlids: 1, Mr. and Mrs. Embleton (Novos); 2, 3 and 4, L. Dixon (Novos). Rift Valley Cichlids: 1, K. Dobbie (Priory); 2, B. Turrel (M.P.A.S.); 3, C. Mallaby (M.P.A.S.); 4, Mr. and Mrs. Caddle (Novos). A.O.V. Cichlid: 1, S. Todd (Priory); 2, Mr. and Mrs. Embleton (Novos); 3 and 4, Mr. and Mrs. Caddle (Novos). Betta Splendens: 1 and 2, Mr. and Mrs. Embleton (Novos); 3, R. Kirkup (M.P.A.S.); 4, J. Birleson (M.P.A.S.). Labyrinths: 1, P. Best (Priory); 2 and 3, E. Conely (Priory); 4, Mr. and Mrs. Caddle (Novos). I.L.T.C.: 1, R. Kirkup (M.P.A.S.); 2, G. Quantrell (Priory). Trop. Catfish: 1, W. T. Grant (Priory); 2, K. Dobbie (Priory); 3, Mr. and Mrs. Risbridge (Novos); 4, S. Todd (Priory). Corydoras: 1, Mr. and Mrs. Embleton (Novos); 2, Mr. and Mrs. Risbridge (Novos); 3, C. Mallaby (M.P.A.S.); 4, D. Hulme (M.P.A.S.). Rasbora, Danio and Minnows: 1, Mr. and Mrs. Risbridge (Novos); 2, K. Ring (M.P.A.S.); 3, Mr. and Mrs. Embleton (Novos); 4, P. Best (Priory). Loach: 1, Mr. and Mrs. Risbridge (Novos); 2, D. Campbell (M.P.A.S.); 3, M. Campbell (M.P.A.S.); 4, K. Ring (M.P.A.S.). A.O.V. Egglayers: 1, M. Campbell (M.P.A.S.); 2, R. Kirkup (M.P.A.S.); 3,

Mr. and Mrs. Risbridge (Novos); 4, W. I. Grant (Priory). Pairs Egglayers: 1, P. Best (Priory); 2, K. Dobbie (Priory); 3, D. Campbell (M.P.A.S.); 4, Mr. Tipple (Novos). Pairs Livebearers: 1, R. Kirkup (M.P.A.S.); 2, E. Brown (Priory). Guppy Male: 1, G. Quantrell (Priory); 2, Mr. Tipple (Novos). Guppy Female: 1, R. Kirkup (M.P.A.S.). Niph Heller: 1 and 2, R. Kirkup (M.P.A.S.); 3, P. Best (Priory); 4, Mr. and Mrs. Embleton (Novos). Platy: 1 and 4, R. Kirkup (M.P.A.S.); 2, Mr. and Mrs. Embleton (Novos); 3, G. Quantrell (Priory). Molly: 1, R. Kirkup (M.P.A.S.); 2, E. Brown (Priory); 3, L. Dixon (Novos); 4, P. Caddle (Novos). A.V. Coldwater: 1, S. Todd (Priory). Breeders Egg-layers: 1, B. Turrel (M.P.A.S.); 2, E. Brown (Priory); 3, S. Todd (Priory). Breeders Livebearers: 1 and 2, R. Kirkup (M.P.A.S.); 3, W. Walton (Priory). Plants: 1, 2 and 3, W. Walton (Priory); 4, R. Kirkup (M.P.A.S.). Societies result was: 1, Priory 55pts, 2, Mount Pleasant 54pts, 3, Novos 41pts.

IN January the **Merseyside A.S.** held a meeting at which approximately eighty members attended. In the first half of the meeting, the Chairman of M.A.S., Mr. F. Mulla, gave a lecture on Fishkeeping for Beginners. In the second half of the meeting a lecture on Electric in the Aquarium was given by Mr. R. Barkley, Assistant Show Secretary.

At the second January meeting Mr. A. Bland gave a lecture and slide show on "The Feeding of Fish." His lecture included all aspects of feeding of both dry and live foods. Both lectures were greatly enjoyed and informative. The society meet every alternate Tuesday at the N.U.R. Club, Deane Road, Liverpool 7, at 8 p.m. All newcomers welcome.

THE new committee elected at the annual general meeting of the **Coventry Pool and Aquarium Society** was as follows: President, B. Broomfield; Chairman, R. Cleaver; Secretary, A. Brown, 189 Baginton Road, Styvechale, Coventry, Tel: 413252. Treasurer, P. and S. Bull; Junior Member, S. Price; Newsletter Editor, A. Simmons; Show Secretary, K. Davis; Vice-Chairman, T. Emms and D. Hascox. Meetings are held on the second Tuesday of each month at the Heath Hotel, Foleshill Road, Coventry at 7.45 p.m. and visitors can be assured of a warm welcome.

THE annual general meeting of the **Trowbridge and District A.S.** was held in January when a committee was elected with the addition of a new secretary as Mrs. Peggy Pearce has unfortunately resigned due to ill-health. Mrs. M. Bennett was elected in her place. The members discussed trips for the coming year and also the lectures and slide shows they would like to have at their meetings. This year there is to be an open show and with the Interclub and the monthly table shows promises to be an interesting one. New members are most welcome. The Club meets every second Tuesday of the month at the Rosing Club, Bradford-on-Avon at 8.00 p.m. Raffles and lectures on fish keeping make it a worthwhile visit.

**COMMITTEE** changes made at the **South Park Aquatic Study Society** annual general meeting were: Chairman, Mrs. M. Dudley; Secretary, H. Trim, 3 Milner Road, Morden, Surrey. Treasurer, Mrs. R. Trim; Show Secretary, L. Clapp; Asst. Show Secretary, G. Herring. Meetings are held on the third Tuesday in the month at Wimbledon Community Centre, St. Georges Road, S.W.19. Further details from Secretary 3 Milner Road, Morden, Surrey.

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**TABLE** Show results of the **Brighton and Southern A.S.** for February were as follows: Class F: 1, F. Hine; 2 and 3, P. Brookes (Jnr.); 4, E. Collins. Class M: 1, Mr. and Mrs. Ramshaw; 2, R. Collins (Jnr.); 3, F. Hine; 4, Mr. and Mrs. Collins. Class L: 1 and 3, Mr. and Mrs. Sayers; 2, B. Short; 4, Mr. and Mrs. Ramshaw. Open Show date 2nd July, Portland Town Hall, Victoria Road, Portland, Sussex.

**OFFICERS** elected at the annual general meeting of **South East Cornwall A.S.** were: Chairman, S. Francis; Vice-Chairman, P. Dack; Treasurer, E. Smith; Secretary, Mrs. H. Byford. Club meetings are held at the Long Room, West Street, Liskeard, on the third Monday of the month at 7.30 p.m. Visitors and new members are welcome. Details from the secretary at Liskeard 42394.

At the February meeting of the **Norwich and District A.S.** members and visitors heard a talk complete with slides on Catfish by Mr. Carl Rumbay. A very interesting year's programme has been arranged, and new members are always very welcome on the first Thursday of each month at The Norfolk Dumping, Norwich Livestock Market at 8 p.m.

**LAST** year finished in grand style for the **Uxbridge and District A.S.** with a lecture from Mr. Kettle entitled Fish on Stamps. All members agreed that it was a most enjoyable evening. The final meeting was a party for the children of members and friends of the club. Father Christmas appeared and gave all the children a present, and this was followed by a cartoon film show and an auction of gifts donated to the club by its members. As a result of the auction the Society were able to make a generous donation to the Save the Children Fund.

The 1978 season opened with a highly informative lecture on Catfish by G. Higgs and this was followed by an evening of members judging fish that D. Parsons brought along which proved quite a few laughs, but by and large the final paintings compared favourably with the experts. At the next meeting a talk was given by J. Parker on Plants.

As enthusiasm is growing meetings are going to be held fortnightly once again. Full details from the secretary A. Isted, 87 Larch Crescent, Hayes, Middx. Phone: 01-845 7567.

**MEMBERS** elected at the annual general meeting of the **Blackpool and Fylde A.S.** were: President, B. Simmons; Vice-President, F. Wilkin; Chairman, D. Wright; Vice-Chairman, B. Kenyon; Secretary, Kathleen Smith, 14 Newton Drive, Blackpool. Tel: 35618. Asst. Secretary, Agnes Cooke; Show Secretary, Deanne Moseley; Table Show Secretary, T. Wildman; Treasurer, A. Ruffell; Committee Members, R. Haigh, A. Gasey and S. Wilson.

The following officers were elected at the annual general meeting of the **Port Talbot and District A.S.** for this year.—Chairman, J. Egan; vice-chairman, Mrs. Callistair; treasurer, A. Callistair; secretary, D. Nichols; deputy secretary, J. Dunne; assistant show secretary, R. Perkins; trophy secretary, I. Rupert; show secretary, A. E. B. Foursacre, 3 Cross Street, Velindre, Port Talbot, West Glamorgan SA13 1AZ, tel: Port Talbot 3752.

The society would be welcome to welcome new members to the club meetings which are held fortnightly, on a Tuesday evening at The Talbach County Youth Centre, Margam Road, Port Talbot.

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**COMMITTEE** changes at the **Barrow and District A.S.** are as follows: president, B. Bailey; vice-president, B. Dickinson; secretary, Mrs. Jeanne Fittes, 2 Salthouse Road, Barrow-in-Furness; treasurer, Mrs. Doreen Doe.

**DESPITE** the fact that there had been some of the deepest snow in the district for many years, sixteen people braved the elements to attend the February meeting of the **New Forest A.S.** held at the Community Centre, Lymington, Hants., and this number included three visitors.

During the evening the F.B.A.S. judge, J. Jeffery spoke on judging fish. He explained the points system for single fish, pairs, breeders class of six fish, and furnished aquaria, etc., hoping to encourage people to enter open shows which are now commencing. Table show results—Red Tail Shark: 1, P. Norup; Platy: 1 and 2, P. Norup; Danio: 1, R. Travers; 2 and 4, P. Norup; 3, T. Mathews. New members will be welcome to any of the monthly meetings which take place on the third Monday each month and are invited to write to R. Travers, secretary, The Bungalow, Ashley-Arwood, New Milton, Hants. BH25 5QA.

**OWING** to the sudden indisposition of their guest speaker, members of the **Evesham Fishkeepers Society** were entertained impromptu at the February meeting, by their chairman B. R. Goll who lectured on Methods of Fishbreeding. Among his most interesting remarks were those concerning the breeding habits of the Killifish.

Table show results were as follows: Sharks, Loaches and Botias: 1 and 4, Mrs. J. Hessel; 2, Mrs. E. Thornton; 3, Miss E. Wright. Anabantids: 1, A. Lippert; 2, Mrs. J. Hessel; 3, Master D. Goll; 4, A. Launder. Society meetings are held on the first Tuesday of each month, 8.00 p.m. at Church Meeting Rooms, Evesham. Visitors and new members welcome. Club secretary, K. R. Baker, 124 Kings Road, Evesham, Worcs.

The first Wednesday in February was the date of the **Portsmouth A.S.** annual general meeting. The officers elected were as follows: chairman, J. Stillwell; treasurer, Miss W. Ryder; exhibition manager, D. Forse; vice chairman and table show secretary, W. Ryder; librarian, C. Forse; social secretary, Mrs. J. Stillwell; host, J. Howard, junior representative, S. Morris; general duties, I. Walker; secretary, V. B. Hunt, "Cargilas", 120 London Road, Widley, Nr. Portsmouth, Hants. PO7 5EW; G. Hardy is assistant secretary.

The second meeting in February was devoted to an excellent talk on native marine fishes and invertebrates given by C. Palmer of the Portsmouth Polytechnic who illustrated it with slides.

**RESULTS** of **Sheaf Valley A.S.** Open show held in February were as follows: Guppies: 1, Mr. and Mrs. Chadwick (Castletford); 2, Master J. Millington (Sheffield); 3, Mr. and Mrs. Barlow (Sheaf Valley). Medlies: 1, Mrs. D. Cruikshank (Ealing) (Section Winner); 2, B. and B. Durham (Longridge); 3, Mr. Bradbrook (Tower). Swordtails: 1, Mrs. D. Cruikshank (Ealing); 2, Mr. Waragg (Barnsley); 3, Mr. and Mrs. Honner (Doncaster). Platies: 1, 2 and 3, B. and B. Durham (Longridge). A.O.V. Livebearer: 1, Mrs. D. Cruikshank (Ealing); 2, B. Jackson (Doncaster); 3, R. Stansfield (Castletford). Small Anabantids: 1, Mrs. Richardson (Wyke); 2, Mr. and Mrs. Copley (Doncaster); 3, P. Smith (Scunthorpe). Large Anabantids: 1, Mrs. Hardy (David Brown) (Section Winner); 2, D. Harris (Mexboro); 3, Mr. and Mrs. Copley (Doncaster). Fighters: 1 and 2, Mrs. Gray (Wyke); 3, Mr. Bradbrook (Tower). Corydoras: 1, Mr. and Mrs. Roberts (Doncaster); 2, T. Cruikshank (Ealing); 3, J. Durham and P. Harman (Long Ridge). A.O.V. Catfish: 1, T. Stansfield (Castletford) (Section Winner); 2, K. Richardson (Wyke); 3, Mr. and Mrs. Daines (Doncaster). Loaches and Botias: 1, D. Harris (Mexboro); 2, Mr. and Mrs. Daines (Doncaster); 3, E. and A. M. Rice (Barnsley). Small Barbs: 1 and 3, Mrs. D. Cruikshank (Ealing); 2, D. Harris (Mexboro).

Large Barbs: 1, Mr. and Mrs. Kemp (Sheaf Valley) (Section Winner); 2, Mr. and Mrs. Roberts (Doncaster); 3, R. Kay (Wyke). Small Characins: 1 and 2, D. Harris (Mexboro) (Section Winner); 3, Mr. Holden (Sheaf Valley). Large Characins: 1, Mr. and Mrs. Bradley (Retford); 2, Mr. and Mrs. Slight (Mexboro); 3, B. Sommerscales (North Allerton). Rasboras: 1, Mr. and Mrs. Vernon (Retford) (Section Winner); 2, Mr. and Mrs. Bradley (Retford); 3, A. A. Grafton (Sheffield). Danios and Minnows: 1, Master W. Oldfield (Ind); 2, D. Harris (Mexboro); 3, T. Cruikshank (Ealing). Dwarf Cichlids: 1, Mr. Gray (Wyke); 2, Mr. and Mrs. Wigglesworth (Barnsley); 3, Mr. and Mrs. Clark (David Brown). Large Cichlids: 1, Mr. and Mrs. Vernon (Retford) (Best Fish in Show); 2, Mr. and Mrs. Slight (Mexboro); 3, A. Hodgson (Mexboro). Rift Valley: 1 and 2, P. and Y. Warts (Greenly); 3, A. Frisby (Wyke). Angels: 1, Mr. and Mrs. Jarman (Barnsley); 2, Mr. Mrs. J. Martin (Scunthorpe); 3, Mr. and Mrs. Hill (Barnsley). A.O.V. Tropical over 15cms: 1, A. Frisby (Wyke) (Section Winner); 2 and 3, Mr. and Mrs. Holmes (Mexboro). A.O.V. Tropical under 15cms: 1, Mr. and Mrs. Copley (Doncaster); 2, T. Stansfield (Castletford); 3, Mr. and Mrs. Clark (David Brown). Sharks and Foxes: 1, Mr. and Mrs. Hopkinson (Darfield) (Section Winner); 2, Mr. and Mrs. Honnor (Doncaster); 3, L. Bush (Morley). Toothcarps: 1, S. Hill (Alfreton); 2, R. Brown (Morley); 3, Mr. and Mrs. Walker (Barnsley). A.V. Female Egglayer: 1, Mr. and Mrs. Hopkinson (Darfield) (Section Winner); 2, J. and P. Busfield (Barnsley); 3, T. Stansfield (Castletford). A.V. Female Livebearer: 1, Mr. and Mrs. Copley (Doncaster); 2, B. and B. Durham (Longridge); 3, Mr. and Mrs. Harrison (Sheffield). Pairs Livebearer: 1, B. and B. Durham (Longridge); 2, Mr. and Mrs. Copley (Doncaster); 3, Mr. and Mrs. Millington (Sheffield). Pairs (Egg layers): 1, Mr. and Mrs. Bradley (Retford) (Section Winner); 2, Mr. and Mrs. Copley (Doncaster); 3, J. and P. Busfield (Barnsley). Breeders (Livebearers A.B.): 1, Mr. and Mrs. Chester (Retford); 2, Mr. Sykes (David Brown); 3, Mr. and Mrs. Millington (Sheffield). Breeders (Livebearers C.D.): 1, Mr. and Mrs. Hill (Barnsley); 2, Mr. and Mrs. Walker (Barnsley); 3, J. and P. Busfield (Barnsley). Breeders (Egglayers A.B.): 1, P. Griffiths (Mexboro); 2, Mr. and Mrs. Grover (Barnsley); 3, F. S. and A. Haywood (Blackburn). Breeders (Egglayers C.D.): 1, Mr. and Mrs. Bradley (Retford) (Section Winner); 2, Mr. and Mrs. Copley (Doncaster); 3, L. Hattersley (Sheaf Valley). Goldfish and Comets: 1, L. Waller (Chesterfield); 2, Mr. and Mrs. Chadwick (Castletford); 3, K. Chapman (Mexboro). Fancy Goldfish: 1, Mr. and Mrs. Hopkinson (Darfield); 2, W. England (Barnsley); 3, Mr. and Mrs. Chadwick (Castletford). A.O.V. Coldwater: 1, Mr. Dickinson (Wyke) (Section Winner); 2, G. and C. Betty (Blackburn); 3, Mr. and Mrs. Hardy (David Brown). Mini Jar: 1, Mr. and Mrs. Chester (Retford) (Section Winner); 2, Mr. and Mrs. Barlow (Sheaf Valley). Plants: 1, 2 and 3, Mr. T. Killington (Doncaster). Best Fish in Show: Mr. and Mrs. Vernon (Retford). Best Exhibit: Mr. and Mrs. Bradley (Retford). Best Society: (Doncaster).

At the annual general meeting of the **Mid-Sussex A.S.** Mr. D. Soper, the President, thanked the members for the efforts made to ensure yet another successful year; especially on the social side. Although the social side of the club is building in strength, the membership secretary, Mr. J. Birch, said that membership had fallen over the past year. He hoped that members who were not able to attend club events last year, would be active in this coming year.

It was felt that owing to the size of the club it was necessary to streamline the committees. The decision was to disband the stewards, purely as an experiment, leaving the running of the club entirely to the elected committee, with assistance when necessary from other members. The following were elected to serve on the committee for 1978: Chairman, N. Short; Vice-Chairman, A. Temple; Sec-

retary, B. Slade; Treasurer, R. Young; Show Secretary, J. Burdles; Membership Secretary, J. Birch; Committee, Mrs. S. Frost, B. Perrin, D. Stone.

Any person interested in details of the club, please contact the Secretary, Mr. B. Slade (H. Heath 53747).

**MEETINGS** are held by the **East London A. and P.A.** fortnightly on the first and third Friday of each month at Ripple Road School, and new members are always welcome to attend.

So far this year the club has had speakers on breeding, habits, characters and on the construction and fitting out of fish houses. Guest speakers and table shows have already been arranged for the remainder of the year and the meetings continue to be varied and interesting.

**ENTRIES** are being taken now for the **Portsmouth A.S. Inter-Club Show** which is being held on the 28th May.

The Clubs around the South will be notified by post as soon as possible.

Clubs taking part last year were: Salisbury (who won the shield), Southampton, Havant, Brighton, Isle of Wight, New Forest, Gosport, Kingston, Southampton, Wessex, Petersfield and Godalming. Owing to circumstances beyond their control, Fisches, S.P.A.S.S., Reigate and Redhill and Hounslow were unable to take part in the Show. Basingstoke were involved in a closed Show, and Weymouth were holding their Open Show. During the Inter-Club Show someone lost a watch which has not yet been claimed.

#### HENDON ANNUAL CONGRESS

ONCE again the **Hendon & District A.S.** is pleased to announce the Annual Congress to be held on Saturday, 22nd April, at Whitefields School, Claremont Road, Hendon, N.W.2, commencing at 6 p.m.

In the past the Society has been fortunate to obtain the services of some of the most eminent speakers. To name but a few they have previously acted as hosts to Dr. Axelrod of America, Prof. Condé of France, Colonel Jørgen Scheel, Leif Christensen of Denmark, H. C. de Witt and W. Tomer of Holland.

This year is no exception and the society has been fortunate enough to obtain the services of one of the most notable personalities in the fish world, Mr. Van Den Neuwsehuizen. He will need no introduction to Aquarists because not only is he one of the world's leading Aquarists but his fish photography is also outstanding. His programme will be supported with his famous colour slides. Thus there will be an evening that will appeal to all.

Many of the important personalities in the hobby will be in attendance and they will be at the disposal of all to discuss the various aspects of fishkeeping. Refreshments are available for early arrivals and once again during the long interval, so there is every excuse to make this occasion a day out in London.

The Society is confident that for this year the standard will be as high as it has been since the first congress in the 1950's. The occasion also serves the opportunity to renew friendships with some of the 400 other aquarists who regularly attend this important occasion.

Early application for tickets is advisable and these are priced at £1.50 each, half price for Juniors. They are available from Miss Y. Longuet, 01-202 5049.

#### F.B.A.S.

THIS year the Federation of the British Aquatic Societies celebrates its 40th Anniversary.

In this anniversary year, the F.B.A.S. is pleased to announce the publication of two new booklets: No. 10, Scientific Names and their Meanings, price 50p; No. 11, Aquatic Plants, Furnished Aquaria and Aquascapes, price 50p. No. 10 booklet is a companion volume to the popular Dictionary of Proper and Common Names of Freshwater Fishes bringing an extra dimension to the hobby and dispelling notions that scientific names were only invented to make things more difficult for the hobbyist. No. 11 gives valuable information upon the

exhibiting side of those oft-neglected aquarium inmates—aquatic plants, together with a section which directs the plant-keeper to the exact page in the plant reference works.

An International weekend is planned for the 23rd-24th September; an Anniversary Dinner and Dance will be held, followed the next day by a meeting of the Aqua-Terra-International delegates, where the Federation will be playing host to its European Federation counterparts, and the third F.B.A.S. Convention at London Zoo. Additional titles are planned for the Aqua-Talk series of tape/cassette/slide programmes, including Marine Fishkeeping, Furnished Aquaria and Aquascapes and other aquatic subjects. A very full year is already under way, and the Federation looks forward to serving the aquarist in the months (and years) ahead.

#### VENUE CHANGES

**Blackpool and Fylde A.S.** The society now meet at the Stanley Arms, "Blue Room," Church Street, Blackpool.

**Croydon A.S.** The new venue is now at the 10th Croydon Scout Group Hall, 113-115 St. James's Road, West Croydon, Surrey.

**Bexleyheath and District A.S.** The new meeting place is now The Committee Room, ABC Cine Bowl, Broadway, Bexleyheath, and the Society meet every other Thursday at 8 p.m.

**Dudley and District A.S.** Now at Bulls Head Public House, Lower Gornal, Nr. Dudley, Worcs.

**Lytham A.S.** Both venue and meeting night have been changed. The society now meets at the County Hotel, Lytham, on the first Thursday of each month.

#### CHANGE OF ADDRESS

The new address particulars of the **Lytham A.S.** secretary are R. A. Nichols, 31 Lamaloch Drive, Freckleton, Preston PR4 1AJ.

#### NEW SOCIETY

A new society is being formed in the Redditch area, to be called the **Abel Morrall Aquatic Society**. Anyone interested should contact C. Brown, 91 Wishaw Close, Greenlands, Redditch, Worcs.

#### F.G.A. (New Section)

A new section of the **Fancy Guppy Association** has been formed in the North East. Meetings are held monthly and new members are welcome.

Full details can be obtained from the secretary, R. Hill, 45 Deptford Terrace, Sunderland SR4 6DD.

#### SECRETARY CHANGES

**Trowbridge and District A. and P.S.** Mrs. M. Bennett, 30 Lewis Crescent, Frome, Somerset. Tel: Frome 3836.

**Havant and District A.S.** D. Jennings, 11 Bliss Close, Parbrook, Hants, PO7 5XD.

**Northwich and District A.S.** A. Myers, 2 Cherry Lane, Cuddington, Nr. Northwich, Cheshire. Tel: Sandiway 2966.

**Bassettlaw Fishkeepers' A.S.** K. Pratt, 10 Kingston Road, Manton, Worksop, Notts. Tel: 85526.

**Dudley and District A.S.** Margaret Homer, 4 Kennedy Crescent, Lower Gornal, Nr. Dudley, Worcs.

**Erith and District A.S.** acting secretary is K. A. Beadle, 4 Horva Road, Erith, Kent.

**South Humberside A.S.** J. Bacon, 310 Westby Street, Grimby, South Humberside.

**Bexleyheath and District A.S.** Mrs. Y. Shepherd, 30 Rosebury Gardens, Dartford, Kent.

#### CANCELLATION

**Gloucester A.S.** regret having to cancel their Open Show planned for 14th May. We will be back next year.

#### AQUARIST CALENDAR 1978

**2nd April:** Sheffield and District A.S. Open Show at Greenfield College of Further Education, Granville Road. Benching is from 12 to 2 p.m. Details from R. Sidebottom, 36 Deives Drive, Hackenthorpe, Sheffield S12 4AF.  
**2nd April:** Warrington A.S. annual open show. The venue will again be the Parr Hall, Palmira

Square South, Warrington. Details are available from Mr. G. Millman, 101 Loughers Lane, Warrington, Ches.

**2nd April:** Malvern and District A.S. open show at St. Joseph's Parish Hall, Newtown Road, Malvern. Schedules available from Secretary, B. E. Cureton, 27 Elgar Avenue, Malvern, Worcs.

**4th April:** Aireborough and District A.S. Spring Mini Show and Auction at Greenacres Hall, New Road Side, Rawdon, Nr. Leeds. Schedules from P. J. Smith, 10 Wyndford Rise, Leeds LS16 6HX. Tel: Leeds 675712.

**8th April:** Catfish Association Great Britain Open Show at St. Saviour's Church Hall, Cobbold Road, London W12. Schedules: Open Show Secretary, Mr. T. Cruickshank, 82 Stanley Avenue, Greenford, Middx. Tel: 01-578 0104.

**9th April:** Kettering A.S. Annual Open Show at the Cornmarket Hall, London Road, Kettering. Show schedules will be available from R. Vickers, 141 St. John's Road, Kettering, Northants.

**9th April:** The Southcope Museum Society Aquarist Group eighth annual open show at Charter Hall, Corporation Road, Southcope. Schedules are now available from the show secretary, D. Caldwell, 5 St. Martins Road, Scawby, Brigg, 5th. Humberside BF2058BG.

**16th April:** Billingham Half Moon A.S. Open Show at the Corporation Hall, West Row, Sockton, Cleveland. Schedules from Show Secretary, C. W. Buck, 22 Danby Grove, Thornaby, Cleveland TS17 8BX. Tel: Stockton 45284.

**16th April:** Nelson A.S. annual open show at the Civic Centre, Stanley Street, Nelson. Details from R. McKenna, 52 Bath Street, Nelson, Lancs. BB9 0NP.

**16th April:** Halifax A.S. are holding a "Spring Show". Details to follow.

**16th April:** Morley A.S. First Open Show to be held at Newlands Junior School, White Lane, Morley. Schedules available from Sheila Gear, Tingley Tropicals, Beadford Road, Tingley, Wakefield.

**16th April:** Reigate and Redhill A.S. Open Show at Blethingley Village Hall, Blethingley, Surrey. Schedules from Gina Sandford, 5 Victoria Road, Eastwood, Redhill, Surrey. Redhill 69339.

**16th April:** British Killifish Association general meeting to be held in Bury, Lancs. Beginning at 11 a.m. and lasting until 7 p.m., there will be a general meeting and an auction of members' surplus fish and eggs. For details send S.A.E. to B. P. Brown, Publicity Officer B.K.A., 173 Parr Lane, Unsworth, Bury, Lancs. BL9 8JN.

**16th April:** Taunton D.A.S. Open Show at Corfield Hall, Taunton. Schedules: Mr. M. Bray, 11 Whitthall, Taunton, Somerset. Tel: 74150.

**23rd April:** York and District A.S. Open Show at the Livestock Centre, Murton, York. Benching 12 noon to 2 p.m. Details from Show Secretary, H. Welsh, 1 Enfield Crescent, Holgate Road, York.

**23rd April:** Leigh A.S. Open Show at Leigh C. B. High School, Leigh Rd, Leigh, Lancs. Details from: J. Goncalves, 52 Penine Grove, Leigh, Lancs. WN7 5HU. Tel: Leigh 054675.

**23rd April:** Halifax A.S. Spring Show at Forest Cottage Community Centre, Cousin Lane, Ovenden, Halifax. Schedules S.A.E. from Show secretary J. Shackleton, 12 Chevin-edge Crescent, Baley, Halifax.

**23rd April:** Yeovil and District A.S. Annual Open Show.

**29th April:** Bristol T.P.S. annual show will take place at Church Hall, Newton Street, Bristol.

**30th April:** Aireborough and District A.S. Open Show at West Park High School, Spen Lane, West Park Ring Road, Leeds. Schedules

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for auction etc., from Show secretary P. J. Smith, 10 Wynded Rise, Leeds LS16 6HX. Tel: Leeds 65712.

**30th April:** Midland Aquarist League Open Show, Nuneaton. Schedules: Mr. F. Underwood, 10 Hyde Road, Kenilworth CV8 2PD. Tel: 59280.

**30th April:** Nuneaton A.S.: M.A.L. and Open Show to be held at the Friary Youth Centre, Abbey Street, Nuneaton, Warwickshire. Benching from 12 noon till 2 p.m. Show will be run to M.A.A.S. Rules and Standards. Further information available from Show secretary, Mr. M. Short, 8 Greenhill Road, Soke's Golding, Nr. Nuneaton, Warks.

**30th April:** Havant A.S. Eighth Annual Open Show to be held at The Hornbeam Community Centre, the Merchiston Hall, Hornbeam. Schedules from Mr. G. Ellis, 42 Bridgefoot Path, Emsworth, Hants. Tel: Emsworth 3961.

**7th May:** Oram A.S. Open Show.

**7th May:** Hull A.S. Open Show to be held at the "Blind Institute," Beverley High Road, Hull.

**13th May:** Port Talbot A.S. open show will be held at The Talbach County Youth Centre, Margam Road, Port Talbot, West Glamorgan. Ample parking space is available. Trophies, plaques, cards for all classes. Schedules will be available by early March from show secretary, A. E. B. Fouracre, 3 Cross Street, Velindre, Port Talbot, West Glamorgan SA13 1AZ. Tel: 3752.

**13th May:** The British Aquarists Study Society second spring meeting, at 2.30 p.m. in the Meeting Rooms of the Zoological Society of London, Regents Park, London, N.W.1. "Toothmarks of the New World." Tickets £1.25p members, £1.50p non-members from W. Goodwin, 14 Dawlish Drive, Devon Park, Bedford.

**14th May:** Gloucester A.S. open show at the Chequers Bridge Leisure Centre, Painawick Road, Gloucester. This show will be run in accordance with F.B.A.S. ruling. Trophies for first and second places plus award cards. Schedules will be available from March onwards. D. Parry, 49 Oxgangs Way, Longlevens, Gloucester (secretary).

**14th May:** Bournemouth A.S. annual open show will be held at Kinson Community Centre, Pelhams Park, Kinson, Bournemouth. Show secretary, J. V. Jeffery, 30 Braemar Avenue, Southbourne, Bournemouth BH6 4JF. Tel: 0202 427523.

**14th May:** Gooles and District A.S. Open Show, Bartholomew Middle School, Gooles (Provisional booking).

**14th May:** Wynnast A.S. Annual Open Show at Bryn Coed Hotel, near Ruabon. Secretary, D. Lloyd, 26 Bran, Plas Madoc, Acrefair, Clwyd.

**20th May:** Goldfish Society of Great Britain general meeting, 2.30 p.m., Conway Hall, Red Lion Square, Holborn, London, W.C.2.

**20th May:** Southend Leigh & District A.S. The next open show will be held at St. Clements Hall, Leigh-on-Sea. Further details in due course.

**20th May:** Merthyr A.S. Third Annual Open Show at St. David's Church Hall, Church Street, Merthyr Tydfil under F.B.A.S./C.N.A.A. rules, with plaques and cards for the first four places in each class. Schedules can be obtained from show secretary, Mr. E. Morgan, 27 Ty Gwyn Street, Penydarren, Merthyr Tydfil.

**20th May:** Trowbridge and District A. and P.S. are holding their Open Show at Bradford-on-Avon Rowing Club, Wilts. Schedules will be available from Mr. S. J. Boswell, 1 Dean Close, Melksham, Wilts., from April onwards.

**20th May:** Southend Leigh and District A.S. Open Show at St. Clements Hall, Leigh-on-Sea, Essex. Schedules from show secretary, A. J. H. Smith, 39 Willow Walk, Hadleigh, Essex SS7 2RW. Tel: Southend 555940.

**21st May:** Skegness and District A.S. will hold their First Annual Open Show at the Arcades Centre, Skegness, good car parking. Schedules from Mrs. M. Butler, St. Michaels Lodge, St. Michaels Lane, Wainfleet, Lincs.

**21st May:** Merseyside A.S. Annual Open Show at the Rainhill Village Hall, Rainhill, Lancs. Hon. Secretary, J. Bailey, 11 Auburn Road, Liverpool L13 8BJ.

**20th May:** Yorkshire Koi Society A.G.M., Wetherby Motor Hotel, (Harwood suite) beginning at 2.30 p.m. A limited amount of time will be spent on business which will be followed by two speakers and an "Any Questions" panel. All welcome.

**20th May:** Redcar A.S. Sixth Open Show again at the Coatham Bowl, Redcar. Run under F.B.A.S. Rules. Details: telephone Redcar 74599 or write Secretary, 13 Brancepeth Close, New Marske, Cleveland.

**20th May:** Loyal Aquarists open show, St. Paul's Parish Hall, Scooth, Lancaster. Details from Mrs. J. A. Hodgson, 8 Hall Garth Gardens, Over Kellet, near Carnforth, Lancs.

**20th May:** Bridlington and District A.S. Annual Open Show, will be held at the Hildershorpe Junior School, Shaftesbury Road, Bridlington. Show schedules available from the show secretary, Mr. M. Jordan, 12 Greenfield Road, Bridlington.

**20th May:** Portsmouth A.S. Inter-Club Show at the Portsmouth Community Centre, Malins Road, Portsmouth.

**20th May:** Yorkshire Koi Society Open Spring Koi Show, Fishlake Water Gardens, Fishlake, near Doncaster. Schedules from Mr. S. E. Bent, 20 Oakwood Road East, Rotherham, Yorks.

**31st May:** Midland Aquarist League Open Show, Leamington. Schedules: Mr. F. Underwood, 10 Hyde Road, Kenilworth, CV8 2PD. Tel: 59270.

**4th June:** Sudbury A.S. Open Show at the Wasps Rugby Ground, Repton Avenue, Wembley, Middx. Schedules from L. J. Brazier, 66 Ormsby Way, Kenton, Middx. Tel: 01-204 5374.

**4th June:** Loughborough and District A.S. Open Show at Bursleigh College, Theopie Hill, Loughborough. Schedules from J. S. Purdy, 10 Cleveland Road, Loughborough, Leics., LE11 2SP.

**10th June:** Llantwit Major A.S. "Silver Jubilee" Open Show to be held at the Town Hall, Llantwit Major. To celebrate 25 years of continuous activity we offer superior plaques for 1st, 2nd, 3rd and 4th places in 32 classes judged to F.B.A.S. standards. Schedules available, early May, from J. J. Edwards, "Glanafon," Mill Park, Llanblethian, Cowbridge, South Glamorgan, CF7 7BG.

**11th June:** St. Helens A.S. Open Show will be held at the same venue as last year's show, Rainhill Village Hall, Rainhill, Nr. Liverpool. Schedules are available from the secretary at a later date.

**11th June:** Cheltenham T.F.C. Open Show at St. Marks Community Centre, Brooklyn Road, Cheltenham. Schedules available soon.

**11th June:** Salisbury and District A.S. Open Show, at the Activity Centre, Wilton Road, Salisbury, to F.B.A.S. Rules and Recommendations. Over 40 classes, including six richild classes. Show schedules, available in April, from Hon. Secretary, Mr. R. F. Adams, 26 Empire Road, Salisbury, Wilts. S.A.E. please.

**11th June:** Boston A.S. Open Show at Kewwood Girls School, Morian Road, Robin Hood's Walk, Boston. Y.A.A.S. rules. Schedules available from secretary, Mrs. M. Sands, 20 Argyle Street, Boston PE21 6PH.

**17th June:** S.P.A.S.S. Open Show at Wimbledon Community Centre, St. Georges Road, Wimbledon, London SW19. Show secretary, Mr. L. Clapp, 16 Over Hillway, Beckenham, Kent.

**17th-18th June:** Aberdeen A.S. Open Show at Music Hall Union Street, Aberdeen. Full details and schedules from show secretary Mrs. G. Forbes, 10 Craigmaraoin Gardens, Altens, Aberdeen. Tel: Aberdeen 872170.

**18th June:** Corby and District A.S. open show, Civic Centre, Corby. Schedules mid-March, F.B.A.S. rules. C. MacAllister, 18 Malford Road, Corby, Northants.

**18th June:** Swillington Open Show. More details at a later date.

**18th June:** Fancy Guppy Association, North West Lancs. (Manchester Section). Annual Open Show, commencing at 2 p.m. Benching from 12.30 p.m. All classes to be judged to F.G.A. show rules. Show to be held at The Seton Chalon Temple, Savoy Street, Preston.

Further details from show secretary, Mr. B. Morris, 4 Irwell Street, Burnley, Lancs.

**18th June:** Northwich and District A.S. Open Show to be held at Hartford Secondary Modern School (Boys), Greenbank Lane, off Chester Road, Hartford, Northwich, Cheshire. Judging to F.N.A.S. methods and standards. Further details from show secretary, Mr. D. Valentine, 43 Hartford Road, Davenham, Northwich, Cheshire. Tel: Northwich 6624.

**24th June:** Nailsea and District A.S. Fifth Open Show at Holy Trinity Church Hall, Church Lane, Nailsea. Details from show secretary, Mr. P. Fitchett, 2 Woodland Road, Nailsea, Bristol, Avon.

**25th June:** Dunlop Aquarium Keepers Society Open Show to be held in Factory Canteen, Speke, Liverpool. Further information can be obtained from either, Show secretary K. Sey, 31 Bray Road, Speke, Liverpool 24 or Hon. Secretary T. Griffiths, 19 Belpier Street, Liverpool 19.

**25th June:** Alfreton and District A.S. Venue, Alfreton Hall. Further information later. Show secretary, P. W. Bonser, 10 George Street, Riddings, Derbyshire.

**2nd July:** Brighton and Southern A.S. Open Show at Portland Town Hall, Victoria Road, Portslade, Sussex. Show secretary, M. Rooney, 66 Portlady Villas, Hove, Sussex. Tel: Brighton 411151.

**2nd July:** Blackburn Aquarist Waterlife Society Annual Open Show in the Windsor Hall, Blackburn. Schedules will be available shortly from the secretary, J. Oldcorn, Highridge, 4 Mollington Road, Blackburn, Lancs., BB2 6EG.

**2nd July:** The Chard and District A.S. will be holding its Fourth Annual Open Show at Furnham School, Chard, Somerset. Details from Mr. A. Griffin, 24 Thornton Road, Yeovil, Somerset. Tel: Yeovil 23231. Show schedules available end of April.

**2nd July:** Midland Koi Association Open Show at the Whitley Abbey School, Coventry. Schedules and further information from R. Caser, 8 Swinburne Road, Hinckley, Leics.

**7th, 8th and 9th July:** Three Rivers Fish-keeping Exhibition to be held this year in the shopping complex Eldon Square, Newcastle-on-Tyne. Further details, contact Show manager, G. T. Liddle, 17 Palmerston Avenue, Walkergate, Newcastle NE6 4RD. Tel: 655794.

**9th July:** Lytham A.S. Annual Open Show to be held at Lytham Baths, Dicconson Terrace, Lytham, Lytham St. Annes. Benching from 11.00 a.m. to 2.15 p.m. Further details and show schedules from: Show Secretary, P. Ham, 1 Wyndene Grove, Freckleton, Preston, PR4 1DE. Tel: Freckleton 633182.

**15th July:** Goldfish Society of Great Britain general meeting, 2.30 p.m., Conway Hall, Red Lion Square, Holborn, London, W.C.2.

**16th July:** Scarborough A.D.A.S. Open Show at Gladstone Road Junior School, Wooler Street, Scarborough. Schedules (March) from J. F. Richardson, 5 Keld Garth, Pickering, N. Yorks. YO18 8DG.

**16th July:** Sandgrounders A.S. are holding their Open Show at Meols Cop School, Meols Cop Road, Southport. All enquiries to B. Baldwin, show secretary, 10 Olive Grove, Southport PR8 6BG.

**22nd July:** Basingstoke and District A.S. once again this year are holding a specialist show for all livebearing fishes in the Carnival Hall, Basingstoke. Schedules from T. Fraser, 151 Culver Road, Basingstoke, Hants.

**23rd July:** Gosport & District A.S. Annual Open Show.

**30th July:** Dorchester T.F.S. First Open Show. Details to follow later.

**6th August:** Blackpool and Fylde A.S. Open Show at St. Kentigerns School, Newton Drive, Devonshire Square, Blackpool. Schedules from show secretary, Doreen Mosley, Flat 80, Forshaw Avenue, Grange Park, Blackpool. Tel: Blackpool 36456.

**20th August:** Stroud and District A.S. next open show at the Subscription Rooms, Stroud. Show manager, J. Cole, The Hill, Randwick, Stroud, Glos. Tel: Stroud 4504.

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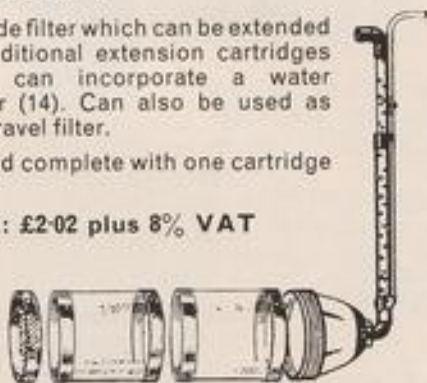
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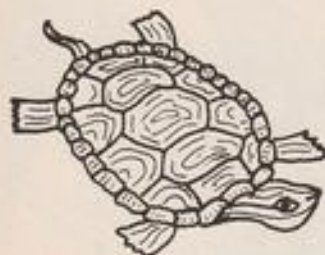
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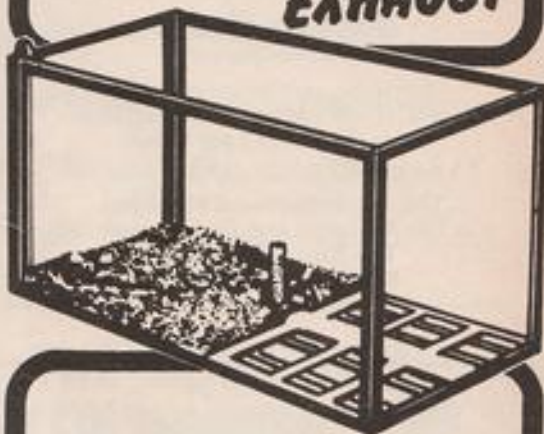
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# SHIRLEY AQUATICS LTD

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Stratford Road, Monkspath, Shirley, Solihull, Warwickshire

SURPLUS BREEDING STOCK  
OF HIGH GRADE  
**KOI**  
ABOUT 30 FISHES  
FROM £100 EACH  
(4 WINTERS OUTSIDE IN  
OUR NURSERIES)

ENGLISH BRED GOLDFISH

3 YR. OLD CHROME YELLOW FEMALES	£7.50 EA.
3 YR. OLD PEARL WHITES	£7.50 EA.
(PAIRS £17.50)	
LAST YEARS COMETS	FROM £1.25
LAST YEARS COMET SHUBUNKINS	FROM £1.50
LAST YEARS PEARL COMETS	£2.00

GOOD SELECTION  
OF  
WATER PUMPS  
FOUNTAIN  
ORNAMENTS  
POOLS, CASCADES  
AND ALL  
ACCESSORIES  
FOR GARDEN  
POOLS



POND PLANTS  
IN  
GREAT  
VARIETY  
THROUGHOUT  
THE  
SEASON

THE RECENTLY OPENED M42 PASSES NEAR US  
(Leave at Exit 1, Turn Right 1/2 Mile on Right).

**PLEASE NOTE**—All enquiries requiring a reply MUST be accompanied by S.A.E. Our premises are situated on the main Stratford-Birmingham road, 8 miles from Birmingham, Midland "Red" Bus Nos. X20, X50 from Bus Station, Birmingham, passes the door, alight at "The Crown", Monkspath.

**CLOSED ALL DAY SUNDAY AND MONDAY**

**HOURS OF BUSINESS**—NOVEMBER—MARCH 10 a.m.—5 p.m. APRIL—OCTOBER 10 a.m.—6 p.m.  
**TERMS OF BUSINESS**—Cash with order please. Fish sent by rail. Minimum order £20.00, insulated container and carriage £3.00 (Scotland £3.00). Plants by post (minimum order £2.50) please add 50p. post and packing on aquarium plants up to £3.00 and 75p. on orders over £3.00. Postage and packing on pond plants, £1.50.

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