

APRIL 1986 95°

# AQUARIST

AND PONDKEEPER

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DR. DAVID FORD

## The 'Aquarian' ADVISORY SERVICE

Dr. David Ford, Head of the 'Aquarian' Advisory Service offers his advice on different aspects of fishkeeping.

The 'Aquarian' Advisory Service has been offered to all aquarists for over 10 years. Thousands of queries have been answered, just a few examples being shown below:

### A BEGINNER

**Q** I am interested in setting up an aquarium in my home but the books I have consulted in my local library are so technical they make me worry about starting. (12 YEAR OLD FROM CUMBRIA)

**A** You can make fishkeeping as simple or as involved as you wish - that is what makes it such a fascinating hobby. A free copy of the "Guide to Freshwater Fishkeeping" from the 'Aquarian' Advisory Service is enclosed - it tells you all you need to know in clear, easy-to-understand language.

### FIN ROT

**Q** I have kept some Fantail Goldfish for a year but recently their tails have become ragged and treatment with Fungus Remedy and Tonic Salts have failed to stop the problem. (MISS S.G., SURREY)

**A** Fin Rot is a bacterial infection so treatment with chemicals will not cure the problem. Visit your local Veterinary Surgeon for a supply of antibiotic. Oxytetracycline at 20 mg/litre in soft water and up to 100 mg/litre in hard water for a week should prove effective. The basic problem however may be dirty water - improve general tank care and move growing Goldfish to a larger tank.

### WHICH FILTER?

**Q** There are many filter units on the market - which is best for my 36x12x15 inch tank? (R.L., WALSALL)

**A** You cannot overfilter an aquarium so buy the biggest system that you can afford. This ranges from the very cheap bubble-up box filter to the large external power filter. Enclosed is an article on filtration to help you choose a model.

### CARBON FILTRATION

**Q** I use Atlantis Charcoal in my power filter - can I reactivate it when the unit is being cleaned out? (P.R., BIRMINGHAM)

**A** It is possible to reactivate carbon (charcoal) by rinsing and drying in a cool oven. However, it is never as efficient as when new and the heating costs may be equal to buying new charcoal. Personally I use carbon as a medium for supporting nitrifying bacteria, the carbon is rinsed but never sterilised and only replaced annually. Remember to contain it in a porous bag to prevent floating pieces of charcoal fouling the filter pump.

### TROUBLE IN THE TANK

**Q** I have been offered a 6" Kissing Gourami, can it be placed in my 6 foot tank which houses two Oscars and four Texas Cichlids? (S.D., WILTSHIRE)

**A** Trouble will certainly arise if you mix these fish, especially as you indicate that the Oscars are a pair. When they come into breeding condition the large Gourami will be considered a threat to a planned family.

### BREEDING SHARKS

**Q** I have two Red tail Black Sharks and wonder if they are a pair - if so, how do I breed them? (S.D., SCOTLAND)

**A** Redtail Black Sharks will not breed in the home aquarium. Commercial breeders in the Far East inject their brood stock with hormones to trigger spawning. In the wild the fish breed at depths greater than that found in standard tanks.

### NEW TANK SYNDROME

**Q** I recently set up a new 36x15x18 inch tank with power filtration and water heated to 78°F. After leaving it to mature for several days I bought 25 community tropicals and installed them. Since then I have been losing fish at the rate of 2 or 3 per week with no signs of disease. (M.E., BRISTOL)

**A** You have "New Tank Syndrome". Water alone does not mature, so the water in your tank was only 'aged'. You must build up stock slowly over several weeks to allow the filter to develop nitrifying bacteria. The deaths will stop when about 50% have been lost...replace them gradually and next time buy at the rate of 2 or 3 per week.

#### THE 'AQUARIAN' ADVISORY SERVICE

The 'Aquarian' Advisory Service is available to all hobbyists for information and advice on any aspect of fishkeeping. Research is carried out on aquarology at 'Aquarian's' laboratories in Halifax and Dr Ford can call on the expertise of many specialists. These include Ichthyologists at several Universities, Animal Behaviourists and Veterinarians at the Waltham Centre for Pet Nutrition and the Senior Consultant to 'Aquarian', Biologist John Dawes. Write to: The 'Aquarian' Advisory Service, 'Aquarian' Laboratory, Thomas's (A Division of Mars G.B. Ltd.), Pelton Lane, Halifax, West Yorkshire, HX1 5QP.

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John Dawes, one of Britain's best-known writers on fishkeeping, has been appointed editor of *Aquarist and Pondkeeper*. John, who has been consultant editor of the magazine for three years, has been keeping fish since boyhood in his native Gibraltar. He has written several books on the hobby, and his latest, *The Tropical Freshwater Aquarium*, is published by Hamlyn this month. His appointment is a major plank in our policy to bring even more quality and authority to Britain's longest-established magazine for aquarists and pondkeepers.

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#### Cover Story

*Symphoricarthus spilurus* is a colourful, midwater species which is very rarely imported into the UK. This is partly explained by the fact that only the smallest specimens can be considered suitable for tropical marine aquaria.

# AQUARIST

AND PONDKEEPER

APRIL 1986 Vol. 51 No. 1

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# IMPROVE YOUR POND CARE

**T**he spring-summer months are, of course, an ideal time for restocking or planting a garden pond and many pondkeepers are now reflecting on last year's problems and wondering how they may be best avoided.

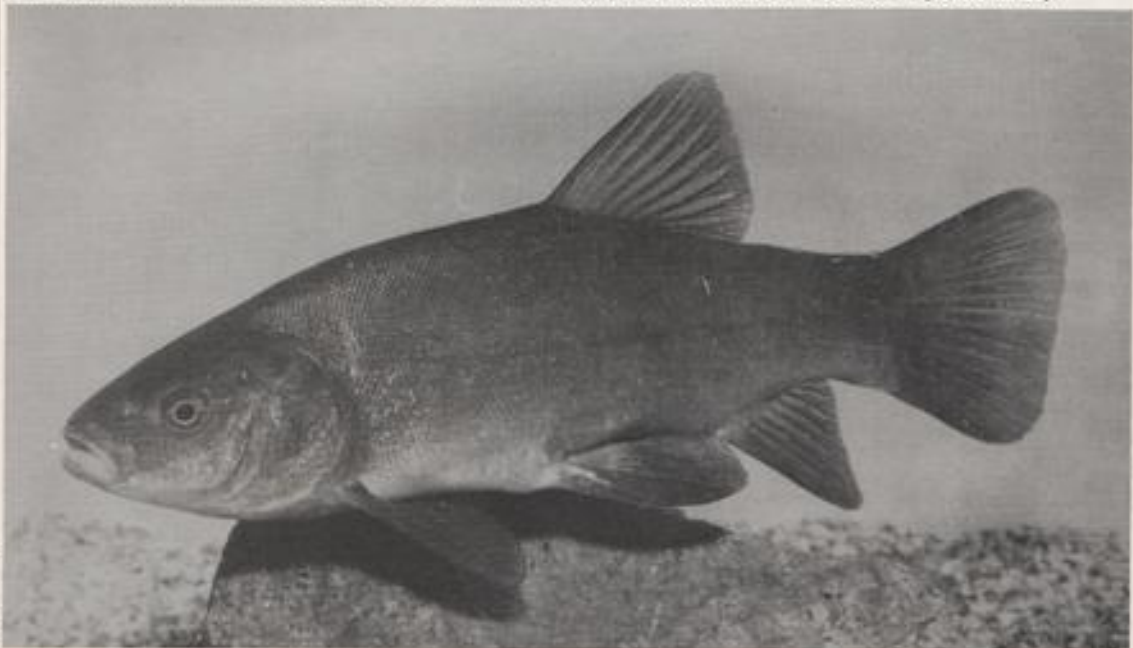
First of all a recurring and all too frequent problem—algae. Many ponds develop algal blooms during the spring and summer periods. Water garden specialists offer a range of products to control this problem. However, it is wise to first consider the cause of excessive algal growth. This is usually a combination of too much sunlight, along with too little other plant life in the pond. Ponds are best situated where they receive some shade from the mid-afternoon summer sunshine. In addition, other plant life in the pond will compete with and control algae, by absorbing the

The coldwater season is upon us once again and with it comes the need to re-establish the ground rules of trouble-free pondkeeping. Follow Dr. Chris Andrews' recommendations and you are likely to enjoy year-round success

available nutrients and sunlight. Newly filled ponds often develop marked algal blooms after a couple of weeks. This should subside after a month or so, as other plant life in the pond becomes established and starts to grow. Never empty a pond with an algal problem—as this will simply start the process over again.

Your local water garden specialist or aquarium shop will be able to advise you on the plant requirements of your pond. As a rough guide, a pond with a surface area of 15-20 square feet and a minimum depth of 13 inches, will require at least 6-10 bunches of pond weed such as *Elodea*, starwort (*Callitriche* spp.) hornwort (*Ceratophyllum demersum*) or the like. To this 5 or 6 marginal plants such as arrow-head (*Sagittaria*), sweet flag (*Acorus calamus*) and flowering rush (*Butomus*

Tench (*Tinca tinca*) are hardy pond fish available in this, the 'wild' or green form, and a less robust golden variety



L. E. PERONS

*umbellatus*) may be added, and planted in shallow water around the edge of the pool. Duckweed (*Lemma*) and the water soldier (*Stratiotes*) are both floating pond plants. Because of the variety of water lilies that are now available for garden ponds special attention must be paid to the depth at which they should be planted. Some prefer relatively shallow water, others prefer deeper water. Floating plants and lilies provide shelter for the fish, though some pondkeepers have found duckweed a problem as a result of its remarkable growth. Nonetheless, this latter plant is a favoured addition to the diet of many pond fish.

Bearing in mind the cost of pond plants, it is tempting to spend a Sunday afternoon dredging a local stream or canal. Whilst this may be an alternative it must be remembered that certain pond pests and disease organisms may be introduced with wild plants. Snails may be introduced in this way, though many pondkeepers add them of their own accord. Snails are in no way essential to a garden pond, and may themselves introduce disease organisms. In addition, although snails do scavenge and ingest small amounts of algae, they can multiply to such an extent to become a nuisance. The ramshorn snail (*Planorbis*) and the common pond snail (*Lymnaea*) are both easily available, though the former is the more attractive and the less troublesome of the two.

Overstocking is a trait common to all newcomers to the aquatic hobby. Too many fish added to a pond during the spring may lead to trouble later in the summer when temperatures rise, or as fish grow and require more space and oxygen. Obviously it is best to avoid overstocking from the beginning. The rule of six inches of fish (excluding tail fins) to every square foot of water surface should be regarded as a maximum, although in relatively new ponds an initial stocking level of 2-3 inches of fish per square foot of water surface is a better idea. This will allow some room for growth of the fish and provide a safety margin for hot, muggy days when fish in overstocked ponds can be seen gasping for oxygen at the water surface. For this reason a fountain pump can be a useful addition to a garden pond. Not only will it make the pond look more attractive, but in certain situations it can be the difference between life or death to the fish.

During the spring and summer most water garden specialists and aquarium shops will be offering an excellent selection of goldfish, fancy goldfish, koi, orfe, rudd, tench and the like—all of which are suitable for the garden pond. Obviously avoid buying diseased fish or fish from tanks containing diseased fish and if you have any doubts about stocking your pond, seek the dealer's advice.

With regard to holidays, so long as pond fish are well fed on good-quality food for most of the spring and summer months they will come to no harm if they are not fed at all during your holiday—

even if you are away for 2-3 weeks. There are bound to be items of live food and plant fragments that the fish can feed on if really hungry, and in any case, a partial fast may do them some good!

Moving on to later in the autumn, the appetite of the fish will wane as the temperature of the pond falls. Care should be taken to ensure that excess, uneaten food is not allowed to pollute the pond at this time, causing a problem in the water. Similarly, if there are trees nearby it is best to prevent too many of the autumn leaves from entering the pond. This may be achieved by placing a nylon mesh net over the pond, taking care to ensure that no animals or children can become entangled at any time. Once the water temperature falls below 10 or 12°C it is wise to cease feeding completely, perhaps just offering a small feed during mild spells when the fish are active. If the fish have been well cared for during the spring and summer they will happily survive the winter in a virtually dormant

Fountains add an extra bit of magic even to impressive ponds like this one

state at the bottom of the pond. For successful overwintering it is important to have a portion of the pond at least 18 inches deep, which will provide the fish with adequate protection during the coldest months. During the winter a sheet of ice may form over the pond. This should be pierced in order to allow the necessary exchange of gases. A kettle (full of boiling water) held onto the ice will make a suitable hole, though this may freeze over again. The best plan is to obtain a low wattage pool heater. These are cheap to run and do not warm up the water sufficiently to disturb the fish. Ice on a pond should never be physically smashed, since shock waves will upset the fish.

Turning full circle, as temperatures rise and days lengthen in the spring, the fish will begin to feed again. Good quality prepared foods should be offered (sparingly at first), and live food such as earthworms may be used to tempt the appetites of the fish.

For further hints and advice on pond care, consult your local water garden specialist.



C. ANDREWS



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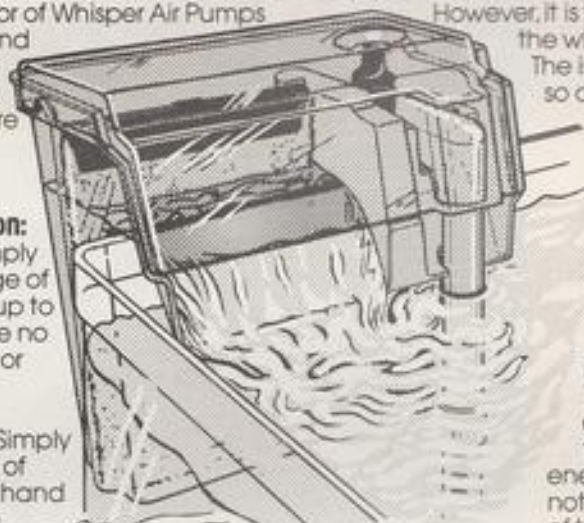
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# CATFISH

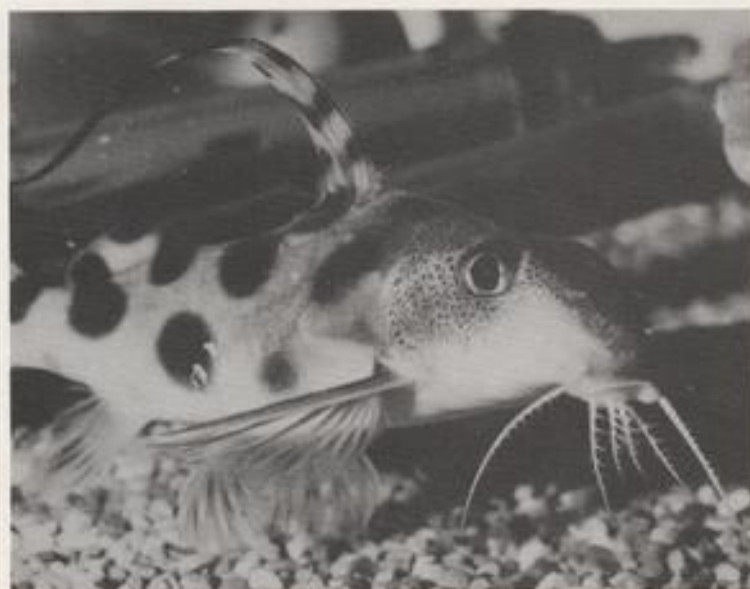
## FORM AND FUNCTION

Armour plating, electricity and invisibility are among the many unusual characteristics that make catfish such fascinating creatures. And it all makes good, sound biological sense, as Ian Sellick explains

If you had to design an underwater armoured vehicle from scratch, would you come up with anything much different from a Callichthyid catfish? How about something essentially invisible when in water? Would *Kryptopterus* be a good solution? And if sensitive detection systems were required, how about *Synodontis* barbels? To deter others, would an electric fence be useful? Take *Malapterurus* then.

Just four examples of adaptations found in catfish that are highly evolved features in what at first sight may appear to be a rather primitive group of fishes. While the relationships and origins of catfish remain obscure, the strange forms that we observe can be given some meaning by careful observation of the behaviour of our aquarium residents. Of course, nothing beats study of fish in the wild in order to relate form to function, but this is difficult (even if funds are available to travel to the appropriate areas) due to the very habits and habitats many of our catfish occupy.

The armoured catfish are one group that has been studied in the wild, par-





ticularly *Loricaria* and *Asotus* in clear water streams in Panama, although these studies were mostly of breeding habits and population studies in relation to food (algae cover) availability. Being armoured on the dorsal surface and the lateral surfaces though, confers several advantages on these catfish. Put yourself in their place. By nature, you graze on algae. As algae need strong light to grow in a luxuriant fashion, it follows that your algal food source is going to be in an exposed area. If you are feeding in an exposed area, it is useful to be protected from predators, in two ways. First by camouflage. A fish like *Asotus* is remarkably difficult to spot underwater when grazing on a pebble covered stream bed, the mottled or spotted colouration confers a benefit here. Even if you are espied by a potential predator, the hard upper surface of the body will deter the casual piscivore (fish eater) and make it difficult for much damage to be done. It can be argued that these advantages, as with others in the catfish, are of no benefit to fish that are most active at night. Well, it should be said that not all catfish are by any means nocturnal—many are largely crepuscular (twilight) and a large proportion are diurnal (day-time) feeders. Think, do all of your aquarium catfish disappear immediately the lights are switched on? Of course they don't.

#### Armour plating and invisibility

Having a 'hard shell' may have other advantages too. Catfish like *Asotus*, when not foraging for food, tend to conceal themselves in crevices and under pebbles, etc. They effectively have a 'hard hat' on to protect them from damage due to pebbles being dislodged. Additionally, with their hard pectorals, the spines of which can be locked, the fish can wedge themselves into a crevice and defy any attempt to get them out. *Asotus* tend to breed in hollows in tree trunks and branches: while protecting eggs, this ability to wedge oneself in is very useful. The mouth used to rasp algae for feeding also comes into play to help enlarge the hole in the wood. Although there is no concrete evidence that the fish 'chisel' wood away with their bodies and fins, with suitable water softened timber, this wouldn't be impossible.

So, being armoured, you have a lot going for you. The disadvantage, like wearing a suit of armour for us, is weight. As catfish of this ilk are bottom associated, this is rarely a problem. *Asotus* and their kin are not given to midwater heroics, it costs too much in energy terms. The broad caudal fin is a powerful oar for getting along laterally; it is not

Above: The Glass Catfish (*Kryptopterus*) is a well camouflaged midwater species  
Left: Delicate barbels are characteristic of *Synodontis* Catfish. This is *S. decorus*

so good for getting up into the body of water.

However, fish like *Hypostomus* and *Corydoras* that, especially in conditions of low oxygen tension in the water, can use air to breathe by swallowing a bubble and allowing gaseous exchange to occur in the stomach, do make midwater forays, but this only as frequently as required by physiological demands.

The glass catfishes of Asia have a similar potential predator problem. They feed in midwater on small insect larvae, copepods, *Daphnia* and the like; in fact, anything planktonic that appeals. As a small, soft bodied catfish, there is no point in developing armour to protect yourself, the energy costs of remaining in midwater with that weight would be too great. So how do you protect yourself? Simple, do a disappearing trick. Like the magicians sleight of hand when things disappear while still in full view of the audience. Just because we can see *Kryptopterus* in the bright lights and clear water of our aquaria, it doesn't mean that the fish are that visible in their natural habitat where things may be significantly more murky.

On the body, the number of melanophores (black colour cells) is significantly reduced, and the muscles and body are clear. Parts that cannot be made clear, such as bone and, particularly, the body cavity containing the stomach and other organs, are concealed in a different way. Here, the body wall contains flat platelets of guanine, in a silvery layer that acts as a mirror. This reflects the general light and colour of the habitat, making the fish effectively camouflaged. So, you might say, if asked how *Kryptopterus* hides itself, that it's all done with mirrors!

#### Barbels in action

We all know why catfish got their name, don't we? Because they've got whiskers of course! But what is the function of these appendages, properly called barbels? The intuitive answer is that they assist the fish to locate food, but the precise mechanism of this is actually poorly defined. As one of their most interesting features, the barbels of catfish are worthy of contrasting between groups. In fish such as *Synodontis* (Mochokidae), the upper lip barbels—the maxillary barbels—are mostly moderately long and held out sideways or forwards rather like a dipole aerial. Swept through the water, they act rather like a food seeking radar. The lower—or mandibular—barbels are often branched, with considerable feathering in some species. Food of *Synodontis* in the wild has been studied in few species, but generally seems to consist of insect larvae and adult insects that drop into the the water. Night-time feeding *Synodontis* have all the hours of darkness to capture insects falling in, by inverting themselves and feeding from the surface of the water, as they do quite happily to feed on flake food in the aquarium. They thus use an important food resource

—the same insects which are snapped up by characins and cichlids during daylight hours. It appears that the maxillary barbels are used to sweep this surface food into the mouth, while the mandibular barbels are the organs of taste and smell for the catfish. These are probably more important in bottom feeding when the catfish will often hover over potential food and 'taste' it with the barbels before actually ingesting it. Interestingly, the taste buds (specialised cells) on the barbels and around the mouth are also found scattered, albeit in smaller numbers, over the body. *Synodontis* can thus smell and taste with its whole body—imagine if you could to that!

In small catfish such as *Corydoras*, all the barbels are quite short and all used in feeling, probing and smelling the substrate for suitable food. In the giant pimelodids, such as the shovel nosed catfish, the barbels are held erect in front of the fish, splayed out, and effectively form a net, guiding prey into the mouth.

*Malapterurus electricus* is a stunning fish. Well perhaps not in looks, but with the ability to deliver several hundred volts at a fair amperage into the water, it is the only electric catfish. The tubby body contains stacked series of muscle tissue that acts like a giant battery with the ability to discharge instantly like a capacitor.

#### The living power pack

A rather sluggish fish living in swamps and rivers in Africa, the electric catfish can use its electric fence as a defence. If disturbed by predators, more likely to be reptilian, avian or mammalian than piscine, what better way to defend yourself than the short, sharp shock treatment. As a lazy, sluggish fish, the ability to stun your prey, such as other fish, if required when they come into range, certainly beats having to lunge after them. This relative inactivity is one of those chicken and egg situations; in order to produce electricity, the muscle tissue needs to be kept in fairly precise alignment. Therefore it can't be used for other purposes such as swimming. Not being able to swim much or very fast means that electricity to stun your prey and save this effort is useful. Now, in order to produce electricity. . .

We are only just starting to unravel some of the mysteries of the catfishes; because it isn't easy to study them in the wild, our aquaristic observations can be quite valuable, if accurately observed and reported. Look at your catfish in a new light, as a group that has evolved an incredible catalogue of adaptations to feeding and living in every aquatic environment. Name it, and you will probably find a catfish doing it. Did I hear you say "how about sea-water", and poisonous to boot? No problem, sir or madam, just look in our catalogue and you'll find just the thing: *Plotosus* is the model you require. . .





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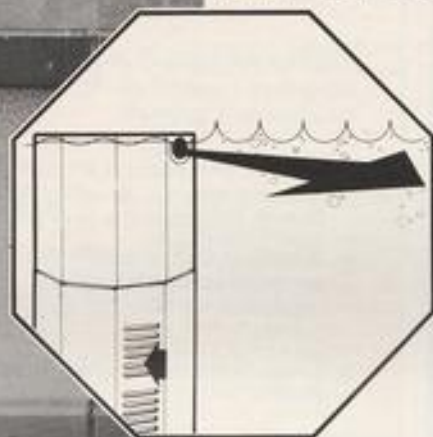
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## Coldwater

### Salt in tank

*I often put some salt in my fish tank. Is this right and how often and how much should be added?*

It is quite wrong to keep putting salt into a fish tank. This salt will remain in the tank as the water evaporates and more water is added, so that a dangerous level of salt will be produced. There is no need to put any salt in your tank. Salt has often been recommended as a bath for a sick fish, but I have found that in all such cases it is better to use a mild solution of T.C.P. A fish can be left in this for some minutes but should always be kept under supervision and removed if it turns over. The fish will soon recover in fresh water. For removing flukes and fish lice, a stronger solution can be used, even half and half with water.

### Fountains are useful

*I am making a garden pond 9 ft. x 7 ft. x 3 ft. and would like to know if a fountain serves any useful purpose apart from being attractive, and if I fit one when and how often will I switch it on?*

A fountain is a great asset to a pond by keeping a good

circulation and re-oxygenating the water. The tiny droplets of water freshen up the pond water. Obviously you will want the fountain on when you are in the garden and for as long as you are prepared to use the power. One golden rule is to run the fountain more during warm weather than in cold. During hot or thundery weather run the fountain during the late evening for at least an hour.

When fitting make sure that the inflow pipe is as low down in the pond as possible as long as it is not so close that it would be liable to get choked up with sediment. This will ensure that the stale water at the bottom is brought up and a certain amount of circulation of the water is caused.

### Orandas

*I have an Oranda in my pond with a number of common goldfish. These chase the Oranda and cause it to get blood streaks in the tail. I thought they were spawning but I have not seen any eggs. I take the fish out and cure it but soon after returning it to the pond the same thing happens again. Any advice please?*

I do not think that Orandas are suitable for a pond if they are put with common goldfish. They are very handsome fishes and are more suitable for an indoor tank where their beauty can be observed more easily. There is the possibility that

your Oranda is a male. If a fat bodied fish is placed with common goldfish, the latter will think that it is a female fish filled with eggs and try to spawn with it. It has been noticed that the fat body of a fish, whether male or female, can excite male fishes to chase it with a view to spawning. Orandas are not very suitable for an outdoor pond during the winter months as they are very liable to attacks of fin congestion.

### Sick fish

*I have a goldfish in my pond which appears to be always suffering from one disease after another. No matter how I treat it, it soon gets something else. Do you think I should destroy it or keep trying fresh cures?*

It would be much better to destroy the fish than to keep it in the pond with healthy fishes. It is apparently a weakling and if it was in the wild it would not live for long. It is a great mistake to keep such a fish with others as they could also be infected. Should the fish breed (rather unlikely) the young could also be weaklings.

### Pond filter

*I am intending making a garden pond, 10 x 10 x 3 ft., and with a liner. What base compost should I use and also which type of filter?*

No base compost is neces-

sary as all water plants can be planted in separate containers so that it will be easy to remove them for the annual cleaning out. No filter should be necessary unless you intend to stock with Koi. As long as you do not over-stock with fishes and have sufficient oxygenating plants, the water should keep clear and only an occasional part change of water and the annual clean will be enough. Over-feeding is the usual cause of water pollution.

## Tropical

### Shrimp Imps

*Could you give me any information on a live food called Gammarus, I believe it is also known by the trade name of 'Shrimp Imps'.*

According to certain books this live food can be cultured by the average aquarist in the home.

*I would also like to know if it can be obtained in this country, and if so who can supply it.*

The live food *Gammarus* is actually an Amphipod or Freshwater Shrimp. Another shrimp that looks practically identical is *Hyalella*. Both are called Scuds or Caledonian Shrimp as well as Shrimp Imps. They are small creatures with a characteristic semicircular shape and feed off vegetable matter in streams



and rivers in the USA and Europe, where the water is high in oxygen. They breed continuously from early Spring to late Autumn, via eggs held in a pouch on the female. The young shrimps are born with an outer shell and this is shed periodically as they grow.

The shell is quite tough and this makes the shrimp unsuitable for fish other than large Trout. For the same reason the Shrimp has not been exploited for Tropical fish but would be suitable for large Cichlids. They also carry parasites, which makes them a dangerous live food—freeze drying or deep freezing overcomes this problem.

Some USA entrepreneurs have bred the Shrimp in captivity with green water, chopped spinach or oatmeal as food. To keep the oxygen high, shallow tanks were used. There are no UK suppliers.

The Fairy Shrimp, *Eubranchipus* is probably a better live food being a fresh water equivalent of the Brine Shrimp ie, the shell is soft. They are much sought after by American breeders but the animal is rare in Europe and cannot be cultivated because its breeding pattern is quite unpredictable.

## UK Fish Farming

I am writing to you in the hope that you could possibly supply me with some information, or reference to information on the U.K. ornamental fish farming industry (any references to articles on the subject in journals would be very useful).

I am a 3rd year undergraduate student at Southampton University, and I am undertaking a project on ornamental fish farming, with particular regard to the realities and possibilities of ornamental fish farming in the U.K.

I am particularly interested in obtaining data on the extent, profitability of the industry as a whole, and of sizes, distribution and varieties of individual fish farms within the U.K.

No survey of U.K. ornamental fish farmers has been carried out, but most are a combination of breeders and importers—hence they may

probably be members of the Ornamental Fish International organisation. I suggest you contact: Mr. B. Rushton, O.F.I., 6th Floor, Onslow House, 60-66 Saffron Hill, London EC1N 8QX.

You will also find a list of Fish Dealers in *The Fish-keeping Yearbook 1986* by John Dawes ISBN-0-947728-15-5 published by Robert Royce Ltd at £5.95 (October 1985) pages 156-169.

## Choosy Oscars

I have two 8 in. Oscars which I have had for about a year and a half. For the past five months they have 'been off' their food. I now feed them very little each day and they are not really interested in the food. They used to eat frozen lamb's heart, lamb's liver, bloodworms and occasionally lance fish. They will always eat live fish and earth worms, but I have not got the money nor garden for this to make up a sufficient part of their diet.

I have eliminated everything I can think of that might put them off their food but I think they are just getting choosy. Please could you suggest some other foods I could try especially frozen foods or things I could freeze myself.

Oscars can be moody fish and often this includes refusing to eat. Providing the fish is healthy and housed in clean water, it should resume eating eventually.

You ask for a list of items that will tempt the fish—there is no need to list them because you can apply the simple rule . . . "if you can eat it, they can eat it." Just avoid foods with animal fat (sausages, hams, pastries, etc) and highly spiced foods (which is good advice for its owner too).

## Blue-green algae

I am troubled by some of my tanks becoming overgrown with blue-green algae, despite keeping to all the plant density, lighting, feeding and stocking rules.

I intend stripping my tanks and setting them up again. If I use the same gravel after washing thoroughly, should I

bake it to destroy the algae?

I should have mentioned that the trouble is in both coldwater and tropical tanks.

Algae can cause problems in aquariums, particularly the Blue-Green variety once it gets a hold. Any chemicals that could kill this form of algae would have to be so powerful it would also kill your plants. Your plan to strip the tank and start afresh is probably the best solution. There is no need to bake the gravel, just scald it with boiling water. Wash the plants in running tap water and discard any covered with the algae. Soak the tanks and fittings in household bleach but rinse it all away thoroughly afterwards.

## Cloudy water

I have an aquarium 48 in. x 15 in. x 18 in. with four undergravel filtration plates 12 in. x 12 in, corner filter and internal power filter. My tank is constantly cloudy even though I do regular water changes every two to three weeks and recently cleaned the tank thoroughly, ie, gravel washed, undergravel filters removed and cleaned and half a tank water change. Although the water is not so cloudy now, this has not been a complete cure. I also have a 2 ft. 6 in. and another smaller aquarium and am not experiencing this problem with them. When feeding the fish, I watch to see that the food is consumed in 3 to 5 minutes. Therefore, I feel that this rules out the possibility that overfeeding is my problem.

As an afterthought, could chlorine through the domestic water supply be a factor?

I doubt if your tap water is responsible for the cloudiness, but certainly some tap waters are poor these days. In my part of Yorkshire the water can be so dark that the fish are invisible in a freshly filled aquarium!

I suspect a bacterial bloom—particularly with the problem getting worse after cleaning everything . . . this is a typical reaction. Your undergravel may be turning over at too low a rate—try increasing the bubble-up rate. Your corner filter cannot cope with bacteria—only floating solids. The internal power

filter probably has foam inside and may work better if the foam is replaced with the ceramic filter mediums now on the market. But be prepared to allow the filter bed to mature—do not clean anything for several weeks. As the biological filtering action takes over, the water should suddenly clear—then start partial water changes etc.

## Plants

As from this month, Barry James of Everglades Aquatic Nurseries will be taking over our Plant Queries section from Dr. Vivian de Thabrew who has been forced to relinquish his popular service to *A&P* readers owing to increasingly heavy commitments elsewhere. We thank Dr. de Thabrew for his valued contributions over many years and warmly welcome Barry to our panel of experts.

## Rust-like marks on plants

I enclose a plant sample from my aquarium. When I bought this specimen, I noticed a small patch of rust-like marks on the leaves. These have become a lot worse since then but do not affect Vallis, Cabomba or Crypts. There is no plant food or peat in the tank, the light (40 Watt Gro-lux) is on 10-12 hours per day, the water is clear and the fish are healthy.

I am afraid that the sample was too far gone by the time I got it and was just a pulpy mess.

However I think that the plant was probably an emerse grown specimen. It is a pity you did not name it. If the plant was grown out of water as many plants are, then many of these leaves always rot away and start as small rust-coloured patches as you describe. However this is quite normal and, providing the plant is a true aquatic and not a bog or house plant, it should produce new leaves and grow away strongly after a few weeks. Mind, your lighting is only half as strong as it should be and only plants needing a low lux level would survive for any length of time.





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## Water lily roots

*My pond is 6ft. x 5ft. with a maximum depth of 27in. It is filtered by a Cyprio filter and, at all times, the water is very clear. The pond edges are planted and, in the summer, we put two baskets of oxygenators in the deep section. Would it also be advisable to put a water lily in the deepest part of the pond which looks a bit bare? I have been told that water lily roots will pierce the butyl liner?*

Certainly there is no problem in putting a water lily in the deepest part of your pool. You plant it as you did your other plants in a water lily basket. There is no fear of the roots penetrating the butyl liner. Because of the flexible nature of the material even tree roots growing under the liner will not damage it.

## Marine

### Decorating fumes

*I have a 48 in. x 15 in. x 12 in. marine tank in which I have one Powder Blue Surgeon fish, one Emperor Angelfish (adult), and two clown fish with undergravel filters plus a power head.*

*The tank is in my lounge/dining room which I can't shut off from the rest of the house. My problem is I wish to decorate now and I was wondering if there was any way I could cover the tank to stop the fumes of the paint from getting in. What do you suggest I do, short of moving the tank upstairs?*

It is quite unnecessary, indeed undesirable, to move your sea aquarium upstairs whilst decorating the dining room. The resulting chaos and disruption to the fishes and invertebrates would almost certainly result in the loss—or at least the sickness—of some of the fishes and/or invertebrates concerned.

The toxic organic fumes which emanate from emulsion and gloss paint, wallpaper paste, etc. are easily controlled and removed from solution by filling a small 75-pence internal plastic box filter with an ultra-high activity marine grade charcoal,

such as 'Seacoal', and immersing this filter (connected to an air pump of course), in a corner of your tank. This very special charcoal will not only remove all organic paint, paste toxins from solution but will also remove all fish and invertebrates excreted toxins as well.

## Discus

### Hole-in-the-head disease

*One of my Discus seems to have the 'Hole-in-the-head' disease, there is a discharge of pus around the head.*

*I would be very grateful for the most effective cure for this disease, how to use the cure and where it could be obtained.*

Many Discus fish must have come to an early end because of this disease. It was only about 15 years ago that the German, K. A. Frickhinger, found the parasite responsible for this ailment in Discus fish even though many other species seem to get infected by it. In the early sixties it was shown to be common even amongst trout and salmon. Its scientific name is *Hexamita* but it is also often described as *Octomitus* and *Spiromucelus*.

It is often suggested that this disease can be introduced with polluted live foods and to start any kind of therapy the feeding of live foods should be stopped. There are a number of cures available and they usually contain the active ingredient: Metronidazole. Flagyl is probably the best known remedy; although it is used for human therapy it works very well with hole-in-the-head disease. You can obtain possibly a few tablets from your friendly chemist or you must ask a vet for a proper prescription.

You will need 2 x 400mg tablets per 100 litres of water. Remove the filtering material from your filtering system and replace with new polymer wool; give your tank a  $\frac{1}{2}$  water change. Add the necessary amounts of tablets to the water and leave for 3 days. Carry out a  $\frac{1}{2}$  water change. Repeat dosage and leave for 5 days. Again do a

$\frac{1}{2}$  water change; filter the water through a quality carbon and the fish should be clear. Heat (95° F) will increase the effectiveness of the Flagyl tablets.

## Filtration

*After returning to tropical fish from an eight year break, I have decided to set up a tank for Discus.*

*Please can you advise me regarding filtration as to which method you think is best. The magazines seem to go for the undergravel method whereas I have always found the power filters good.*

*Also, can you tell me where I can obtain the de-mineralized water other than from the usual retail outlets.*

There is no better filtration system than a power filter. With it you have the choice of either going purely biological, or chemical or even a combination of mechanical (which will in time also turn

biological) as well as either one of the other, or even in combination. There are not only filtering materials which will keep the water in good condition for the fish but also to remove only certain types of pollutants from the water; there are others which will add certain kinds of nutrients to the water. It has a greater turnover of the water without having the noise the undergravel will give, and also, it is a small matter to clean or replace certain parts of the filtering system/material in a few minutes when necessary. When an undergravel filtration system needs cleaning it usually means stripping down the tank on a Sunday afternoon.

De-mineralized water, other than from the usual retail outlets, will mean making a few enquiries to laboratory suppliers in your local area; telephone number through the Yellow Pages, or produce it yourself either with throw-away cartridges or a 2 column deioniser. Certain fish shops sell it at 30 pence per gallon.

## Next month

May is Water Garden month in *A&P* with a supplement of specially commissioned articles by leading writers.

- **Bill Heritage** tackles the problems of planting a pond in one of our main colour features.
- **Philip Swindells** shows that there is a Lily for every occasion.
- **Stephen Smith** proves that it is possible to build a pond for £500 in a week.
- **Water Gardening** is booming. We present a special colour feature on some of the things you can expect to find when you visit Water Garden Centres.
- As always, we also have a comprehensive range of unmissable articles on other subjects, from marines to coldwater, our regulars, and lots of other things in between.

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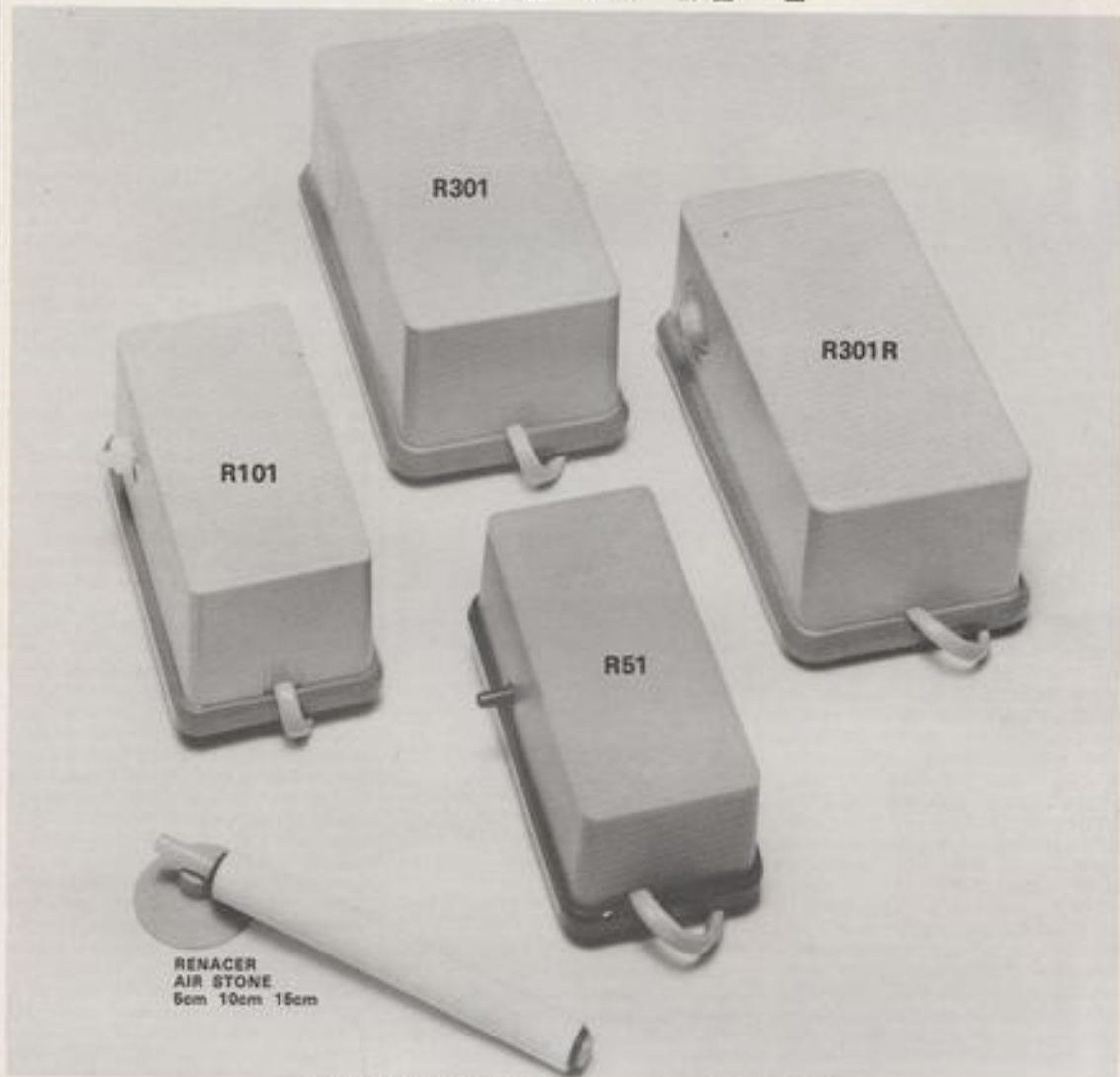
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# NOISY AQUARIUM FISH

**W**ater is a good medium in which to make noises, for comparable sounds can be heard at greater distances than in air.

It is not surprising, therefore, that many fish can make noises, although in some cases e.g. convicts, angel fish and jewel cichlids (Myrberg *et al.* Science 149, 555-558: 1965), the sounds may not be heard outside the tank. They can only be detected with underwater hydrophones.

Noisy fish are so common that scientific eyebrows are rarely raised merely by new additions to the list. Instead, current interest is often focussed on the role of sound-making in the lives of fish.

Much of the impetus behind the study of fish sounds stems not from the curiosity of academics fuelled by a knowledge of the importance of sounds to birds and mammals, but from the practical experiences of the second world war. Navy men, bending an ear for enemy ships, sometimes mistook the sounds of fish for the noise of warships and falsely alerted the defence forces. Furthermore, some mines dropped in the sea of Japan, were discharged by animal noises (Marshall. *Symp. Zool. Soc. London* 7, 45-60, 1962). All this led to improved methods of detecting sounds and a greater awareness of noisy fish—particularly marine species.

The US navy sent a biologist to study the animal sounds in the Pacific. Soon after the war, she had compiled a list of 42 families of sound-making fish in the area and given them information about their abundance, distribution, size and especially the type of sound they produce. Many of the families were represented by numerous species, and thus it was clear from just one important study that there might be thousands of sonic fish in the Pacific alone.

Although scientists must necessarily characterise fish sounds by their magnitude and frequency spectra, they also use a number of graphic terms—e.g. grunting, whistling, croaking, whining, knocking, growling, snoring and purring, that strike a more familiar cord with the fishkeeper. Indeed, some of their comments on fish sounds really catch one's attention. Here are some that caught mine:

(1) At a distance of 2 metres, the intensity of sound produced by the

Sounds like the bubbling of a giant percolator, or a jew's harp, or even a subway train are among the vast repertoire of improbable sounds produced by fish. Dr. Michael Benjamin of University College, Cardiff reveals these and other fascinating secrets of the noisy underwater world

toadfish (*Opsanus sp.*) may equal that produced by a subway train!

(2) The singing catfish of Ceylon sounds like a distant automobile horn.

(3) There is (or was?) a commercially available record of the sounds made by a shoal of *Galeichthys* (a mouth-breeding, marine catfish found off the coast of America) that sounds like the bubbling of a giant percolator.

(4) Fishermen claim to be able to tell which species of piranha they have caught, before they lift their nets, by the different sounds the fish make.

(5) Characoids of the genus *Prochilodus* (commercially important food fish, but including some aquarium species) make sounds like an outboard motor when ascending an Amazon river on their spawning runs. Fishermen keep track of them by these sounds.

(6) The Siamese Sole attaches in

numbers to the bottom of boats and makes a sound like a jew's harp, struck slowly.

## Sound-producing mechanisms

There are several ways in which aquarium fish make sounds. Some noises are linked to activities like swimming, burrowing and feeding. Yet even such incidental noises may affect the lives of fish in the wild. Feeding noises for example, might attract conspecifics (i.e. others of the same species) to the feeding spot, so that food resources are maximised. But they could also alert predators.

**Air bubble noises:** Fish with a swim bladder that opens into the first part of the gut, can make noises by releasing air bubbles from their mouths. Eels have been known to do this if they are disturbed.

Gas bubble noises are also typical of the croaking tetras. *Mimagoniatus (Glandulocauda) inaequalis* for example, is a small characid where male, courting fish, periodically gulp air at the water surface, swim below, and then release it from their gill covers, to make a croaking noise. According to Nelson (*Evolution* 18, 526-540: 1964), the air is not used for respiratory purposes. Air gulping in the croaking tetra probably evolved from a habit its ancestors had, of nipping at the water surface in search of food.

Certain loaches have achieved a degree of fame for their ability to emit gas bubbles from their anus! Presumably this is associated with their use of the gut as an accessory organ of respiration. Politeness, forbids the use of the vernacular term for such an activity, but the interested reader could find it in the Oxford Paperback Dictionary between 'farrow' and 'farther'!

**Stridulation:** This is the noise made when two hard parts of an animal are rubbed together. It is the method used by crickets and grasshoppers, but of more immediate interest, by the mouth-breeding cichlid, *Oreochromis mossambicus* (which the reader may know as a Tilapia). These fish can rub together their pharyngeal or 'gill' teeth in the throat. The teeth are chisel-shaped and well suited for making grating or grinding sounds. Aquarium-bred males and females, adults





Left: The Elephant-nose fish (*Gnathonemus petersi*) makes clicking sounds when confronting other fish. The noises do not result from the well known electrical activity of the fish. Below: The Talking catfish (*Acanthodoras spinosissimus*) makes stridulatory sounds by moving its pectoral spines and amplifying the noise with its swim bladder

and juveniles can all make noises. Young fry start as soon as they get enough teeth and can chatter away at 3 weeks. According to Lanzing, (*J. Fish Biol.* 6, 341-347: 1974), the sounds of feeding animals differ from those of schooling fry and territorial males. The Surinam Geophagus (*Geophagus surinamensis*) is another cichlid that grates its pharyngeal teeth. It does this audibly when caught.

Stridulatory noises can be produced when special fin rays and spines are moved. This method is adopted by several species of freshwater catfish (see below) and probably accounts for the low intensity sounds made by the three-spined stickleback.

**Swim bladder noises:** Certain aquarium fish (including numerous catfish) can produce sounds by vibrating their swim bladder. The noises are generally lower pitched than stridulatory ones. In those fish where this function of the swim bladder is highly developed, there are often special drumming muscles whose rapid contractions vibrate the swim bladder and thus produce the sounds.

In a number of aquarium catfish (e.g. *Pangasius* 'cats') there is a special device known as the elastic spring mechanism. The springs are specially flattened plates (parts of vertebrae) that are attached to the swim bladder and vibrate in response to the contraction of powerful muscles. The vibrations are transmitted to the air bladder and a growling or humming noise results. As in a loud speaker, the swim bladder can have numerous partitions which act as baffle plates and intensify the sound.

The croaking gourami has an accessory respiratory organ, the labyrinthine organ, located above the gills on each side of the body. According to Daugherty & Marshall (*Physiol. Zool.* 49, 227-244: 1976), the contraction of special muscles displaces these organs and vibrates the air cavities around them to produce the croaking sound. The swim bladder then amplifies this noise. The croaking occurs during lateral displays and is always accompanied by head-shaking. This allows you to tell which fish is making the noise.

The swim bladder of a fish can amplify sounds produced by stridulation. Alwynne Wheeler, for example, says in his 'Fishes of the World' that the talking



catfish, *Acanthodoras spinosissimus*, makes its noises by moving its pectoral spines and amplifying the sound with its swim bladder.

Axelrod *et al.*, (In 'Exotic Tropical Fishes' 1983) drew attention to the loud growling noises produced by the spotted Synodontis (*Synodontis notatus*), that can be easily heard outside the aquarium. According to these authors, the sounds, and those of the upside-down catfish, *S. nigromaculatus*, are made because the fish grind their pectoral and pelvic spines in their sockets and amplify the noises with their swim bladder.

#### The significance of fish sounds

Although sound production in fish is widespread, we know little of the part that sound plays in their lives. There is ample opportunity here for the careful observations of the fishkeeper to lead the way for scientists.

Sounds may be restricted to one sex and characteristic of a particular time of day or year. The croaker, *Corvina nigra*, is, for example, a species where the male grunts with increasing frequency up to dusk, but virtually stops thereafter. On the other hand, the 'singing' fish of Ceylon (which is apparently a catfish) only performs at night. Seasonal changes in the activity of wild fish are often associated with breeding habits. This of

course, also applies to birds and mammals; it appears that sound production is a useful way of getting mates together and stimulating them to 'perform'.

Sounds can be associated with many different behaviour patterns. These include courtship (e.g. the croaking gourami and the damsel fish), aggression (e.g. the skunk loach, elephant-nose fish, convict and jewel cichlids, angel fish), confronting a new stimulus—handholding a fish or letting it explore a new environment (e.g. certain seahorses, the elephant-nose fish), competitive feeding (e.g. the croakers), alarm calls (e.g. squirrel fish in shoals (e.g. piranhas). It is interesting that the clicking noises made by *Gnathonemus petersi* (the elephant-nose fish) during agonistic encounters, are not associated with the electrical discharges it is known to produce (Rigley & Marshall. *Copeia*, 134-135: 1973). How intriguing that the fish will 'click' if a suitable plastic model of *G. petersi* is placed in the tank! The clicks accompany lateral displays or chasing.

Although birds and mammals make good use of sound to locate the position of other animals, fish seem to be poor at locating the source of underwater noises at any distance. If this be true, it makes them the only animals with well developed, sound-signalling systems which are of no use in localisation.



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# THE GENUS CYNOLEBIAS

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**S**pecies of the genus *Cynolebias* come from Uruguay, Argentina and Brazil, three countries on the Eastern coast of South America.

They are known in the hobby as the 'South American divers'; a group which also includes seven other genera, but for this article we deal only with *Cynolebias*, of which 17 species make up the genus, ranging in size from 4 cm. (1½ in.) to 15 cm. (6 in.).

*Cynolebias* inhabit temporary pools or bodies of water which generally dry up completely. Between November and May most of the biotopes are dry, and this is when the eggs, which have been laid in mud, develop, awaiting the oncoming of the rains.

I first became interested in Killifish back in the early 1960s, when, as is mostly the case still, very few shops stocked them—not their fault then since very few species were available. My first experience with this very interesting genus was soon after joining the British Killifish Association in 1967, when a member had

received eggs of *Cynolebias nigripinnis* from America. Not much was known of the incubation time in those days and I know the eggs were left for six months before being wetted. He had a few pairs surplus to requirements and I was lucky enough to be given a pair. Since those days they have always been in my fish house and are still my favourite Killifish.

The size of tank required to house *Cynolebias*, of course, depends on the size of the species. A pair of *Cynolebias boitoni*, at 4 cm. (1½ in.) will, obviously, not need as much room as a pair of *Cynolebias elongatus* at 15 cm. (6 in.), so for the smaller species a tank 45 cm. (18 in.) by 30 cm. (12 in.) by 20 cm. (8 in.) is ideal—while the larger species can do with as big a tank as you can provide.

In the wild *Cynolebias* would generally live in soft acid water, but I always keep mine in London tap water, which is very hard and just about neutral. In fact, water chemistry does not seem to affect them too much; they seem quite happy in all types of water, and it certainly does

not inhibit their spawning. A 50% water change each week should help to keep them in good condition.

As far as temperature is concerned, *Cynolebias* species are very hardy. For example, I have had wild *Cynolebias nigripinnis* from Argentina, with a copy of the collector's notes, in which he stated that, at 8.0 a.m. the water temperature was 2°C (34°F) with a slight touch of frost on the surface. At this low temperature the fish were lethargic. In aquaria a water temperature of about 20°C (c.70°F) suits most species. The exception to this is *Cynolebias astenovi*, which comes from a warmer area and, therefore, needs the temperature in their tanks to be higher.

Feeding can have its problems as, in my experience, only live foods are accepted; flake food is almost always ignored. Suitable live foods include *Daphnia*, glass worms, gnat larvae, blood-worms, *Tubifex* worms, grindal worms, white worms, and (for the larger species) chopped up garden worms. As they consume large quantities of food this can

Left: *Cynolebias constanciae* is known to exist in only a few natural sites and is, therefore, in danger of extinction in the wild. Fortunately there are aquarium stocks of this species in the UK, Europe and the States  
Below: *C. bellottii* is commonly known as the Argentine Pearl

E. PORZL, BOTH PICTURES



be a problem in the winter months, a situation that is now eased by the frozen foods available—e.g. *Daphnia*, *Tubifex*, bloodworms, etc.

Spawning your *Cynolebias* can be accomplished in various ways. Pairs or trios do not have to be separated and conditioned, I find. Provided they are well fed, they will spawn until they die. For spawning the smaller species I use a tank 45 cm. (18 in.) long by 20 cm. (8 in.) wide by 20 cm. (8 in.) deep, with a 20 x 20 cm. viewing area. Approximately 10 cm. (4 in.) from the front of the tank I glue two pieces of perspex about 1/4 in. apart to each side of the tank, allowing

me to slide a piece of glass in between. In the area between the front of the tank and this piece of glass I place peat to a depth of 8 cm. (3 in.), which allows the fish to dive into it, and, of course, one is able to observe the spawning. The peat used should be boiled Irish sphagnum moss—don't use other peats as these could contain harmful additives.

The male usually dives into the peat followed by the female, and one egg is laid at a time. All feeding can take place at the back of the tank, helping to keep any dead food from polluting the peat. Another method which can be used is a glass jar put into a tank, with peat placed

in this to a depth of 10 cm. (4 in.). The male will soon find the peat and entice the female to spawn. One advantage of this method is that it could be used in a community set-up. If so, the peat should be collected each week and replaced with new, making sure there are no fish lurking in the jar.

Once the fish have spawned, you will need to store the eggs for some time before they are ready to hatch. This can be done very easily as follows:

First, pour the peat through a fine net and squeeze out most of the water until it is the consistency of very damp tobacco. Then, place the eggs and peat in a polythene bag, labelled with the species, name and date of expected hatching. The incubation period will depend on the moisture content in the peat, and the temperature at which the eggs are stored. Generally speaking, the higher the temperature the quicker they develop and are ready to hatch. When the time has arrived for the expected hatching, open the bag up and with a magnifying glass look for eggs which have 'eyed up'; this means the golden colour of the iris of the embryos can be seen. If the eggs are ready to hatch, I then fill a tank with half old tank water and half fresh tap water to a depth of 15 cm. (6 in.)—temperature at about 15°C (c.60°F)—and sprinkle the peat onto the water, then stir vigorously to wet the peat thoroughly so that it sinks to the bottom. Fry should start appearing one hour to one day after the wetting. If nothing happens re-dry the peat and store for one month more. I have found with *Cynolebias* that no forced hatching is necessary. Many articles and books state that the fry need to reach the surface to take a gulp of air to fill the air-sac, but I have not found this to be the case as the fry of newly hatched annuals would not have the strength to break the surface tension of the water. For a couple of hours the fry will swim rather erratically and will be seen to swim to the surface and then drop back down. However, this will soon pass and they will then swim normally. Feeding can then commence.

Newly hatched brine shrimp or micro worms are the ideal first food. I always add snails to the tank to eat any dead food, thus helping to keep the tank clean. With 50% water changes each week and twice-daily feeds the fry grow very rapidly, soon being able to take grindal worms and chopped *Tubifex*.

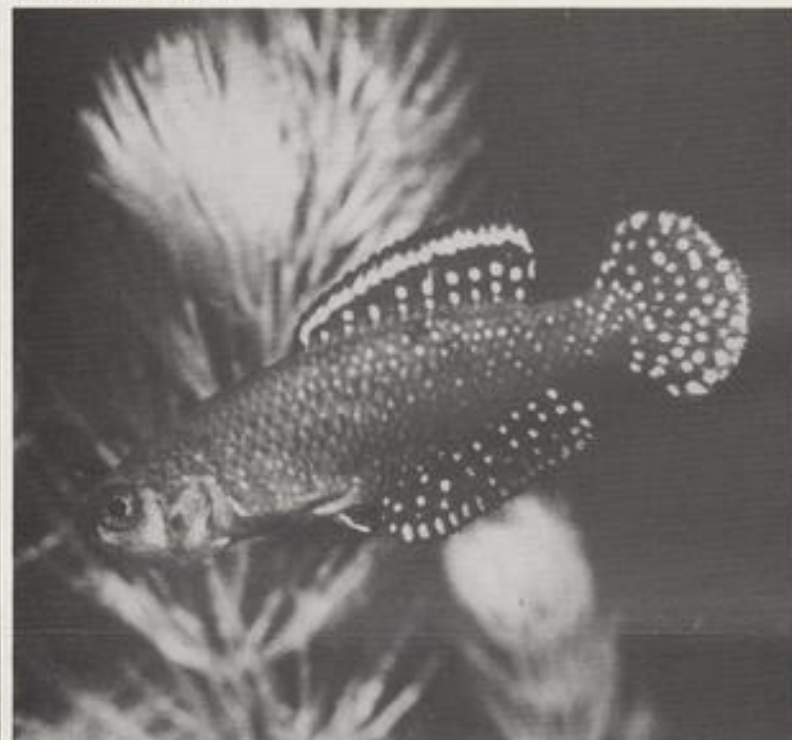
At two to three months they will be sexually mature and ready to start the life cycle once again.

In my experience, the genus *Cynolebias* suffers very little from diseases; on only one occasion have I had velvet, and that was with *Cynolebias tiaratus*.

On the left is a list of *Cynolebias* species, with incubation periods, sizes and Country of origin.

If you need any further information on Killies or the British Killifish Association, please contact the B.K.A. Publicity Officer: Richard Scoltock, 4, Two Bridges Road, Newhay, Rochdale, Lancs. L16 3RP.

The eggs of *C. nigripinnis* from Argentina and Uruguay require an incubation period of three months



## A list of *Cynolebias* species

<i>Cynolebias</i>	Incubation period	Size	Country of origin
<i>adloffii</i>	3 months	5 cm.	Brazil
<i>alexandri</i>	3-4 months	5 cm.	Argentina
<i>antemori</i>	5 months	5 cm.	Brazil
<i>bellottii</i>	4 months	7 cm.	Argentina
<i>boitonei</i>	2-3 months	4 cm.	Brazil
<i>carvalhoi</i>	?	4 cm.	Brazil
<i>cheradophilus</i>	? 4 months	? 6 cm.	Uruguay
<i>constanciae</i>	3 months	5 cm.	Brazil
<i>elongatus</i>	5-6 months	15 cm.	Uruguay
<i>lateoflavimulatus</i>	3 months	5 cm.	Uruguay
<i>myersi</i>	?	?	Brazil
<i>nigripinnis</i>	3 months	5 cm.	Argentina & Uruguay
<i>nonoiulensis</i>	6 months	9 cm.	Argentina & Uruguay
<i>schratmuelleri</i>	?	5 cm.	Brazil
<i>tiaratus</i>	2-3 months	6 cm.	Uruguay
<i>whitiei</i>	3 months	9 cm.	Brazil
<i>wolterstorffi</i>	4 months	10 cm.	Brazil





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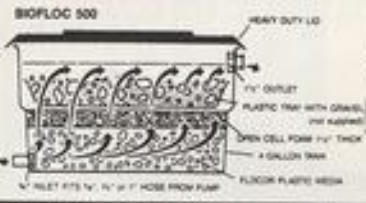
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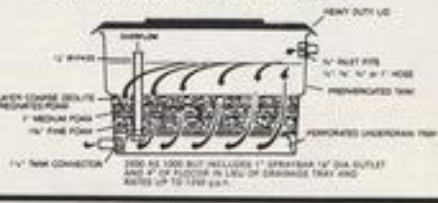
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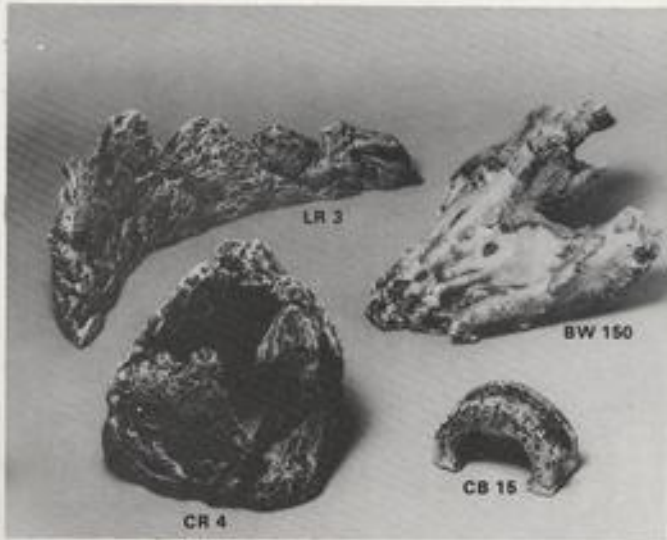
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# Coldwater jottings



Stephen J. Smith

## Golden Orfe— 'Prince of the pond'

I have often described the Moor as 'regal', while the ever-popular Koi is a fitting 'emperor' among coldwater fish. But the 'Prince' of the pond is, without doubt, the Golden Orfe.

In the days before the Goldfish was introduced from China, Golden Orfe would often be seen dancing and leaping among ponds throughout Europe.

The Golden Orfe (*Leuciscus idus*) closely resembles the silver-coloured Dace and was derived from crossing albino specimens of Ide (*Leuciscus idus*) until the beautifully golden-coloured variety became established.

Like the Goldfish, the Orfe is a member of the family Cyprinidae—but there the resemblance ends! The Orfe is a streamlined, fast-moving fish with a silvery underside and golden-pink flanks and dorsal region.

Some specimens are a beautiful pale pink, while others can be completely silver.

Orfe prefer well-oxygenated water, and can suffer during sultry summer nights when the air is poor in oxygen content. Fintage is designed for speed and is thus not prolific—with the exception of a powerful caudal fin.

An almost shark-like triangular dorsal fin rises from the apex of the dorsal arc vertically opposite the pectoral fins, which themselves are small and paddle-like and tucked close to the cigar-shaped body when the fish is not in motion. As with the ventral fins they are held outwards as

'stabilisers' when at rest.

A shoal of Golden Orfe is an extremely attractive sight in a pond, and I have seen such fish quite at home alongside other coldwater species such as Goldfish or Koi.

Although Orfe can be kept in the aquarium—and are also very beautiful when viewed from the side—I would not recommend it: Orfe require plenty of swimming space and well-oxygenated water; while you will certainly need a tightly-fitting lid to prevent the fish from leaping out of the tank!

### Electricity and the aquarium

Over recent months I have been busily making preparations for this year's breeding season by setting up conditioning tanks for parent fish.

In order to assist in bringing 'brood' fish up to spawning condition, I prefer to use gentle heat and occasional aeration; while some form of lighting is essential if one is to fully enjoy viewing the fish during the conditioning process.

**Electricity and water do not mix:** it is essential that proper connections are used when installing electrical equipment to ensure that the installation is thoroughly safe and to enhance the reliability of the equipment.

Thus a cable tidy—although the cheapest of items—is the most important piece of equipment you will use when setting up an aquarium.

I use two-tier stands for my conditioning aquariums. Each pair of tanks is serviced by its own cable tidy which supplies power via its own three-pin plug. A four-gang socket is used mounted to a wall above the level of the highest tanks to avoid any possibility of condensation trickling down the lead and causing a short.

There are several makes of aquarium tidy available for the aquarist, but do ensure that there is provision for an earth lead when making your choice.

It is also extremely useful if the type you select is fitted with a neon mains indicator; while a great advantage is a pair of independent switches for air, pump and lighting.

Although you may feel quite competent at DIY home electrics, do ensure that there is a full set of instructions and wiring diagrams supplied with the cable tidy; and that you read them thoroughly before making any installation. If you have any doubts at all, do consult a qualified electrician.

My own favourite cable tidy is the type which has a 'dog leg' entry passage for each cable. This prevents wires being pulled out of their connections and causing a short—and expensive damage to heaters/filters/pumps.

The cable tidy is fixed to a convenient

position on the tank or hood using adhesive pads or clips, and care should be taken to ensure that it is not sited where it would be liable to splashing. I always position the cable tidy at the bottom right-hand corner of the front of the upper tank.

Although conspicuous this has the advantage that it is far easier to swap or add equipment to the set-up when the tidy is placed at the front. Any other position and it would require moving the tank or other furniture in order to get at the terminals!

### Hope yet . . .

Following my article 'Nature under threat?' (Coldwater Jottings, September 1985) about the loss of natural ponds through cynical 'landscaping', all praise must go to Severn Trent Water Authority, who recently announced their plan for the creation of ponds and bankside improvements to encourage flora and fauna across their region.

Fish and other aquatic life will benefit from the £200,000 scheme for the creation of pools and shallows; while planting of trees, shrubs and waterside plants will provide improved habitation for birds, insects, and other wildlife.

According to Severn Trent: "Other authorities are encouraged to follow the lead . . ." There may be hope yet for Britain's fast-dwindling natural pond life.

### Publicity

I am indebted to the organisations and individuals who, from time to time, send me information on their particular involvement with coldwater fishkeeping.

Obviously, I am unable to give any guarantee of comment in these columns from your information because of the broad range, and the amount, of healthy activity within the hobby—but do keep it coming: information from all quarters is always welcome.

I am always especially pleased to give support to one of the most important aspects of the coldwater scene: the spread of clubs and associations dedicated, in whole or in part, to coldwater fishkeeping.

Despite several pleas through these columns for information from coldwater societies precious little has been received. A member of one society, which has never sent any information on its activities, even wrote to me to express his dissatisfaction with the lack of publicity about his society!

So, to coldwater committees throughout the country, do send details of show dates, special events, results, as well as information about unusual or 'news' stories, addressed to me at A&P.

That member could well be one of yours, so I expect to be flooded with mail from now on!

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Barry and  
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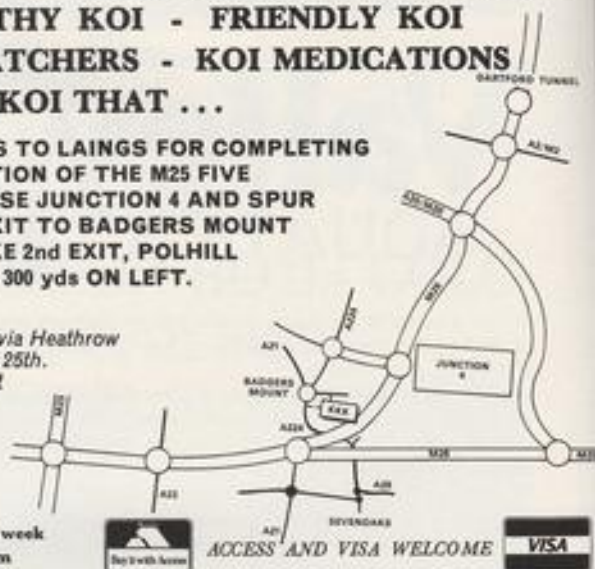
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*Glyn returns from Japan via Heathrow and Junction 4 on March 25th. Koi will follow at frequent intervals.*

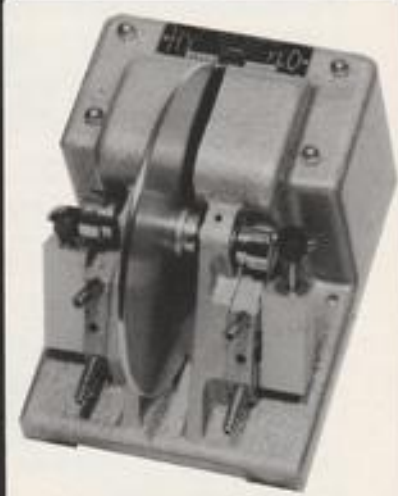


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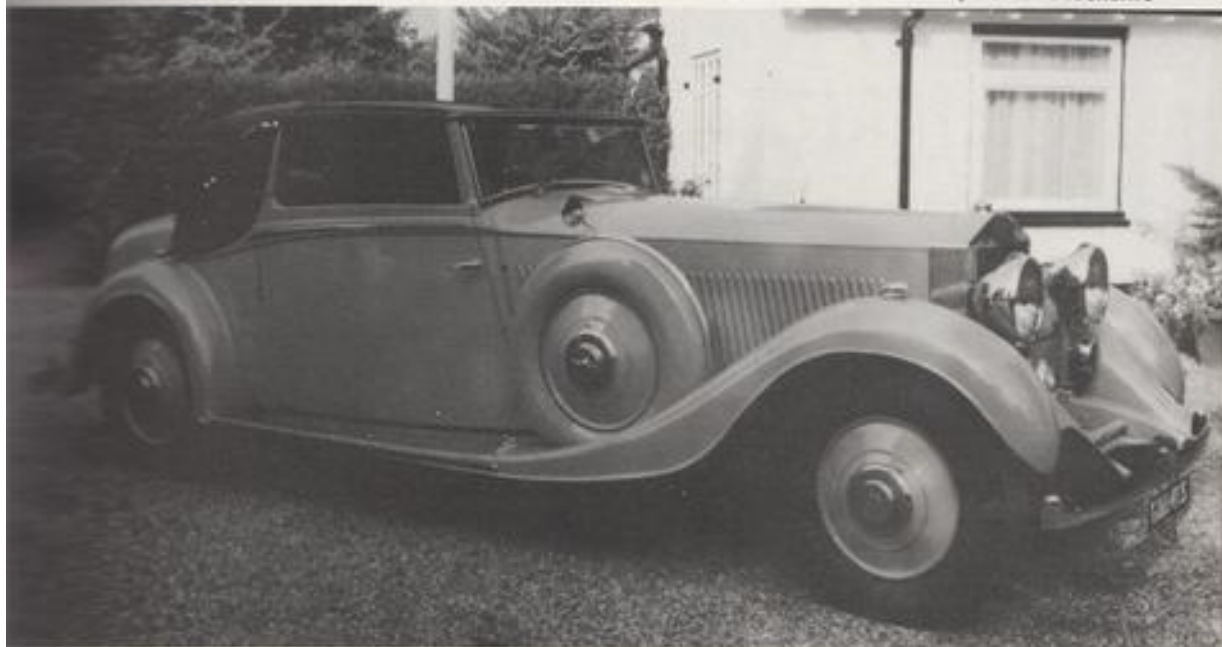
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# Books

## A Superb Book for Cichlid Fans

The Cichlid Aquarium  
Paul V. Loiselle  
Tetra Verlag, £12.50

It has always amazed me that the name of Paul Loiselle is not better known in the UK. With the publication of his first book, this will certainly no longer be the case as we have waited too long for this moment, the first truly genuine book about cichlids in English written by someone who knows what he is talking about. (See our article on *Haplochromis quadrimaculatus* by Paul in *A&P*—Ed).

I first had the pleasure of meeting Paul in 1979 while attending a Convention of the American Cichlid Association in New Jersey, and was stunned by the never-ending flow of words that were uttered, every one relevant and showing great depth of knowledge. I was instrumental in bringing Paul to this country in 1981 where he lectured to all-too-few British aquarists. This flow of words never stops, be it in lectures or articles in magazines. Now, all of this information has been captured and is available to all.

The Cichlid Aquarium is nothing short of a masterpiece, and should be bought by all aquarists, not just the cichlid enthusiast. Why? Well, this is a book about the cichlid aquarium, and over half is devoted to commonsense advice on how to keep cichlids, with practical details of setting up tanks and maintaining them. This advice, of course, applies to plenty of other fish, not just cichlids. Chapters 5 and 6 should be read and inwardly digested by all—'Maintaining the Cichlid Aquarium' and 'Troubleshooting in the Cichlid Aquarium'.

In just over 280 pages, Paul explains what a cichlid is, gives a history of the Family and a brief natural history, as well as describing what happens when cichlids are put where they ought not to be.

A short chapter on cichlid behaviour and its management is sound practical common sense, and the following chapter, on setting up the cichlid aquarium, builds on these behavioural insights and tells you how to go about starting the tank. Furnishing the tank is dealt with in Chapter 4, as are other suitable fish to keep with cichlids, be they small characins for dwarf cichlids, scavengers for the giant cichlid tank, or dither fish to help cichlids settle down and breed.

Chapter 7 tells you in 40 pages all you wanted to know about breeding cichlids.

Split into sections and amply illustrated it covers breeding techniques for monogamous cichlids, breeding techniques for polygamous cichlids, be they harem-forming or openly polygamous, with both breeding options and, importantly, post-spawning management for both parents and fry.

Finally, most of the last 100 pages are devoted to a catalogue of cichlid types for the aquaria that you will now have set up. Not a species by species account, but a group by group account. In this way the book complements nicely the other Tetra cichlid books, the 4 excellent volumes that have previously been reviewed in these pages (available exclusively through the British Cichlid Association, 33 Kirk-

meadow, Bretton, Peterborough, Cambs.).

The sort of sections the catalogue is broken up into reflect biology as well as taxonomic divisions, with subheadings such as "Robust Piscivores and Invertebrate Feeders", "Substratum Sifting Species", "Herbivores and Detritus Feeding Species", etc.

The book is profusely illustrated with colour photographs, mostly taken by the author, including some superb spawning sequences, and photographs of numerous species that have only rarely featured before in the English-language press.

Are there faults? Well apart from the fact that I don't like Paul's usage of *Heros* as a generic name for the *Cichlasoma* left in limbo by Kullander's recent revision (although Paul gives his reasons on page 231), the only real criticism I have is to ask why it took so long for someone to persuade Paul to write this magnificent work!

At £12.50, this book shows what can be done at little cost.

## Practical advice for all

The Aquarium Technology Handbook  
(Fundamentals, Equipment and Practice)

Tony Jenno  
David & Charles, £7.95  
ISBN 0-7153-8690-5

This is the second, revised edition of a book first published under the title of 'Aquarium Technology' in 1976. The new edition is, therefore, extensively updated and, according to the blurb, "takes the enthusiast on from the range of beginners' books to a deeper insight and thorough understanding of the principles and practices involved in the keeping of aquatic livestock in artificial conditions".

This, it most certainly does and, for the most part, does so effectively and in simple uncluttered language. Tony Jenno, happily, has his priorities right:—There is a message he wants to get across and he does so in a professional, uncomplicated manner that is most commendable.

I always think that the author's introduction to a book is the best resumé of what one can expect to find in the ensuing chapters. In this respect, Tony Jenno makes two very significant remarks:— "The basic requirements of good fish-keeping are that the fundamental environmental conditions should be provided by as simple and efficient means as are consistent with proper maintenance."

"In the following chapters simple, safe

and reliable methods are recommended for various aquatic environments, and the principles behind these practices and the functions of any equipment associated with them are explained."

These statements are, once again, carried out competently in the text.

One of the difficulties with a book such as this lies with where to draw the line between fundamental, basic equipment/technology and the more sophisticated aspects of aquarium keeping. Despite this difficulty, I can see no reasonable justification for omitting a detailed description of power filtration. Yet, in this book, it only warrants the briefest of reference. This, I find most disappointing, particularly when quite a bit of space is given to less common equipment, such as a home-made gasometer-type air compressor.

Up to a point, similar arguments apply to lighting and lighting equipment where the only two types mentioned are tungsten bulbs and fluorescent tubes.

The illustrations throughout the text consist of well-executed line drawings, most of which convey a great deal of information and complement the text quite effectively.

Overall, 'The Aquarium Technology Handbook' represents a good 'second' book for aquarists who have gone beyond the initial stages of the hobby. It would also be fair to say that even beginners would derive tremendous benefit from this book.



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# Tomorrow's aquarist

## It's Cartoon Time!

Cartoon time is here again, folks! Miss S. Long of 66 Burbage Road, Herne Hill, London SE24 9HB recently came across the following glorious misprint in a petshop advertisement which appeared in her local paper. Apparently, amongst the pets they stocked were 'Koi Cart'! Miss Long (sorry, you didn't send us your first name) wonders whether the Koi were meant to travel in the cart, or pull it!

What do you think? Send us your version of a Koi Cart (CARTOONS ONLY PLEASE) by 10th May at the very latest.

The three best entries will receive the following superb prizes donated by Rolf C. Hagen (UK) Ltd.

### First Prize

**Fluval 302 External Filter** with twin inlets and outlets, full set of taps and maximum turnover of 222 gallons/hour, making it suitable for aquaria up to 6 ft. in length. Individual canisters inside the main filter canister allow the 302 to be adapted to a wide range of uses in both freshwater and marine aquaria.

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Retail Value: £15-53

### Third Prize

**Fluval 42 Internal Filter** with adjustable flow control up to 60 gals./hr. (suitable for aquaria measuring up to 3 ft.), and a Venturi attachment capable of working down to a water depth of 12 ins. Maximum stability is provided by a bottom-mounted motor.

Retail Value: £15-53

### How to Enter

Simply mark your envelope 'Koi Cart Competition' and post it to:

**The Aquarist & Pondkeeper,**  
Buckley Press Ltd.,  
58 Fleet Street,  
London EC4Y 1JU.

Don't forget the closing date is 10th May.

For her sense of humour and brilliant idea for this competition, Miss Long will shortly receive a Fluval 42 Internal Filter donated, once more, by our sponsor Rolf C. Hagen (UK) Ltd.



## Beginners' Corner

One of the many fascinating things about fishkeeping is that no matter how long you have been involved in the hobby, there is often something new and unexpected 'just round the next bend'.

Every time this happens, you become a beginner all over again—the excitement builds up and the questions begin. What is it? Where does it come from? What does it feed on? How big does it grow? Are there any books on the subject?

Mr. E. Collins from Kirkaldy found himself in precisely this situation and wrote to tell T.A. about it. Here is his letter:

"I was in a pet shop in town looking at Kuhli Loaches amongst other things and had been looking at an aquarium of these loaches for some ten minutes

when another customer and shop assistant arrived. 'He is in the gravel but I won't sell him if he does not show himself,' said the assistant and proceeded to entice out a Spiny Eel of 3 or 4 ins. in length and with some 5 or 6 Porthole or Eyes on the top part of his rear. I was so fascinated after watching it, which included a dive into the gravel again, that I went back later in the day and bought it for £1-60. That was six weeks ago.

"My Spiny Eel seems happy enough in my 24 in. x 12 in. x 12 in. aquarium along with some Swordtails, Platies, Bronze Corydoras, Otocinclus and Kuhli Loaches kept at 76°F, but finding information about these fish is difficult. It took me five weeks to find out that Spiny Eels belong to the family Mastacembelidae—mine is a *Macrogonathus aculeatus* (*aculeatus* means sharp or pointed). Where can I find any good books on Spiny Eels (all species) and also on the one I have?"

### Notes:

- 1 The fish usually known as *Macrogonathus aculeatus* is, in fact, *Macrogonathus siamensis*.
- 2 Don't miss our forthcoming articles on Spiny Eels written by Dave Curran. They represent the most up-to-date accounts of these fantastic fish yet published.
- 3 If you would like to contact Mr. E. Collins on the subject of Spiny Eels, write to him at 24 Beveridge Road, Kirkaldy, Fife, Scotland K71 1YX.
- 4 Mr. Collins will shortly be receiving an 80 gm. tub of Tetra Min (Staple Food), an 80 gm. tub of Tetra Cichlid (Special Food) and a 100 gm. tub of Tetra Fin (Goldfish Food) kindly donated by Tetra, from our Tomorrow's Aquarist Fund.

Spiny Eels spend much of their time buried in the substratum





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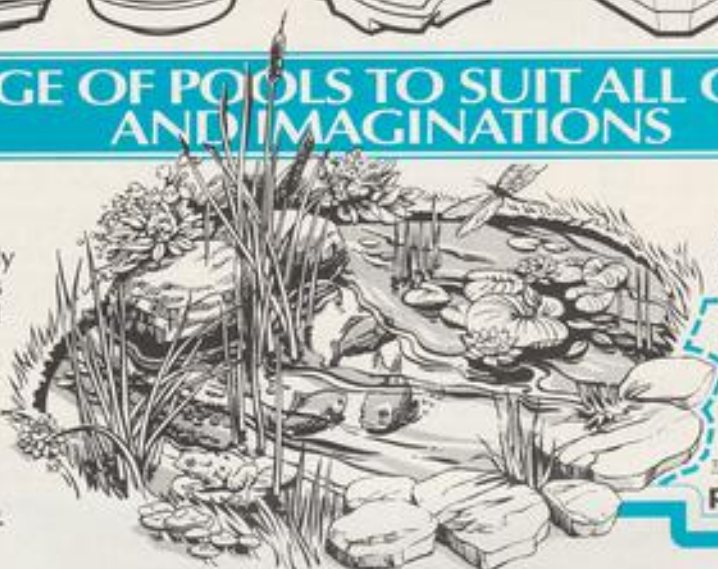
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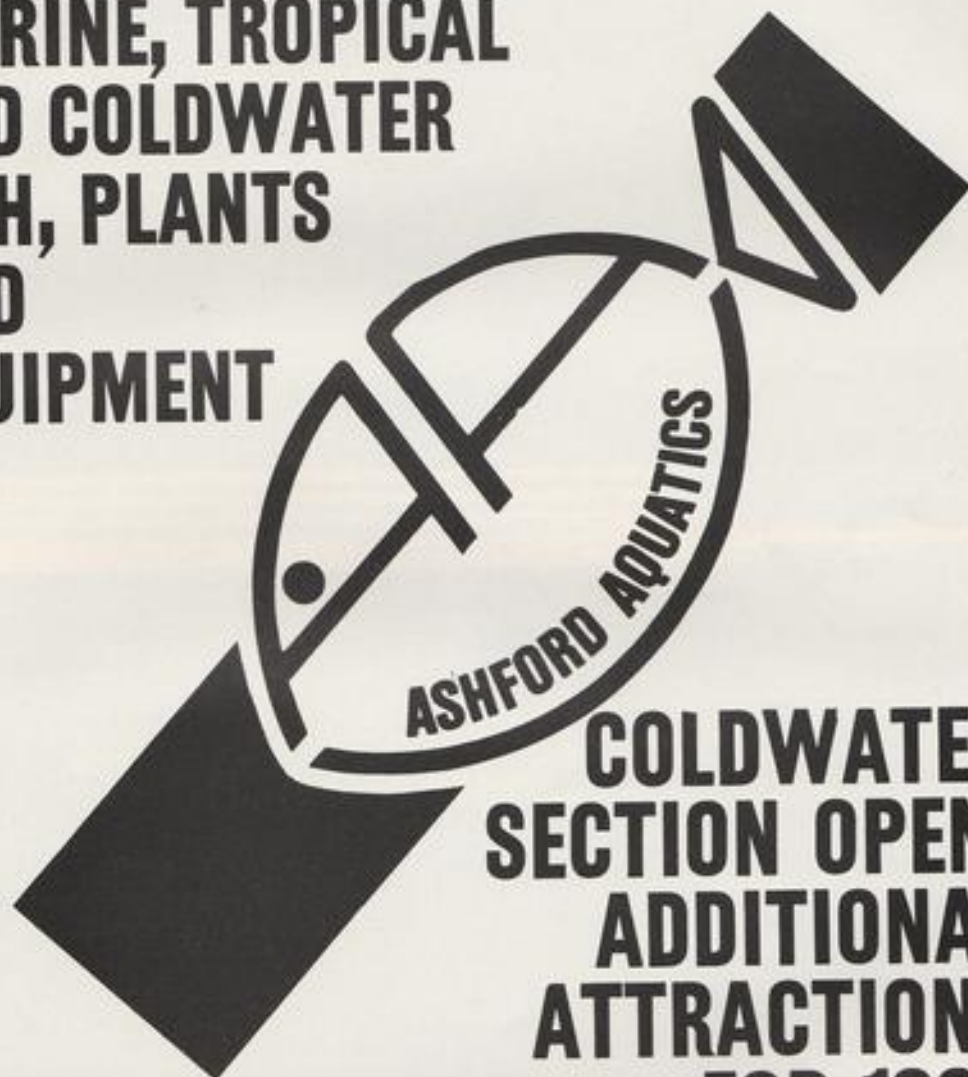
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Above: A sexually quiescent male *Haplochromis quadrimaculatus*. Note the relatively short ventral fins and the few, poorly developed pseudo-ocelli on the anal fin as well as the incompletely masked lateral spots. Below: A sexually active male *H. quadrimaculatus*, female in the background. Juveniles and females consistently display the lateral spots from this species derives its scientific name





# THE IDEAL UTAKA

Dr. Paul Loiselle of the University of California highlights the many outstanding qualities of *Haplochromis quadrimaculatus*, an ideal utaka for the cichlid aquarium

The enormous popularity enjoyed by the many haplochromine cichlids of Lake Malawi is due in no small measure to the fact that this fauna can boast of some of the world's most brilliantly coloured freshwater fishes.

By any objective criterion, the utaka complex of open-water zooplankton-feeding *Haplochromis* merit inclusion in this select assembly of dazblers. These extremely desirable cichlids owe their popularity to more than just their brilliant coloration, however. At least equally important from the aquarist's standpoint is the simple fact that, by Malawian standards, utaka are small cichlids. Few species exceed 12.0 cm SL (standard length), while the largest of the lot, *Haplochromis pleurostigma*, barely reaches 20.0 cm SL. This immediately endears these fish to those aquarists who lack the space to house many equally colourful but much more robust haplochromines. Furthermore, by cichlid standards, utaka have remarkably mellow dispositions. Admittedly, conspecific males are not very tolerant of one another when both sexes are housed together, but this aside, these are not aggressive haplochromines.

As a rule, utaka kept in a community situation are more apt to be put upon than the reverse. This tendency to turn the other cheek is not carried to unrealistic lengths, however. As females ripen, conspecific males in any but the roughest company rarely have any difficulty in

Right: Spawning sequence of *H. quadrimaculatus*. The rear wall of the tank provides the focus for the male's courtship in this sequence of vertically oriented spawning.

In the second picture oviposition follows a period of reciprocal circling. However, given the orientation of the couple, the eggs begin to fall towards the bottom as soon as they are spawned.

In the third picture the female must pick the eggs up before they fall within the reach of potential predators.

Lastly, fertilisation, which is intrabuccal (ie occurs in the mouth) follows the pattern usually encountered among Malawian haplochromine cichlids, the female mouthing the male's vent to elicit ejaculation

asserting themselves long enough to pull off a successful spawning. This trait is complemented by a solid commitment to motherhood on the part of ovigerous (egg-carrying) females. The picture that emerges from these observations is of a complex of species that require only decent attention to the essentials of good aquarium maintenance to breed freely and successfully. With so much going for them, is it any wonder that the utaka are among the most eagerly sought-after of all the Malawian cichlids currently available to aquarists?

Of the seven utaka species to date in captivity, my personal favourite is *Haplochromis quadrimaculatus*. Described by the British ichthyologist C. Tate Regan in 1921, this species made its aquaristic debut in the early 1970's, together with such other representatives of the group as *H. chrysonotus*, *H. nhatse* and *H. pleurostigma*. It would be pleasant for once to report no confusion over the usage of a particular scientific name in conjunction with the marketing of Malawian cichlids, but unfortunately, in this instance, as in so many others, the case is otherwise.

Two fish have been marketed as *H. quadrimaculatus* in North America. Fortunately, they are sufficiently different to have earned different trade names. The subject of this article is usually sold as the 'True Quad'. By happy coincidence, this rather chunky utaka corresponds in all particulars to Regan's species, a state of affairs that lends





particular felicity to its vernacular designation.

The second species is typically sold as the 'Reverse Quad'. As can be seen from the accompanying photo, quite apart from the obvious colour pattern differences, this is a slenderer species with longer fins. Juveniles and females also have smaller lateral spots than do those of the 'True Quad'. The 'Reverse Quad' corresponds more closely to *Haplochromis likouae* Iles 1960 than to any other representative of the complex. Regrettably, his description lacks information on male breeding dress. This makes it imprudent to state categorically that the two entities are identical, notwithstanding the force of evidence from other quarters. A third utaka species whose male breeding coloration suggests membership in this complex of species is widely marketed in Europe under the name *Haplochromis borleyi* Iles 1960. As I have never had the opportunity to examine this fish in the flesh, I will only observe that published photographs of sexually active males (Steack and Linke, 1982) agree well with data on the life colours of *H. borleyi* given in the original description (Iles, 1960b).

*Haplochromis quadrimaculatus* is one of the largest utaka, growing to 18.0 cm SL in nature. It is one of the least morphologically specialised representatives of this feeding guild, with a rather chunky build, slightly emarginate (notched) caudal fin and only moderately protractile (extendable) jaws. For all that, it is still the only representative of the utaka known to lead a truly pelagic (open-water) existence for a portion of its life. The other members of the group typically remain quite close inshore throughout their lives. However, according to Iles (1960a), while juveniles and sub-adult individuals of *H. quadrimaculatus* up to 13.0 cm SL conform to this pattern, at two years of age, they disappear from their former haunts only to reappear a year later off the rocky shorelines where breeding occurs. The simplest explanation of this disappearing act is that sub-adults move into the pelagic zone of Lake Malawi and exploit its relatively abundant reserves of zooplankton to complete their growth.

#### Nitrite concentration and 'Malawi bloom'

This commitment to a partially pelagic lifestyle does not interfere with this species' ability to adapt to life in captivity. *Haplochromis quadrimaculatus* is an easily maintained species. It prospers over a temperature range of 22°-30°C., and like all Malawian cichlids, requires alkaline water of moderate hardness. Like all other utaka, this species is unforgiving of poor management of the nitrogen cycle in its aquarium. Prolonged exposure to even low levels of dissolved nitrite invariably results in the onset of systemic bacterial infections such as the dreaded 'Malawi bloom'. In my experience, a

combination of efficient mechanical filtration, a biologically active filter bed and fortnightly changes of up to 75% of their tank's volume satisfies the demands of all Malawian cichlids for a clean environment. The mechanical filter should be examined daily and its media purged or replaced whenever they appear to need such treatment—usually every four or five days in a well-stocked tank. Both the mechanics and economics of this practice are facilitated by the use of reusable plastic filter medium. Water changes are easily managed in areas where hard, alkaline tap water is the rule. Commercial salt mixes can be used to provide Malawian cichlids with suitable living conditions in areas where municipal water supplies are soft and acid to neutral. While these products serve this purpose admirably, the need to employ them can complicate the mechanics of water changing to an awkward degree. Under such circumstances, the use of chemically active filter media to remove nitrogenous wastes from solution and thus prolong the interval between water changes may prove sufficiently attractive to justify their cost.

*Haplochromis  
quadrimaculatus*  
is an excellent resident in  
a Malawi cichlid  
community tank

Like other utaka, in nature *H. quadrimaculatus* feeds upon planktonic crustaceans and *Chaoborus* larvae (glassworms). Both foods are relished in captivity, as are live adult brine shrimp, but the usual prepared and frozen foods meet a positive reception at feeding time as well. I rely upon Tetra Cichlid Flakes, Hikari Cichlid Gold pellets and frozen brine shrimp as staple foods. Frozen bloodworms and live *Daphnia* and glassworms are periodic treats. This diet maintains the fish in excellent colour, promotes rapid growth and allows females to mature a batch of eggs every five to seven weeks.

*Haplochromis quadrimaculatus* is an excellent resident in a Malawi cichlid community tank. I have maintained this species with minimal difficulty in 320-litre aquaria containing both other utaka species and representatives of the smaller chisawasawa (sandy shore-dwelling Malawian cichlids) and the smaller, less aggressive mbuna. Apart from the inexplicable and persistent dislike for a male *Haplochromis kirki* shown by one male *H. quadrimaculatus*, I have never observed any serious aggressive interactions between males of this species and those of the other species housed with it. This even disposition does not arise from any inability on the part of males to defend themselves when bullied. I have several

times had to move pairs or trios of this species into a Tanganyikan community tank for brief periods of time. At the cost of a few split fins, the male *H. quadrimaculatus* invariably and quite swiftly convinced the resident *Lamprologus* that he had no intention of being victimised. Indeed, when one of these stays coincided with the maturation of a clutch of eggs by one of his consorts, the male kept two pairs of *Lamprologus* bottled up in their caves for the three days prior to spawning! This species simply reserves aggression for the brief defence of a breeding territory. Given the strong sociality essential to the successful pursuit of a pelagic life style by a cichlid of modest adult size, such economy in the expression of aggressive behaviour should come as no surprise.

This is one of the most easily-bred Malawian *Haplochromis* species. The simplest means of assuring successful spawning with minimum risk to the female is to house a single male with two or more females in 150-litre aquarium. Single pairs are best bred in a community situation, as males court females with extreme vigour. If his environment does not provide him with sufficient distractions, the male's single-minded attentions to his intended spawning partner can lead to her injury or death. Either of these approaches precludes the likelihood of such a mischance.

The mechanics of spawning display a remarkable degree of behavioural flexibility. When such territories are available, males will defend a flat surface as close to the surface of the water as possible and spawn thereupon in the manner typical of Malawian haplochromines. Failing this, a male will exclude all other fish from the upper rear quadrant of his tank and vigorously court the ripe female therefrom. Once the object of his attentions joins him in his peculiar territory, the pair will assume a vertical orientation and indulge in modified midwater spawning, as depicted in the accompanying photos.

#### Variety of spawning techniques

Over the three years I have kept *H. quadrimaculatus*, I have observed two spawnings of the first type and seven of the second. It is not clear what factor or factors dispose(s) a particular male in his choice of spawning site and mode. Obviously, if the rockwork in a tank does not closely approach the surface of the water, or if the tank lacks such rockwork altogether, vertically oriented spawning can be expected. However, even when platforms are present, a given male will display neither consistency nor predictability in this regard. The presence or absence of other fishes seems likewise to have no influence on the male's choice in captivity, though it would be surprising were this not a significant factor in the lake. Indeed, both the vertically oriented spawning behaviour of this species and the true midwater spawning behaviour of another



utaka species, *Haplochromis chrysomotus*, as documented by Eccles and Lewis (1981) probably represent an adaptive response to a combination of intense competition for available spawning sites and egg predation during spawning in nature.

However the process of spawning is managed, the outcome is a mouthful of yellow-orange, pyriform (pear-shaped) eggs that measure 2.8-3.0 mm along their major axis. Females are excellent mothers, usually carrying their burdens without incident for the full length of the developmental interval, which lasts 21 days at 28°-30°C. This is not a very prolific species. I have had large females release as many as 78 fry, but brood sizes usually range from 32 to 40 fry, with a strong mode (6 out of 11 spawns) at 36. The newly-released fry measure 11.0-13.0 mm TL (total length). They have no difficulty managing either *Artemia* nauplii or finely powdered prepared foods for their initial meal. As there is nothing to be gained in captivity from prolonging the association of mother and fry beyond this point, I have never left them together long enough to know if the females of this species exercise any post-release care (care after the fry have left their mother's mouth).

Given ample food and frequent partial water changes, the fry grow quite rapidly. By the sixth week post-release, they will range from 2.0-3.0 cm SL. By the sixth month post-release, their size will range from 5.0 cm to 6.5 cm SL. At this point, they may be sexed on the basis of both size (males are consistently larger than

Females are excellent mothers, usually carrying their burdens without incident for the full length of the developmental interval, which lasts 21 days

females the same age) and colour (males develop a sooty wash in the vertical fins and begin to show fleeting metallic blue highlights in the cephalic (head) and dorsal regions). Sexual maturity is attained three months later, at c. 8.0 cm SL for males, slightly smaller for females. Young males possess full adult coloration at this point, but have to wait an additional six months before their finnage attains its full development. Such sexual precocity under aquarium conditions contrasts sharply with the observed growth pattern of this species in Lake Malawi, where according to Fryer and Iles (1972), *H. quadrifasciatus* does not begin breeding until its third year of life, at which

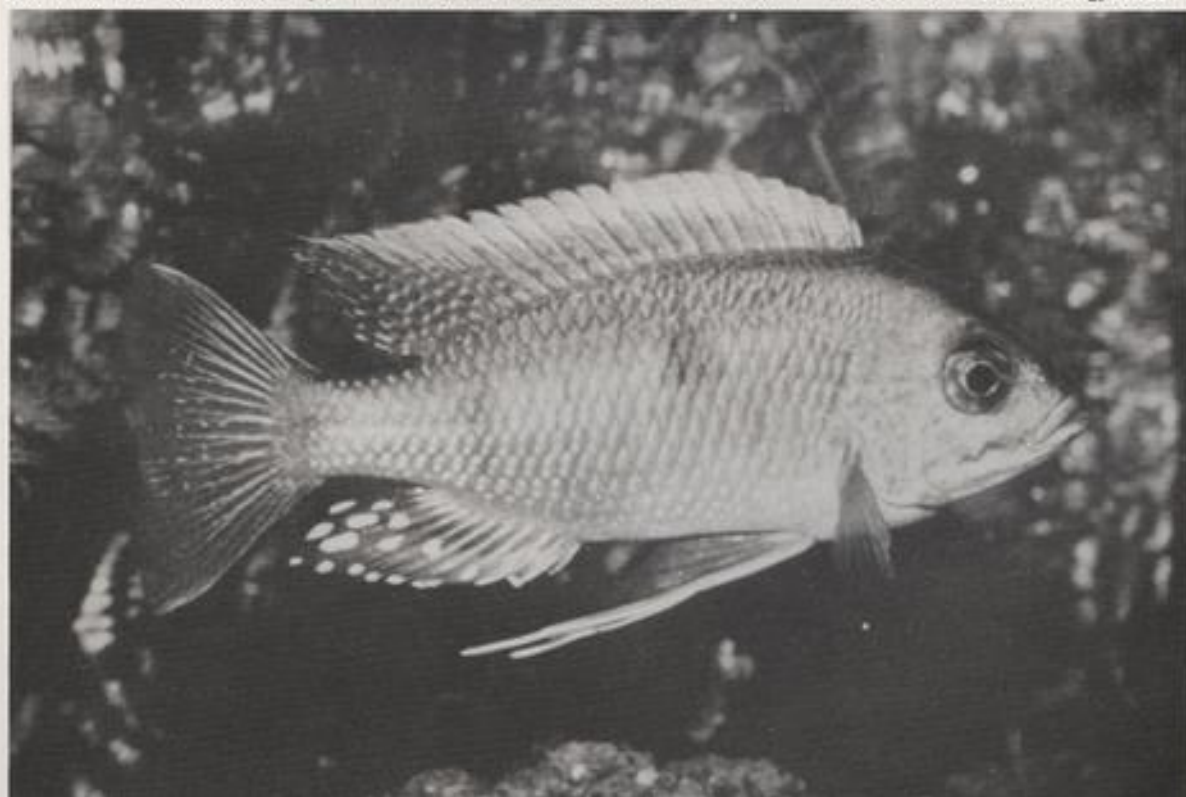
A sexually quiescent male of the Utaka sold in North America as the 'Reverse Quadrifasciatus.' Note the long ventral fins and the numerous, well-developed pseudo-ocelli on the anal fin

point the fish measure 16.0 cm SL.

Now that Malawian cichlids have moved squarely into the mainstream of the aquarium hobby, individual species are being judged on their merits as aquarium residents rather than on the basis of their origin alone. Brilliant coloration, modest size, easy-going temperament and general hardiness seem certain to keep *H. quadrifasciatus* firmly in the affections of cichlid enthusiasts, while the ease with which it can be bred guarantees that it will remain in good supply. So, regardless of whether you are a novice keeper of these cichlids or an old Malawi hand, give *H. quadrifasciatus* a try. It is, in all respects, the ideal utaka.

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## Here's for a long life...

Up till now, its usually been pretty difficult choosing the right pump for your tank. They've either been too small, too big, too noisy, too expensive or even too cheap! (Anyone who has ever bought a really cheap pump knows exactly what we mean).

Now there's a whisper going round that this has all changed.

There's a whisper that says a range exists with 10 (yes TEN) models to choose from.

The whisper also tells us that they are amongst the most reliable pumps ever offered to the aquarist.

And, the whisper emphasises, there is a peace and tranquility which hovers over the living room and fish house which was once thought gone forever!

The Whisper is... from Interpet.

And Interpet, being the UK's largest Manufacturer of Aquarium Equipment have a lot to shout about. Since their introduction, the Whisper Range of pumps have rapidly become the Aquarists most popular buy. Which, when you analyse it, is not surprising.

The Whisper's quiet good looks are firmly seated in a tough, vibration absorbing rubber base and a high impact resistant outer case protects the mechanics. Inside, the same attention to quality ensures a long, quiet and troublefree life.

### The secrets in the valve

All aquarium pumps have thin and delicate rubber valves pulsating at a speed of up to 50 times each second! Air pollutants like ozone and hydrocarbons cause deterioration, resulting in a loss of airflow and pressure.

The Whisper valves however are made from a new material - SILAFLEX which stays supple and flat for many times longer than previously possible, adding years to the life of your pump, with a big plus. They are exceptionally quiet - in fact Whisper quiet.



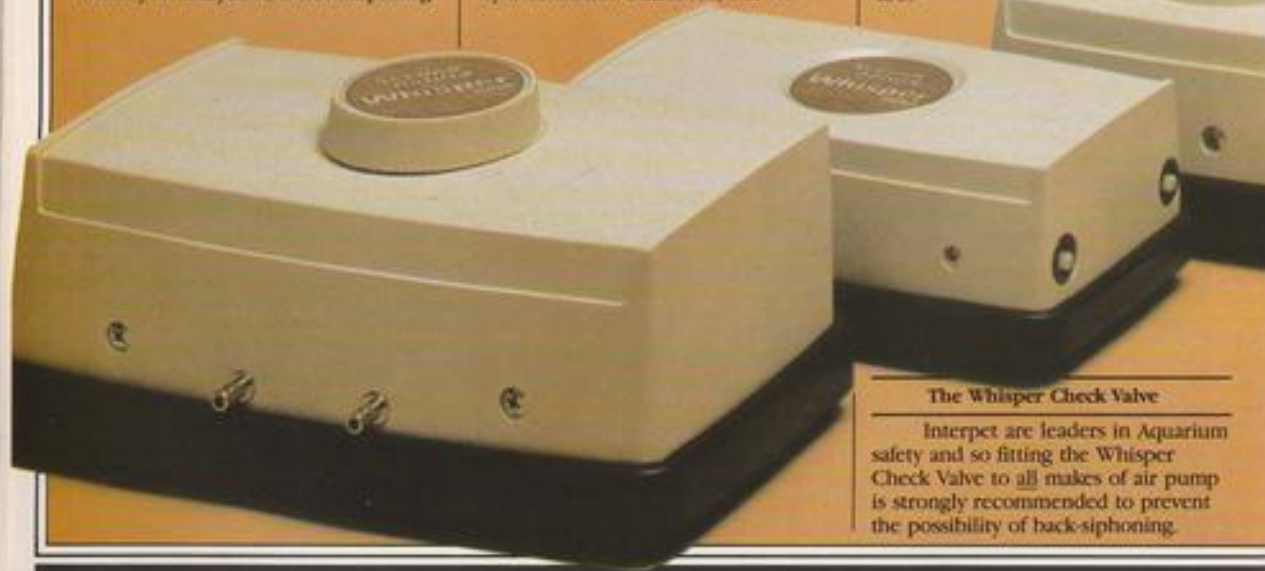
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Each Whisper pump is covered by a 12 month Guarantee, but we



fully expect our pumps to go on working much longer than that, and so, for when parts do wear out there is a comprehensive selection of pre-packed parts kits readily available.

Each kit is tailored to each model and includes: Diaphragms; Silaflex valves; Washers; Hinges; Filter Pads; A comprehensive instruction booklet and even a special tool to make life really simple! Diaphragms and Filter Pads are available on their own too!



### The Whisper Check Valve

Interpet are leaders in Aquarium safety and so fitting the Whisper Check Valve to all makes of air pump is strongly recommended to prevent the possibility of back-siphoning.



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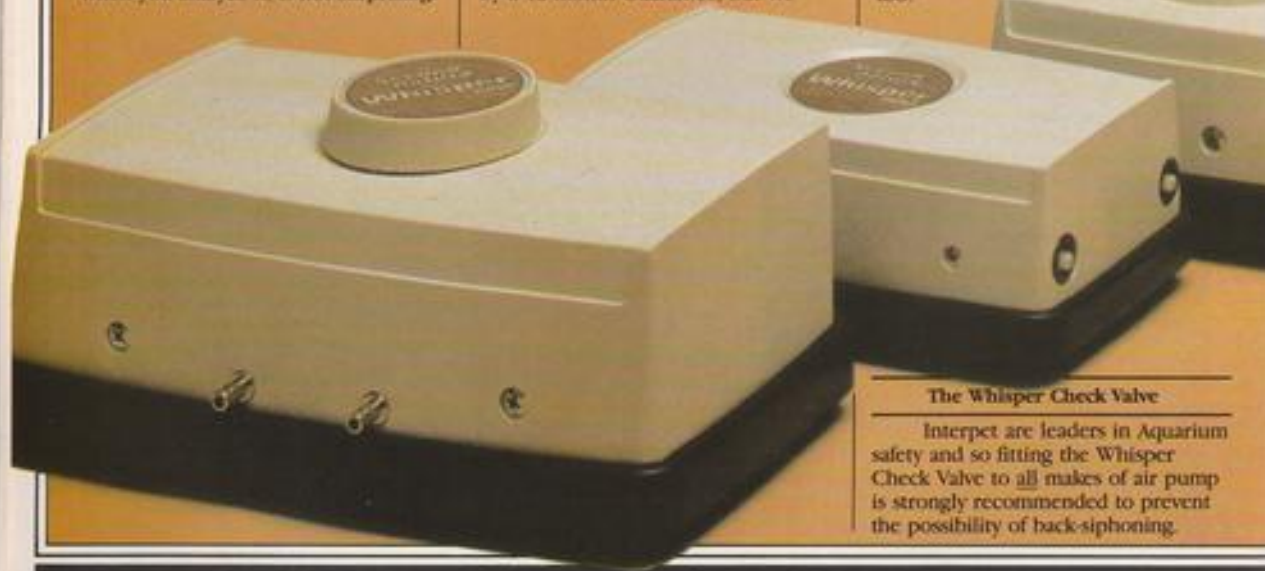
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**Model 700A The Powerhouse.** For aquariums of 5'6" and above and for aerating and filtering an assortment of tanks. "Tee" provided to convert to one nozzle.

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**Model 1000. Flagship of The Range.** For 30 to 200 gallon aquariums. With electronic flow control. Ideal for the serious aquarists or the professional with several tanks.

## A Guide to Air Usage

Airflow Requirements (litres/min)

Equipment	Low	Normal	High
Airstones	0.25	1.0	2.0
Slide-line Filter	0.5	0.75	1.2
Cascade Filter	1.4	1.75	3.0
Super Twin Filter	1.2	1.75	2.5
Airstream - Bottom Filter	0.25	1.0	2.0
Junior Bottom Filter	0.25	0.5	1.0
CV Sub-gravel Filters	0.25	0.5	1.0

## Your Pump Selection Guide

Pump	Air Flow (litres/min)	Max Pressure Depth of Tank in inches
W100	1.0	40
W200	1.5	54
W300	2.0	61
W400	3.0	58
W500	3.0 Adj	58
W600	6.5*	64
W700	8.0*	68
W800	8.0 Adj	68
W900	9.0*	50
W1000	10.5 adj	68

Adj. - These pumps are adjustable.

\* Twin Pumps - This is the combined output of all diaphragms.

\*\* 4 Diaphragm Pump.

Airflow figures are measured on a gap meter under free flow ideal conditions. A full range of Spare Kits, Filter Packs and Diaphragms is normally available from stock.

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# Spotlight

## THE DWARF GOURAMI

John Dawes

**A**ny fish that would be considered a real giant of its kind at a mere 2½ in. (6 cm.) but which, at half this size, can control a tankful of four-inch fish without any bother is remarkable by any standards.

Add to this other outstanding features, such as a dependence on atmospheric air (the gills cannot absorb enough dissolved oxygen to meet the fish's needs), an ability to build strong, magnificent floating nests out of nothing more than mucus-covered air bubbles interwoven with bits of vegetation, an in-built rugged resistance to unfavourable environmental conditions, and eggs that hatch in 24 hours into fry which float upside-down and are born without properly-formed eyes, and you begin to get the feeling that you are dealing with quite an out-of-the-ordinary kind of organism.

This is all, of course, perfectly true. Yet, how many people really see the delightful Dwarf Gourami that forms part of virtually every community tank in this way? The answer, unfortunately, is far too few.

The fact is that the Dwarf Gourami, *Colisa lalia*, has become so common that many people don't give it a second thought. It is a pretty fish which is hardy and does not generally cause problems (that is, until it decides to spawn, when it becomes King of the Castle). It eats almost anything that is edible and can comfortably withstand a wide range of temperature and water conditions. Yet, to view the Dwarf Gourami in this limited way is to do it a great disservice, particularly when there is still so much to learn about this gem of a fish.

All you have to do is scratch the surface and you immediately discover a fish worthy of pride of place in any aquatic collection and possessing characteristics so interesting as any you are likely to find among its usual community tankmates.

This versatile fish has received considerable attention from commercial breeders over the last decade or so resulting in, at least, two tank-produced varieties. These

are now widely available under a number of trade names, the two most popular, and probably most descriptive, being the Blue Neon Dwarf and the Sunset Dwarf.

If anything, these man-made strains have pushed the Dwarf Gourami even further up the popularity stakes. Both varieties have a great deal to recommend them, of course. If they have a weakness at all, it is that they appear to be a little less hardy than the original wild-type (my own personal favourite) which is still extremely popular, and deservedly so.

The Dwarf Gourami is one of four species belonging to the genus *Colisa*, the others being the Honey Gourami (*C. chuna*), the Giant, Striped or Indian Gourami (*C. fasciata*) and the Thick-lipped Gourami (*C. labiosa*), two types of which are now available, i.e. the normal wild-type and a stripe-less, golden form. Until quite recently, it was thought that there was a fifth species in the genus, *Colisa sota*. However, this is now generally thought to be a synonym of *C. chuna* and may lead, according to priority laws, to the eventual loss of *C. chuna* as a valid name (but, as they say, that's another story).

*Colisa lalia* and its closest relatives can be distinguished from other Gouramis in a number of ways. In *Colisa*, the dorsal (back) fin has a very broad base extending from just behind the nape (neck area) nearly all the way back to the caudal (tail) peduncle.

This is not unique to the genus, though. Other Anabantoids (Labyrinth Fishes), also have long-based dorsal fins. The unique feature in *Colisa* is that this type of dorsal fin is always found in association with an equally long-based anal (belly) fin and two pelvic (hip) fins which are modified into long, single filaments. Although there is also a single rudimentary spine associated with each pelvic fin, it is so small as to be undetectable externally.

The other Gouramis which, perhaps, come closest to *Colisas* in overall appearance are the various species belonging to the genus *Trichogaster*. However, the latter have a narrow-based dorsal fin and several small rays associated with the

single filamentous one in each pelvic fin.

In overall size, the Dwarf Gourami is second, in ascending order, when compared to the other members of its genus. The full sequence from smallest to largest is: the Honey Gourami—2 in. (5 cm.) maximum, the Dwarf Gourami—2 in. (5 cm.), the Thick-lipped Gourami—around 3.2 in. (8 cm.) and the Striped/Giant/Indian Gourami—about 3.9 in. (10 cm.). This factor is significant in that, taken in conjunction with other characteristics, it helps to place the Dwarf Gourami in perspective when compared to its most closely related species.

For instance, there is hardly any overlap in size between adult Honey and Dwarf Gouramis. On the other hand, there is some (though not a great deal) of overlap between the largest Dwarf Gouramis and the smallest adult Thick-lips. Taking things a stage further, there is considerable overlap between adult Thick-lips and Giants.

This same overall picture also emerges when other parameters besides body length are compared, giving rise to the hypothesis that Dwarf Gouramis are, perhaps, more closely related to Thick-lips and Giants than to Honeys.

I pursued this line of investigation some time ago by attempting to cross Dwarf Gouramis with other *Colisa* species and obtained some very interesting results.

For a start, I never managed to cross Dwarf and Honey Gouramis, no matter how hard I tried. I did, however, manage to cross Dwarf and Thick-lipped Gouramis after some involved water-mixing tricks. The hybrids all turned out to be sterile males, while hybrids between Thick-lips and Giants ended up as fertile males and females, thus lending support to the hypothesis.

Investigations such as these, allied to patient observation, and a bit of luck, tell us a great deal about Dwarf Gouramis. One of the most exciting things about it all is that for every question that is answered, a whole host of new ones arise. The inescapable, and very welcome, fact is that this popular little fish, which spawns in a series of almost balletic embraces even in crowded community tanks, is a very special fish indeed.

But will we ever fathom the innermost secrets of the Dwarf Gourami? I, for one, sincerely hope not, for therein lies the magical pull that this remarkable species can exert over anyone who looks a little bit further than the glass wall of an aquarium.

*Footnote:* For regular in-depth information on Dwarf Gouramis and other Labyrinth Fishes, contact The Anabantoid Association of Great Britain, c/o Mr. Ron Wright (Secretary), 141 Military Road, Colchester, Essex CO1 2AT.



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# Company profile

## Mainly Marines



A corner of the spacious Mainly Marines Centre at Leeds

"We've already got twelve centres in different parts of the country, have three new ones in the pipeline and hope to open, at least, six every year from now on", says Tim Witcherley, Director of Mainly Marines Franchising Ltd.

So far, there are centres in Newcastle-upon-Tyne, Leeds, Sheffield, Chelmsford, Caldicote, Wickford, Shepperton, Ashford, Crawley, Worthing, Bromley and Pulborough. Those in the pipeline will be in Enfield, Bury-St-Edmunds and the North Midlands.

We met Tim Witcherley at the Shepperton Mainly Marines Centre which, we were told, was quite a typical example, in most respects, of the Mainly Marines operation.

The Shepperton shop is situated, like all the others, within an existing garden centre, in this case Squires Garden Centre, Halliford Road, Shepperton, Middx. Tel: (093-27) 761878. Where it differs from its counterparts elsewhere is that the others are actually located inside a main garden centre building, thus sharing most of the garden centre facilities with the other departments 'under the same roof'.

At Shepperton, the design of the main Squires Garden Centre building did not make this possible so an existing, but separate, building was adapted and transformed into a self-contained aquatic

centre bearing all the distinctive corporate trimmings which identify it as part of the Mainly Marines organisation. This means, among other things, that the shop is designed with plenty of room to wander in and view the 65 or so tanks containing the full range of coldwater and freshwater tropicals which form the backbone of every fish collection. There is also a selection of species for the specialist.

As you would expect from the company's name, there are also some tanks dedicated to marine fish and invertebrates. However, the majority of stocks are, in fact, freshwater, a potential source of confusion to aquarists not familiar with Mainly Marines centres.

Although the current crop of shops do not possess quarantine quarters, all the fish are bought from wholesalers who quarantine their stocks. Indeed, the numerous fish we saw during our visit all appeared to be in extremely good condition. As a back-up, though, each shop has a number of hospital tanks behind the scenes.

Should a major break-out occur in a particular tank, treatment is carried out on the spot, i.e. in the display tank itself, and a notice is put up indicating that the fish are not for sale. Risks of cross-infection are also kept to a minimum by ensuring that nets are disinfected every

time they are used, something that Manager Philip Blanch and Assistant Manager Adam Kitts insist upon.

The Shepperton shop also differs from other Mainly Marines centres in that entry into the sales area itself is via a small step. This does not, however, present a significant obstacle to wheelchair-bound aquarists since the staff are only too happy to lift a chair down into the shop. Wheelchair visitors to the centre this season should find things even easier as Manager Philip Blanch told us that he would like to replace the step with a ramp.

A typical feature of Mainly Marines centres is that the dry goods, ranging from tubs of flaked food to pondliners (and ponds in some centres), plus everything else in between, are displayed attractively and in an accessible manner designed on a self-service basis.

Although there are always stocks of coldwater fish and plants all the year round, these are augmented considerably during the coldwater/pond season by means of an extensive outdoor display of 'pond' species which also add a splash of colour to the already attractive exterior centre design.

The philosophy of the parent company, as far as siting its centres is concerned, is to establish them where "leisure-conscious, house- and garden-proud families spend much of their free time—in big, attractive, out-of-town garden centres up and down the country."

"In essence, we do all the spade work" says Tim Witcherley. "Franchising is a marriage of strength and flexibility which can take much of the risk out of starting up in business on your own. We will research the area of a potential franchisee's choice and will select a site which meets the company's requirements for turnover potential. The company will also handle all the legal and financial negotiations involved. The overall fee will include the design of the chosen centre in the company's corporate style, complete with fittings, presentation, labelling, stocks of dry goods, fish and plants via a centralised buying arrangement (with all the inherent benefits of large-scale ordering) and a comprehensive training programme for the franchisee and his or her staff."

The evidence we saw at Shepperton, where the franchisee is Sue Viewing, suggests that the Mainly Marines approach to aquatic centres is meeting with considerable success.

For further information, contact Tim Witcherley at Mainly Marines Franchising Ltd., Aquarius House, Dulverton Road, Aston, Birmingham B6 7EQ. Tel: 021-327 3985.

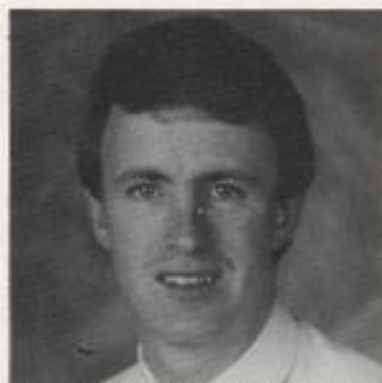


## New pool in Tetra

Tetra have appointed Dr. David Pool as the new Head of the Tetra Information Centre. Dr. Pool is well qualified for his task as his doctorate is on the study of fish diseases and he also has an honours degree in the ecology and management of freshwater fish.

The Tetra Information Centre has now been established for over eight years and regularly receives over 5,000 letters and enquiries a year from fishkeepers in the UK. Dr. Pool will not, however, be devoting all his time to replying to these letters as he will also be trying to tour the country giving advisory talks to aquatic societies and clubs.

The Tetra Information Centre itself has moved address and will now be centralised at Tetra UK headquarters in Eastleigh. This move will improve the service to aquarists, making it easier for Dr. Pool and his team to put at the fishkeeper's disposal all the 36 years of



Dr David Pool of the Tetra Information Centre

accumulated experience and knowledge of Tetra's aquatic research and development laboratories and Europe's biggest fish breeding centre—Tetra's West Aquarium.

The address to write to if you would like to contact Dr. Pool is:

**Tetra,  
Mitchell House,  
Southampton Road,  
Eastleigh,  
Hampshire SO5 5RY.**

## Easycare products from King British

Four pond treatment products have been launched by King British under the **Easycare** brand name: Paracide, Bactericide, Fungicide and Safe-guard.

Each product comes in a dispensing container specially designed to provide measured amounts of the particular formula in a single operation. More detailed additions to the instructions are also supplied for pond treatment. The containers themselves are decorated with a full-colour eye-catching designed shrink sleeve and each has a different outline colour with corresponding colour-matched cap for ease of identification.

For further details, contact **Keith Anderson at King British Accessories Co. Ltd., Hayfield Mills, Haycliffe Lane, Bradford, West Yorkshire BD5 9ET. Tel: (0274) 576241.**

## N.T. Laboratories move

An increased turnover of 300%, secured export markets for 65% of the company's production and two first prizes in trade exhibitions in the last three years, have led to N. T. Laboratories having to move from their original Newington Enterprise Centre location to a newer, and much larger site.

All enquiries and correspondence should now be addressed to:

**N.T. Laboratories Ltd.,  
Unit 13,  
Brambridges Industrial Estate,  
East Peckham,  
Tonbridge, Kent TN12 5HF.**

## New pond products from Cyprio



The Algizorb 500 cartridge filter from Cyprio Ltd

### 1. Zeofoam

The problem with all biological filters used for garden ponds is that several months may elapse before sufficient bacteria have become established in the filter to make it effective. Cyprio claim to have overcome this problem with a new filter material called **Zeofoam**. They have taken the special open-cell foam used in their range of filters and impregnated it with zeolite, a naturally occurring mineral which is instantly

capable of removing toxic ammonia excreted by fish into the pond water. Zeolite has a limited life but, by the time it becomes exhausted, sufficient bacteria should have been established in the foam to take over the purification function completely. A layer of **Zeofoam** is included as standard in the majority of filters now sold by Cyprio.

### 2. Algizorb 500

The **Algizorb 500** is a cartridge filter made from **Zeofoam** which simply

plugs on to an existing pump. Alternatively, it can be fitted external to a pond, e.g. at the head of a waterfall connected to the pipework feeding the waterfall. Suitable for ponds up to 500 gals. and for flow rates up to 450 g.p.h., the **Algizorb 500** retails at £11.95.

### 3. Filterpak

Available by Mail Order only, is a combined filter/pump kit (**Filterpak**) with integral fountain and waterfall attachments giving a choice of six interchangeable fountain heads. The pump is the British made Stuart Turner Nymph 280, producing a healthy 450 g.p.h. and carrying a two-year guarantee. An **Algizorb 500** filter completes the package, which also contains 3m. of waterfall hose. The kit, which would normally retail separately at £90.22, is priced at £74.50, including delivery.

For further details, contact **Cyprio Ltd., 133 Eastgate, Deeping St. James, Peterborough. Tel: (0778) 344502.**



## Book on Health from Interpet's Dr. Neville Carrington

**Maintaining a Healthy Aquarium** by Dr. Neville Carrington. Published by Salamander Books Ltd. of 27 Old Gloucester Street, London WC1N 3AF at £3.95. ISBN 0861012336.

This is another excellent publication in the *Fishkeeper's Guide* series and provides, for both beginners and experienced fishkeepers, "an easy to follow blend of basic science, up-to-date technical information and practical advice." While marines and coldwater fishes are included in the coverage, the book is mainly concerned with the freshwater tropical aquarium and deals with water chemistry, growing healthy aquarium plants, success with breeding fishes, how to recognise and treat diseases and how to avoid them.

The chapter on **Water: The Total Environment** explains the interplay of gases, mineral salts, micro organisms and waste materials and covers the use of testing equipment, mechanical and chemical filtration, pH and its modification. This could be considered the most vital section of the book and provides a succinct and solid review of the aquarium

fish's environmental needs.

**Growing Healthy Aquarium Plants** is a necessary adjunct to fishkeeping and the aquarist needs to know his plants' requirements before he starts to indulge in aquatic gardening known as aquascaping and the second chapter covers this aspect comprehensively.

**Improving Success with Fishbreeding.** Different species of fish with differing breeding habits require aquaria with different furnishings and some attention needs to be paid to this when preparing a breeding environment as does water temperature and lighting. The care of eggs and young fish is of great importance and is also covered in this chapter.

**Avoiding Diseases and Reducing Stress** forms the foundation of a chapter which leads the reader to the final one which is an **A to Z of Common Pests and Diseases.**

This information-packed book follows the pattern of others in the series with its ample and excellent illustration using first class colour photographs. Splendid value for a modest amount of money.

## New Factory for Puraq Ltd

The continuing success of Puraq's Ultraviolet water purification units has meant that the company has moved to larger premises in a brand-new industrial unit at:

Unit 2, Mills Road,  
Chilton Industrial Estate,  
Sudbury, Suffolk CO10 6XX.

Telephone: 0787 76259. Telex: 987126.

Puraq Ltd began designing and manufacturing Ultraviolet water purifiers around three years ago, starting with units for aquatic and drinking water uses. It has now increased its product range considerably, and can produce UV units in uPVC and stainless steel using lamps from 4 watts to several kilowatts. These can be used in a wide variety of aquatic applications, ranging from small domestic aquaria, through commercial hatcheries, shellfish cleansing tanks to large scale trout/salmon farming systems.

In all cases the effects are to keep the water free from harmful bacteria and moulds, so preventing losses from water-borne disease, and controlling algae too. The process is entirely electrical, shining powerful UV light through the water to kill micro-organisms as they pass through the purifier. As no chemicals are used, there is no effect on the pH or chemical balance of the water, or other aquatic life. The units are very economical to buy and run.

Managing Director, Mr Mark Mathieson, attributes the company's success to the quality of its designs. This enables Puraq to produce units with many important features not found in their competitor's models, at very competitive prices.

## Local leading grower joins Stapeley

Mr Glynn Williams, the well known local Horticulturist, has recently joined Stapeley Water Gardens of Nantwich to take charge of growing and retailing the wide range of outdoor and indoor plants sold at Stapeley.

After serving his apprenticeship under Sir John Armytage at Kirklees Hall in Brighouse, Yorkshire, and later qualifying on a full time course at the Essex College of Agriculture, Glynn went on to gain his vast knowledge of plants in various nurseries and gardens, ranging from the Arboretum at Kew Gardens, to the famous Harry Wheatcroft's nurseries in Nottingham, and later propagating a wider range of plants on the 40 acre Hornbrook Nurseries in Horsham.

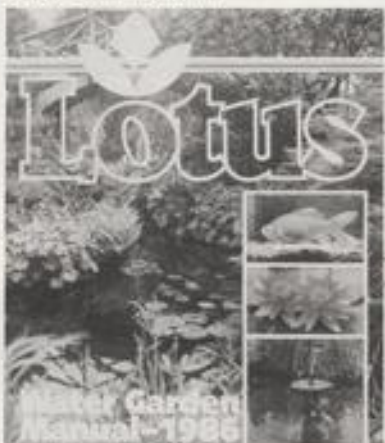
Having spent the last eighteen years at Bridgemere Nurseries, Glynn has decided to take on a fresh challenge in developing the horticultural side of Stapeley's business, where his attention to quality and providing a comprehensive range of well grown plants can be fully exploited and extended to include aquatic plants.

## The Lotus Millstone Replica

Millstones that have been retired from flour-grinding have frequently been integrated into very attractive water displays. Lotus now offer the consumer the opportunity of adding a millstone to their own pool layout, but without the weight problems inherent in the genuine stone variety.

The realistic Lotus replica millstone is made from glassfibre and is consequently light and easy to handle. A small Otter pump can be used to achieve a bubbling water effect in the centre of the 'stone' and a low voltage light is fitted to give subtle illumination. Recommended retail is £120.75.

Full details of the complete Lotus range can be found in their colour catalogue, copies of which are available from their headquarters at 260-300 Berkhamsted Road, Chesham, Bucks.



LOTUS WATER GARDEN PRODUCTS LTD

The new Lotus Manual is updated to give the gardener in any situation other essential and good value and advice on the pond, with the lotus pond in particular. It is available in paperback or hardcover.

A bright new format for the 1986 Lotus Water Garden Manual

## Major supplier—name change

Peter Golding of Wingate & Golding Limited informs us that from December 1985 his Company will be trading under the name of **Peter Golding Limited.**

Since Bill Wingate's retirement from active participation in the company two years ago, the existing management—comprising Peter Golding himself; Yvonne Trowbridge, General Manager; Danny Reynolds, Sales Manager; and Janet Golding, Company Secretary—head an enthusiastic team of 20 personnel.

The newly named Company will continue to offer a reliable weekly or fortnightly delivery service throughout the South and South West of England and South Wales, serviced by the fleet of five vans.



**NEW**

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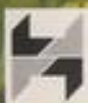
for undergravel filter; with aerating features  
400 turns over 250 gall. per hour  
200 turns over 150 gall. per hour



Art #A-585



Art. #A-587



Rolf C Hagen (UK) Ltd., 275 Kirkstall Road, Leeds. LS4 2BZ

# ARE YOU AFRAID OF MARINES?

Keeping marines is easy when you know how, say Gordon Kay and Dave Garratt of the British Marine Aquarists' Association and West Midland Aquatic Group in the first article of a short series aimed at beginners to the marine hobby



The Sailfin Tang (*Zebrasoma veliferum*) one of the fishes that can be kept quite easily after the initial 'apprenticeship' period

DAVE GARRATT

**A** lot of people outside the marine sector of the hobby are frightened to take the plunge into keeping these wonderful animals because they think it is too difficult. They have heard tales from all sorts of people, including dealers, of the overwhelming problems and expense of keeping marines.

Marine aquariology, like everything else, is easy when you know how and over the next few articles we will prove it. The series is intended as a basic guide to setting up and maintaining a marine aquarium using the ever-popular undergravel filter system. Because it is aimed primarily at beginners, we have included only the basic equipment necessary for success. Expensive 'extras' such as power filters, ozonisers and the like all have their uses but are not essential and can be forgotten for now.

## The Water

With a marine system, water quality

is of paramount importance and is the key to success. The main reason for this is that unlike freshwater fish, marine fish are constantly losing water to their environment, so that they have to take in the water to prevent themselves from dehydrating. If one also remembers that the Coral Reef is the most stable environment on earth, it becomes plain that marine fish are sensitive to water chemistry to a far greater degree.

## Specific gravity and Ph

The first water quality condition is the actual salinity or specific gravity of the water. At a temperature of 75 to 78°F the specific gravity should be 1.020-1.023. Specific gravity is measured with a hydrometer which costs a few pounds from your dealer. It should be noted that an SG of 1.020 is preferable because there will be more oxygen in the water as the SG decreases. It is also said to help with disease control.

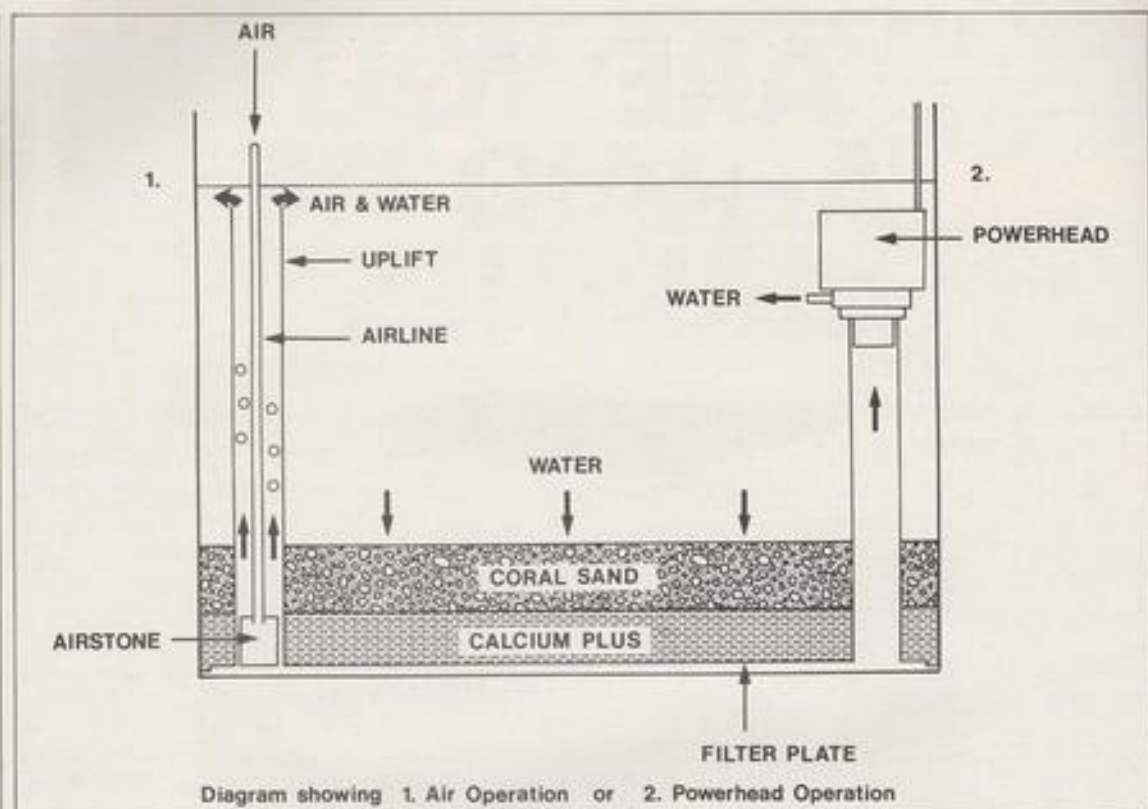
Next, we have to deal with pH, which

is the scale of measurement of acidity and alkalinity. The pH of a marine tank should be between 8.0 and 8.3, which is slightly alkaline. This is why we use a layer of crushed cockle or dolomite gravel in the filter bed. This, together with the coral skeletons used for decoration in the tank, acts as a buffer to keep the pH up. Water changes maintain the correct pH and special buffers can be purchased which are added to the aquarium water. Providing you run your aquarium properly, pH should never be a problem but it should be measured regularly with a test kit and never allowed to fall below 8.0.

Within the stated parameters, the actual readings of the above are not as important as stability. It should be noted that pH is measured on a logarithmic scale, with each point 10 times greater than the one before so that a shift of just one point can stress fishes tremendously.

The other vital problem with water chemistry is the toxic waste produced





An undergravel filter uses airlifts to drive water through a biologically active medium (see text for details)

by the fishes. This is taken care of by the biological filter.

#### The biological filter

The biological or undergravel filter, is the most widely used method of filtration in marine aquariums. This is largely because the 'semi-natural' system, as it's called, is the easiest to establish.

The filter is not so much a piece of equipment as a living entity in itself. It is created by fitting an all-over undergravel filter plate (with airlifts) on top of which is layered crushed cockle or dolomite gravel at a rate of 10 lbs/sq.ft. Calcium Plus is probably the best product available because of its pH buffering properties. On top of this first layer is then spread a layer of coral sand at a rate of 10 lbs/sq.ft. It is useful to lay a gravel-tidy between the Calcium Plus and the sand. This is a thin sheet of plastic mesh which will prevent the two filter media getting mixed together, whilst still allowing the passage of water.

Undergravels are usually powered by an air pump which forces air down the uplift, which in turn draws water through the filter bed, up the airlift and back into the tank (see diagram).

This system has been updated with the introduction of powerheads, which sit on top of the airlift tube. These increase the flow through the filter dramatically, but it should be remembered

that they are water pumps and, as such, do not aerate the water. If these pumps are employed it is best to use an air pump in conjunction with one or two airstones.

The purpose of the filter bed is to develop a colony of nitrifying bacteria which coat every grain of coral sand. The fishes in the tank excrete a large amount of ammonia which is extremely toxic to them, poisoning them if left unchecked. The filter bed works by bacteria breaking down the ammonia into nitrite. This is also toxic but other bacteria then go on to convert the nitrite into nitrate which is much less toxic and is kept in check by regular water changes.

It should be stressed that sufficient flow through the undergravel filter is critical. About four times an hour is optimal. This is because the bacteria in the bed need vast amounts of oxygen to flourish. A good flow rate helps to ensure this. Good water movement is also important because of the mantle of stagnant water which surrounds everything which is submerged. This is kept to a minimum by strong water currents, which make it easier for the fish to carry out their metabolic functions.

#### The Equipment

The first piece of equipment to buy is the tank which should be as large as possible. The larger the tank the slower

will be any changes in water chemistry. The tank should be all-glass with tight fitting cover glasses to minimise evaporation and to prevent pollution.

The pump or pumps should be as powerful as possible to achieve a good turnover rate through the filter bed. Remember, four times an hour is best and twice an hour would be the absolute minimum.

One will also need fluorescent starter units and tubes. For a fish-only system, two white light tubes, the same length as the tank, are sufficient but for a tank containing invertebrates, this should be increased to three or four. The best tubes are those that simulate the complete spectrum. They are, however, expensive. It may, therefore, be more practical to use a combination of these and less expensive tubes, particularly in invertebrate aquaria.

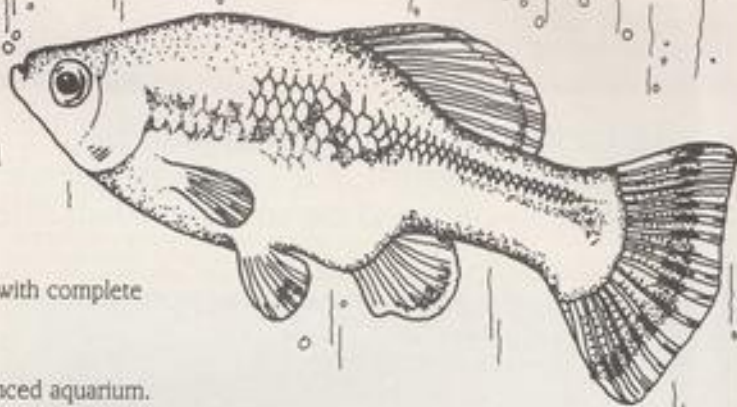
Additional equipment needed is a heater/thermostat, a thermometer, sufficient airline and gang-valves, T-joints and airstones, a cable console and a supply of cable. One will also need test kits for nitrite and pH and a five-gallon brewers' bin for water changes. A very worthwhile piece of equipment is an air-operated protein skimmer, which we will cover in some detail at a later date.

In the next article, we will discuss how to set up an aquarium, decorate it and mature it ready for the fish. We will also cover maintenance.

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# FOLLOW THE YELLOW-SCALED ROAD

In competition with a myriad tropical freshwater or marine species, the Goldfish still retains its popularity among aquarists. Dick Mills offers some advice on fish selection and their care

If you're lucky fishkeeping does, indeed, turn into a place not unlike somewhere over the rainbow, but to get there you have to go along the right road, progress steadily and not try to take too many tempting short cuts.

The road most of us take starts muddily at the pond-side but soon turns, first to red, as we discover the male Stickleback in his breeding garb, and then to gold with probably our first bought fish—the Common Goldfish.

Despite the overwhelming numbers of tropical species kept in aquaria today, the Goldfish, together with its Fancy Varieties, has stood the test of time as an aquarium fish far better than any of its pioneers could have imagined—after all, fishkeepers spanning several hundred years or so couldn't have all been mistaken could they?

Despite being only a single species, *Carassius auratus*, the Goldfish offers much more than it first seems to do. Perhaps 'Common Goldfish' puts people off, maybe 'Goldfish' is a too limiting description, whilst 'Fancy Goldfish' cer-

tainly doesn't give any hints at all of the remarkable coloration, fin-development and body forms that have evolved down through the years of keeping this species. Multi-hued, ornamental aquarium fish are only understatement of its full potential. But where to start?

#### Tank size

It comes as a surprise to learn that although coldwater holds more dissolved oxygen than warmer water, you need a larger aquarium for Goldfish than you do for tropicals. Goldfish also grow larger than the average-sized tropical.

Allow 24 sq. inches (150 sq. cms) for every inch (2.5cms) of fish body length. As you will more than likely prefer to have more than one fish in your aquarium, a tank size of 24 inches long by 12 inches front to back (60cms by 30cms) should be considered the absolute minimum size of aquarium. The water depth dimension is not so critical but obviously the deeper the water the more room the fish will have to swim; a 15 inch (38cms) depth of water makes for a better proportioned

viewing panel than a 12 inch (30cms) depth. (By now, you've probably worked out that an aquarium 24 by 12 will house around three 4 inch fish, or six 2 inch fish.) To give yourself a really good start why not consider a 36 inch (90cms) long tank (the other dimensions can remain unaltered), which will allow you a little more room for aquascaping and a few more inches of vital fish?

#### Filtration

Goldfish are foraging fishes and the water often takes on a cloudy appearance due to suspended matter. A filter will help to enable you to see your fishes more clearly, in addition to purifying the water. Investing in an external power filter will pay dividends, and if this is coupled up to a reverse-flow undergravel filter system, giving biological filtration, you will have the best of both worlds. One safeguard with any undergravel system would be to introduce a sheet of plastic mesh in the gravel covering the filter plate (after the first inch of two of gravel) so that any foraging fishes do not uncover the filter plate thus 'short-circuiting' the biological operation of the filter-bed. Even if the filter system is efficient, a regular partial water change will also help to keep toxic levels in the water down to a minimum. This is especially important when you graduate to keeping the Fancy Varieties whose delicate flowing fins can soon become congested through bad water conditions.

#### Plants

Soft-leaved aquarium plants are often the target for browsing fishes, but fortunately these are also amongst the fastest growing species and soon make good any losses. Tougher-leaved species such as *Vallisneria* and *Sagittaria* are usually ignored. To prevent the root systems of plants being uncovered, or the plants themselves being uprooted, small pebbles can be placed around the crown of the plants, or the plants can be planted in amongst crevices in rock-work (it looks very natural too) away from the fishes' activity area.

#### Gravel

Gravel and rocks should be chosen to

The Comet is a streamlined fish with a tail often three quarters of its body length



BOB EGGON

complement each other and must be of a suitable harmless chemical composition to avoid affecting the water conditions. When arranging the rockwork care must be taken not to create 'blind-spots' where a fish can possibly become trapped and die unseen.

#### Lighting

Whilst a certain amount of direct daylight is beneficial to the aquarium, it is easier to maintain good plant growth and low algae growth by the correct regulation of the amount of light reaching the aquarium. You have better control over artificial lighting and some degree of trial and error will be necessary to find out what is just right for your particular set-up.

Whether your choice is tungsten (ensure

themselves anyway—the metallic sheen coming from layers of crystal *guanin* below them shining through). The scales are known as being *nacreous* (translucent) allowing pigmentation in the skin itself to show through in varying degrees; these colours are blue, brown, red, orange and black. A general body background of pale blue is quite desirable. The colour patterns or speckling extend into the fins.

#### Bristol Shubunkin

Another variation; this time the caudal fin is the centre of attention. The lobes of the forked tail are much larger than that of the Common Goldfish or London Shubunkin, although the body colours are somewhat similar to the London Shubunkin. If the tail is carried droopily, the fish

is considered to be of poor quality. The rest of the fins are generally longer than the preceding varieties and the dorsal is almost as tall as the body is deep.

#### Comet

A much more streamlined fish, whose caudal fin is often up to three-quarters the length of the body. The body depth is usually not more than one-third of its length. Scale forms (again a misnomer, but fishkeepers will know what you mean) can be metallic or nacreous with the body colours being red-orange, yellow or even white-silver. There is a variety with a white body and a bright red 'cap' to the head known as the Tancho Comet. Fins are more pointed than in the preceding varieties.

Right: The Bristol Shubunkin's tail has larger lobes than the tails of the London Shubunkin and Common Goldfish

Below: The Tancho Comet has a white body a red 'cap' and more pointed fins than other varieties

a well-ventilated hood) or fluorescent, make sure your cover-glass is always clean, to ensure that all the light reaches the plants.

#### Water

Tapwater is quite suitable for Goldfish, and providing you leave the set-up tank well-aerated for a few days before introducing the fish there should be no problem. When making partial water changes, if the replacement water has been similarly stored, so much the better.

#### Fishes

Now for the fishes. Don't make problems for yourself by being too ambitious: Goldfish are hardy creatures and possibly take more physical abuse than we imagine. Start off with singletail varieties no matter how tempted you are with the others on offer. The following brief descriptions give you some idea of what is looked for in quality fishes; you will find many variants for sale and whilst these will undoubtedly be healthy fish, much-loved as pets by the family, they will not form the base of good breeding stock if this is the intended direction of your aquarium ambitions.

#### Common Goldfish

This should be a sturdy fish with a symmetrical outline when viewed from the side. The colour of good specimens is, in fact, a deep orange-red rather than gold and the overall appearance should be metallic. Fishes with silver or black patches can be attractive in themselves but will not be regarded favourably by judges at exhibitions.

#### London Shubunkin

The London Shubunkin has a similar body shape to that of the Common Goldfish but the scales are not metallic. (Actually, the scales are not reflective in



DICK MILLS

BOB EISSON



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A Fishkeepers Guide to the Tropical Aquarium (Salamanca) £4.45

Catfish—Advanced (T.F.H.) £9.00

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Cichlids of the World (T.F.H.) £5.00

Danios Handbook (T.F.H.) £13.00

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Guppy Handbook (T.F.H.) £5.30

Handbook of Freshwater Tropical Fish (T.F.H.) £9.50

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Serra's Aquarium Handbook (T.F.H.) £18.55

Tropical Fish Encyclopedia (T.F.H.) £15.00

How to Keep & Breed Tropical Fish (T.F.H.) £9.25

Tropical Freshwater Aquaria, Care & Breed (Hamlyn) £4.50

Complete Aquarist's Guide to Freshwater Tropical Fishes (Lowe) £10.95

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# THE LONDON ZOO AQUARIUM- PAST, PRESENT AND FUTURE

1924 was a good year—The London Zoo Aquarium first opened to the public and A&P was established. In 1986 we are both still going strong and looking forward to exciting challenges in the future

**T**he days of "postage stamp" zoological collections are largely over, says Dr. Chris Andrews, the new Assistant Curator at London Zoo Aquarium.

Past visitors to the Aquarium will appreciate the value of this statement only too well. They will be familiar with the old "postage stamp" approach to the Aquarium's collections which was based on tanks containing either an individual species or individual specimen, the overall aim being to display as comprehensive a range of fish as possible.

Nowadays, basic zoo philosophy is different, with most collections keeping larger numbers of individuals of a smaller number of species. Consequently, zoological collections around the world are becoming more selective in what they keep.

Chris Andrews is a firm believer in the new approach and is already having a major influence on the style in which fish are displayed at the London Zoo Aquarium. He believes that, 'Just as with zoos in general, Public Aquaria, in addition to being educational and serving a conservation purpose, must also be attractive and enjoyable to visit.'

Chris considers that these aims can be achieved in a number of ways.

## Education

- (i) Fish should usually be displayed in a naturalistic setting, taking account of their physiological, environmental and social needs (this involves matching fish and water quality, providing appropriate shelters/background, keeping the fish in compatible communities where relevant, etc.).
- (ii) Sufficient information for the public should be provided in an easily understood manner.



Chris Andrews (far right) with the Zoo Aquarium team. Left to right: Terry Weldon, Ron Dumbleton (Head keeper), Steve Matchett and Brian Harris

## Conservation

- (i) Aquatic displays should be used to inform the public of the need to conserve habitats and protect them from threats such as pollution, destruction and over-exploitation.
- (ii) A captive breeding programme should be established for threatened and endangered species.

## Entertainment

Unusual as well as common species of fish which have wide public appeal should be attractively displayed.

'Fish show a fascinating diversity of body shape, form, coloration, feeding habits and social and reproductive behaviour'. All these features are being brought into play at the Zoo Aquarium by Chris in an attempt to cater for the 'more than one million aquarists and nearly three million freshwater anglers in the British Isles, as well as the general public, both in the existing and the "New" Aquarium currently scheduled for a 1988 opening.'

The new Aquarium, plans for which are already underway, will cost £2.5 million and will feature a very large Indo-Pacific coral reef community tank, plus a number of supporting freshwater and

marine exhibits that can be changed or modified on a regular basis. This new venture will mark a major step forward in thinking and design and presents an exciting challenge that Chris and his staff are clearly looking forward to.

While all this lies in the future, there is still a great deal that can be done, and is being done, by the Aquarium team which incorporates a nice balance of youth, experience, expertise and an inexhaustible supply of enthusiasm.

The Head Keeper, Ron Dumbleton, currently responsible for the Tropical Hall, has worked in the Aquarium for over 30 years. Consequently, there's not a lot Ron doesn't know. He is, therefore, a well-respected and reliable source of information and advice to all.

Brian Harris, his second-in-charge, has more than 20 years' experience. He is responsible for the Seawater Hall and has a particular interest in tropical marines.

The two newest arrivals in the team are Steve Matchett, with his enviable amphibian breeding record (including egg-laying in the Surinam Toad, *Pipa*), and Terry Weldon, who is especially interested in predatory fish and runs the Freshwater Hall.

Together, Chris and his staff, are bringing about many significant changes in the present collection.

They carry, of course, a tremendous responsibility on their shoulders—the Aquarium, after all, is one of the most famous institutions of its kind in the world. A measure of how important the existing Aquarium is can be gauged from the amount of money it took to build in 1924 (the same year A&P was established)—£55,000. You don't need to be a brilliant mathematician to appreciate that this was a massive capital investment.

For this money, the Zoological Society of London was able to replace its original



Aquarium (the first one in the world to be opened to the general public in 1853) with a bigger and better site, under the "mountains" of the Mappin Terraces, for its ever-expanding collection.

The basic design still remains today and consists of three halls—Freshwater, Seawater and Tropical—holding over 100 tanks, the largest of which contains 16,000 litres (3,500 gallons) of water. Altogether, there are over 1,500 fish from about 200 different species.

Many of the commoner fish on display are now bred on fish farms around the world. Where rarer exhibits are obtained direct from the wild, every effort is made, not only to provide the fish with ideal environmental conditions, but also eventually to breed them. Wherever possible, immature fish are collected from the wild and many eventually exhibit a longer lifespan than in their native waters.

The Aquarium also houses an interesting collection of temperate and tropical amphibians, several species of which regularly breed in the tanks and vivaria, along with a range of freshwater and marine invertebrates.

**Below: The American Lungfish (*Protopterus annectens*) is the most commonly imported lungfish species. The specimen at the Zoo has been there for 20 years and is now well over a metre in length**

**Bottom: Just part of the fish and invertebrate life exhibited in the Aquarium's impressive 300-gallon marine community tank**



Each of the three halls has a separate pumped water circulation and filtration system. Within each hall, each tank has its own inflow and outflow which delivers water from, and takes it to, the circulation system.

Water does not flow from tank to tank, but must first pass through the large sand filters in the Aquarium basement, where biological and mechanical filtration occur. This arrangement helps minimise the risk of disease transmission between tanks, clearly of paramount importance in a collection of this size.

A small number of tanks also have their own, isolated water circulation and filtration systems to meet the specific needs of species like trout and marine coral fish.

The total volume of water circulating through the tanks is around 900,000 litres (200,000 gallons), and natural sea water is brought in about once a year for the marine fish and invertebrates.

A supply of compressed air is available to each tank and illumination is provided by over-tank fluorescent tubes, tungsten spotlights or high-power lamps.

Gas-fired boilers and steam pipes keep the tanks in the Tropical Hall warm, and emergency generators are available to power the water circulation pumps in the event of a power cut.

Most of the fish are fed once or twice a day (including Christmas Day) on a variety of foods to suit the nutritional needs and preferences of each species. Such foods include: finely chopped beef heart, dead herrings and sprats, chopped squid and whole mussels, live and frozen plankton, shrimps, bloodworm and Tubifex, flaked, pelleted and freeze-dried foods, lettuce and a range of soft fruits. In one year, the fish in the Aquarium consume, amongst other things, over 400 Kg. of beef heart, 2,000 Kg. herrings and sprats, 150 Kg. pelleted food and 1,200 lettuces.

Most of the tanks are partially siphoned out once or twice a week, and completely cleaned out once or twice a year.

Quarantine and hospital facilities are available behind the scenes, where new fish are generally quarantined for a short period to prevent the introduction of diseases into the display tanks. The quarantine and hospital tanks have separate water circulation and filtration systems.

The Aquarium is open 364 days a year (closed on Christmas Day). Admission charges to the Zoo (free entry to the Aquarium) from 1 March 1986 are: Adults £3-40, Children (aged 5-16) £1-70, Children under 5—Free. There are also reduced rates for Students, Senior Citizens and Groups of 20 or more.

For interested groups, guided tours of the Aquarium, including a look behind the scenes, can sometimes be arranged by contacting Chris Andrews at 01-722 3333.

Chris is very keen to foster closer links with Aquatic Societies and has, in fact, already been in touch with various specialist groups to seek ideas and assistance in setting up displays of particular types of fish.





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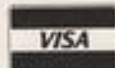
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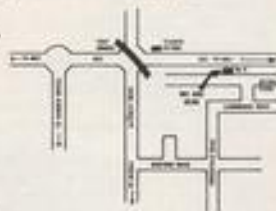
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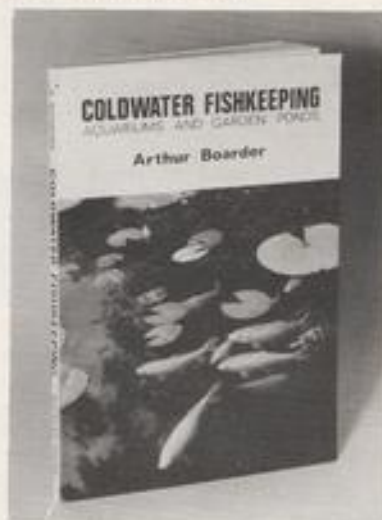
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# Meet the societies

## Marine Conservation Society

While it is true to say that the majority of marine hobbyists specialise in fish and invertebrates from tropical regions of the world, there is a growing number of aquarists who are turning their attentions to our own native marine fauna and flora. Those who do soon realise that we own an extremely rich, varied and spectacular array of marine organisms along our shores, every bit as challenging and exciting as their counterparts from distant coral reefs.

As soon as you start going into the subject in any detail, you also realise that, quite surprisingly for a nation which prides itself on its high regard for wildlife, Great Britain does not have a single statutory Marine Reserve. This contrasts quite starkly with other European countries such as France, Italy and Ireland (the five Nordic countries are also establishing a network of statutory Marine Reserves along their coastlines).

Although there are some voluntary Marine Reserves in Britain, these have no legislative power at all. Consequently,

individuals can enter these areas at will and do practically what they like.

Such matters are of extreme concern to the Marine Conservation Society which is a rapidly expanding national conservation organisation seeking to protect the marine environment and promote its practical management.

With influential people such as the Prince of Wales (President) and David Bellamy (one of the Vice-Presidents)



among its supporters, there is no doubt that the Marine Conservation Society is a force to be reckoned with.

The activities include authoritative lobbying and campaigning on marine issues, research on marine life and, more recently, the wardening of certain coastal sites. The Society also publishes its own scientific reports, marine life identification guides and other educational materials, including sets of slides with notes.

Members receive the Society magazine

*Marine Conservation* four times a year, along with a range of other literature.

The Society also runs a series of Projects. These allow members to play an active part in the Society's work, be it recording organisms on shore, or taking part in underwater surveys. In addition, expeditions are organised to areas of particular interest both here and abroad.

The Information Service consists of a number of experts (mostly based in museums, laboratories or universities) who can be contacted by Society members seeking advice on marine topics.

Activities in the various areas of the country are organised by Regional Groups, namely, Scotland, Borders, Yorkshire and North Humberside, North West, Midlands and East Anglia, South East, Severn, Devon and Cornwall, Northern Ireland, Eire and Overseas.

**Subscription Rates:** Annual Membership, £8.00; Family Membership, £12.00; Life Membership, £100.00; Institutions may join under special donation schemes. In addition, there is a Deed of Covenant arrangement which allows the Society, as a Charity, to claim tax back on members' subscriptions.

**Apply to:** The Marine Conservation Society, 4 Gloucester Road, Ross-on-Wye, HR9 5BU. Tel. (0989) 66017.

## Walthamstow and District Aquarists' Society

In 1949 a small group of hobbyists from the Walthamstow area got together and decided that there was a need for a club where news and views could be exchanged. A venue was booked for a meeting following an advertisement in the local press and Walthamstow & District Aquarists' Society was born.

Affiliated to the Federation of British Aquatic Societies (F.B.A.S.), W.D.A.S. has extensive resources to draw on, including speakers from the Federation, literature, slide shows, etc. Members are also eligible for the award of a coveted F.B.A.S. Gold Brooch and the Society is justifiably proud that one of its number was presented with this honour some time ago.

The competitive side of the Society's activities takes a number of forms. For example, regular Table Shows are run at the fortnightly meetings, with the points awarded being totalled over the year and the respective winners being presented with trophies at the Society's Christmas Party. Trophies are also competed for in the annual Home Furnished Aquarium and Pond competitions. In addition, the Alex Hobden Memorial Trophy goes to the person considered to have done most on the Society's behalf.

Other challenges are represented by various Inter-club competitions (with Southend, Leigh and Romford), quizzes and the highly successful W.D.A.S. Open Show. Nearly 40 Classes were represented at the last one which took place at the Chingford United Reformed Church Hall on 14th September 1985.

The Show Schedule carried the W.D.A.S.'s attractive, 'friendly' logo (thought to be a true reflection of the Society's well-known and very sociable reputation) on its cover. The fish depicted is a Hatchetfish but it is, in fact, affectionately known to most members as the 'Smiley Whale'!



It is also figured (twice) in the W.D.A.S. bi-monthly Bulletin which is distributed to all members. Besides the usual newsy items, the Bulletin also carries some 'heavier' useful material, such as articles on human Granulomas (lumps produced by the bacterium, *Mycobacterium marinum*) and the risks of infection from working

in aquaria while carrying cuts or abrasions on the skin. Other features in the Summer 1985 edition included a very thorough treatment of the African Cichlid genus, *Juliachromis*. The W.D.A.S. Bulletin is, clearly, a publication well worth having.

The Society is also very active in other areas, and not all directly connected with fishkeeping (although the majority do have a fish-linked aspect to them). For example, some of the events organised during 1985 included a riverboat Disco and Barbeque and a visit to Cologne (the Society's annual Continental weekend) which had sightseeing, a Zoo and Aquarium excursion and a trip to Phantasialand as part of the itinerary. Not surprisingly, this was voted an outstanding success. Other activities included visits to Compton Acres, the Bournemouth A.S. Open Show and a Christmas Dinner held at the Walthamstow Greyhound Stadium where members not only enjoyed a meal but could also watch the races.

Meetings are held every 1st Friday and 3rd Wednesday of the month at the Grange Community Hall, Frederick Street (off St. James Street), Walthamstow, London, E17. Visitors and potential new members are always welcome.

**Subscription Rates:** Single, £2.00; Family, £2.50; Juniors and O.A.P.'s, 50p.  
**Apply to:** David Millins, Secretary, 37 Grantock Road, Walthamstow, London, E17. Tel: 01-531 0806.



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WR. C.T.P.A.A.B.

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The firms listed are wholesalers or retailers or both in fishes, tanks, plants, appliances and accessories, reptiles and amphibia. Abbreviations: W Wholesale only. R Retail only. WR Wholesale and retail. C Coldwater. T Tropical. M Marine. P Plants. AA appliances and accessories. B Books. R & A Reptiles and amphibia. ECD Early closing day.

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Telex 847757. Telex Answerback 'Electric Ray'  
Open 7 days a week 10 a.m.-6 p.m.  
WR. C.T.M.P.A.A.B.

**Wildwoods Water Garden Centre**  
Theobalds Park Road, Crews Hill, Enfield  
Telephone: 01-366 0243/4  
Open 7 days a week 9 a.m.-5.30 p.m.  
R. C.T.M.P.A.A.B. R&A.

## MIDLANDS (West)

**Airport Aquaria**  
Bourne Farm Garden Centre, Chester Road, Aldridge  
Telephone: 021-352 0871  
Open 7 days a week 10 a.m.-5.30 p.m. R. C.T.P.A.A.B.

## NOTTINGHAMSHIRE

**Japanese Water Gardens**  
At Gregory's Roses,  
251 Toton Lane, Stapleford NG9 7JA  
Telephone: Nottingham (0602-397926)  
Open 7 days a week 9.30 a.m.-5.30 p.m.  
WR. C.T.P.A.A.B. R&A.

## OXFORDSHIRE

**The Goldfish Bowl**  
118-122 Magdalen Road, Oxford  
Telephone: Oxford (0865) 241825  
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Saturday 9.00-5.30 p.m. Closed Sunday  
Wholesale: Monday to Friday inclusive  
C.T.M.P.A.A.

## SOMERSET

**Hambridge Fisheries**  
Hambridge, Nr. Langport, Somerset  
Telephone: Langport (0458) 251879  
Open Tues.-Sun. 10 a.m.-6 p.m.  
Closed Monday (Open Bank Holidays)  
R. C.T.M.P.A.A.B.

## J & K Aquatics Ltd

The Old Stable, Wellington Gardens Centre,  
Wellington, Somerset TA21 8RA  
Telephone: Wellington 7077  
WR. C.T.M.P.A.A.B. R&A.

## SURREY

**Egmont Water Garden Centre**  
132 Tolworth Rise, South Surbiton  
Telephone: 01-337 9605  
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construction and design.  
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Closed Monday R. C.T.M.P.A.A.B.

**Natureworld Pet Shop**  
129 Anyards Road, Cobham, Surrey KT11 2LJ  
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Telephone: Cobham (0932) 67082  
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5.30 p.m.  
Wed., 9 a.m.-1 p.m. R. C.T.M.P.A.A.B.

**Surbiton Aquaria Co. Ltd**  
27-29 Brighton Road, Surbiton KT6 5LR  
Telephone: 01-399 6783  
Mon.-Sat., 9 a.m.-5.30 p.m. R. C.T.P.A.A.B. R&A.

## SUSSEX

**Eastbourne Aquarium Centre**  
(Entrance in Elms Road, opp. A. & N. stores)  
11A Seaside Road, Eastbourne  
Telephone: Eastbourne (0323) 30635  
Closed all day Wednesday  
Late opening Thursday 7-9. R. B.C.T.M.P.A.A.

**Fishes Paradise**  
Barnham Garden Centre,  
Yapton Road, Barnham,  
West Sussex  
Telephone: (0243) 553642. R. C.T.M.P.A.A.B.

**World of Fishes**  
31 North End, Felbridge, East Grinstead  
Telephone: 0342 22244  
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## WILTSHIRE

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## WORCESTERSHIRE

**Golls Aquatics and Nurseries**  
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# News from the societies

## Northumbria Coldwater Fish & Pondkeepers Society

### Obituary

#### Katey Harrison

It is with the deepest regret that we report the sad loss of Katey Harrison who passed away on 21 January 1986.

Katey was one of our founder members and did tremendous work behind the scenes. She was the Club Treasurer who still managed to supply the goods even when the Club was broke.

Wife and mother to a family of aquarists, she always found time to help when she was needed.

Alongside our late Chairman, Jack English, she strove to project the cold-water fish hobby and her pet Kot.

Our sympathy is extended to husband Jim and family.

She will be sadly missed by us all.

#### Harry Kennard (Secretary N.C.F.P.S.)

## Beverley Aquarists & Pondkeepers Society

Meetings of the Beverley Aquarists & Pondkeepers Society (formed on 15 January 1986) are held every other Wednesday at 7.30 p.m. at the Cross Keys, Laigate, Beverley, West Yorkshire. Comprehensive programme available to members on all aspects of the hobby. For further details, contact Brian Sutcliffe, (Secretary), 162 Norwood, Beverley, East Yorkshire HU17 9JA, or ring Alan Roland on (0482) 861513.

## South Park Aquatic (Study) Society

The new committee elected at the 1986 AGM held on Tuesday 21 January 1986 at the Wimbledon Community Centre is as follows: Mr. Bill Leach—Re-elected President; Mr. Dave Brooks—Re-elected Chairman; Mrs. Norma Brown—Secretary; Mr. Eric Franklin—Re-elected Show Secretary; Mr. Larry Brown—Re-elected Assistant Show Secretary; Mr. Steve Bassett—Publicity Officer.

Membership of S.P.A.S.S. is £2.50 per year (first visit to the club is free). Meetings take place on the third Tuesday of the month at 8.00 p.m. at the Wimbledon Community Centre, St. Georges Road, Wimbledon, SW19. The meeting rooms are only 150 yards from Wimbledon Railway Station. For further information, contact Mrs. Norma Brown, 01-947 2011 or Mr. Steve Bassett, 01-390 7519.

## Haringey Aquarist Society

Haringey A.S. held their A.G.M. at Pax Hall, Hornsey, on Thursday 6 February 1986. The following officers were elected: Chairman—D. Sellars; Treasurer—A. C. Stern; Secretary—A. J. Dempsey; General Committee Members—R. Gill, M. Haswell.

Meetings are held on the first and third Thursday of every month at Pax Hall, 59 Park Road, Hornsey, London N8, at 8.00 p.m.

North London aquarists (both new and experienced) are welcome to attend.

All correspondence should be sent to: Adrian J. Dempsey (Secretary), 135 Rathcoole Gardens, Hornsey, London N8 9PH.

## Dunfermline & District Aquarist Society

The above society meets at 7.30 p.m. at the Netherthorn Institute, Dunfermline, on the first and third Wednesday of the month.

The committee for 1986 is as follows: Mr. David Dobbie—President; Mr. John Wells—Vice President; Mrs. Pauline Hoey—Secretary; Mr. Derek Long—Treasurer; Mr. Philip West—Show Manager.

Further details available from Mrs. Pauline Hoey, 123 Station Road, Kelty, Fife KY4 0BL. Tel: (0383) 830051.

## Kingston & District Aquarist Society

The committee for 1986 is as follows: Mrs. J. Ellis—Chairperson; Mr. D. Mackay—Secretary and Show Secretary; Mrs. P. Lambert—Treasurer.

Fuller details from Mrs. J. Ellis, 6 Buxton Crescent, North Cheam, Sutton, Surrey SM3 9TP.

## Stretford & District Aquarist Society

The Stretford & District Aquarist Society 1986 Open Show and Grand Auction will be held on Sunday 4 May, at the Hartford Community Centre, Canterbury Road, Urmston, Manchester. Benching: 12.00 noon to 2.00 p.m. Judging: 2.30 p.m. Enquiries: C. Leebetter. Tel: (061) 789 4391.

## Gateshead Aquarist Society

Gateshead Aquarist Society will be holding its Fourth Open Show on Sunday 25 May, 1986 at the Gateshead Leisure Centre, Alexander Road, Gateshead, Tyne and Wear. Benching from 11.00 a.m. to 1.00 p.m. Judging from 1.00 p.m.

Further details of the Show (and the Auction) are available from Mrs. Doreen Walters (Treasurer), 60 Hyde Park Street, Gateshead NE8 4QB. Tel: Gateshead 478 6847.

## Corby & District Aquarist Society

The Corby & District Aquarist Society Open Show will take place at the Corby Civic Centre on Sunday 25 May 1986. Benching: between 10.00 a.m. to 1.00 p.m.

Schedules and other details available from Alan Henderson, Show Secretary, 5 The Nook, Corby, Northants. Tel: (0536) 68269.

## Sudbury Aquarists Society

Sudbury Aquarists Society are holding their Annual Open Show on 6 April 1986 at Neasden High School, Quainton Street, Neasden NW10. Further information and Show Schedules from: Barry Witteridge, 142 Joel Street, Northwood, Middx. Tel: (09274) 24450.

## East Dulwich Aquarist Society

East Dulwich A.S. are holding their Open Show on 12 April 1986 at Paisley Hall, Stopford Road, Walworth, London SE17. Further details from Mark Darsley, Secretary, 22 Hughes House, Deptford Green, London SE8.

## Anabantoid Association of Great Britain

The Anabantoid Association of Great Britain will be holding the second Members' Weekend at Sorby House, Sheffield University on 12-13 April, 1986. There will be a visiting group from I.G.L. (the European equivalent to A.A.G.B.), with lecturers on fish collecting, an Anabantoid Show, A.G.M., auction and evening disco. A.A.G.B. members or anyone wishing to join the Association should apply to Tim Groom (details in 'Labyrinth'—the Association's journal).

## Kettering Tropical Fish Club

20 April, Annual Open Show at the Boys School, Windmill Avenue, Kettering. Show schedules and other information are available from Mr. Chris Wright, Ashtree Cottage, Woodford, Northants. Tel: Thrapston 2943.

## Wrexham Tropical Fish Society

20 April—Wrexham Tropical Fish Society 2nd Open Show at the Boy Scouts' Hall, Mold Road, Wrexham. For further details contact Mrs Brigitte Jones at 1 Hope Street, Caergwrle, Wrexham or phone Wrexham 761829.

## Merseyside Aquarist Society

27 April—Merseyside Aquarist Society annual Open Show to be held at the Rainhill Village Hall, Dane Court, Rainhill, Prescot, Merseyside. Further information from Secretary J. Bailey, 11 Auburn Road, Liverpool L13 8BJ. Tel: 051 228 8199.

## Lanarkshire Aquarist Society

The above club has changed its venue. We now meet in the Calderbank Hall, Main Street, Calderbank by Airdrie, on the 2nd Monday of each month at 7.30 p.m.



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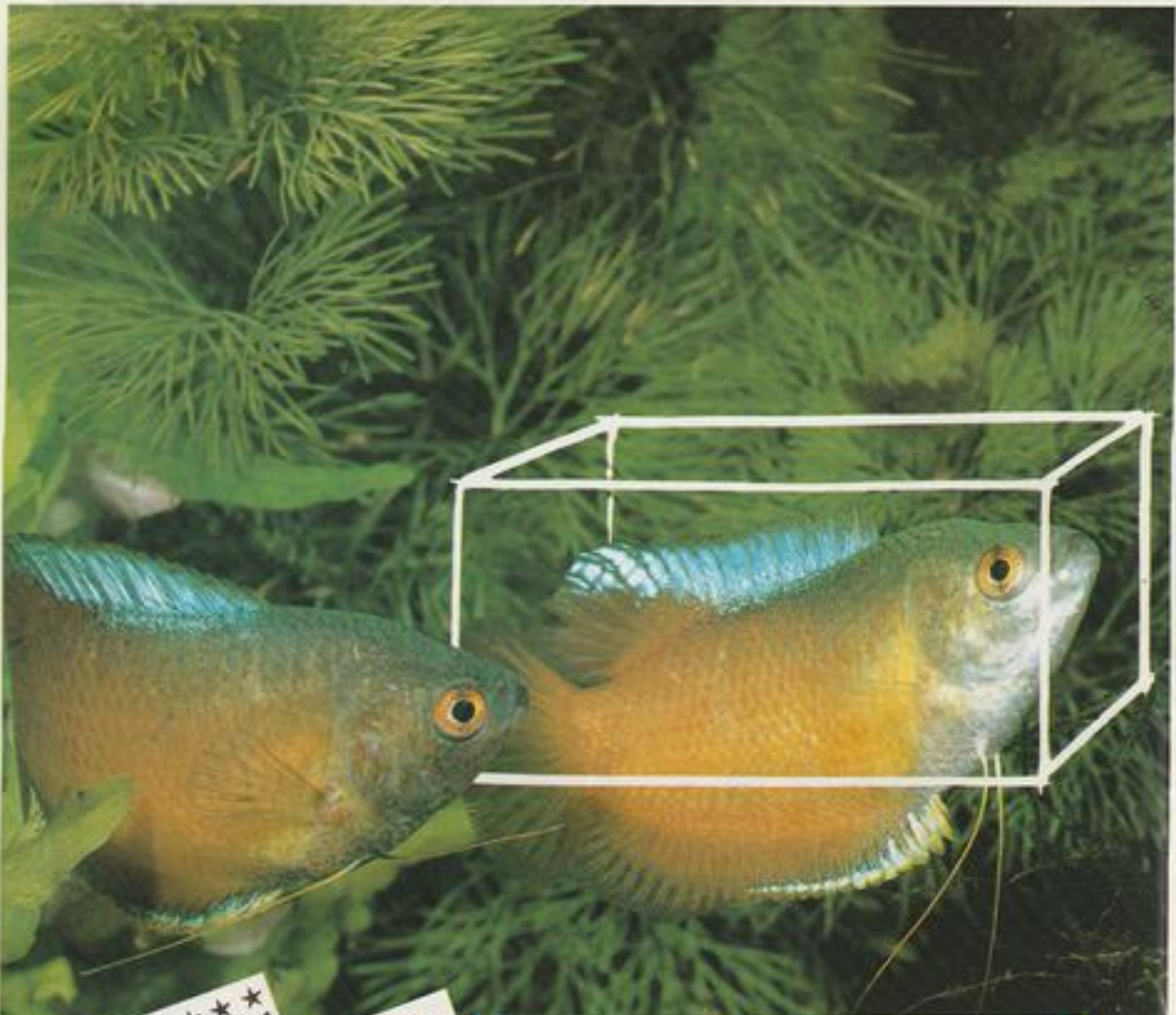
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