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HEALTHY FISH

Above: Shoal of Shark catfish - page 20
Below right: Japanese Koi garden - see page 68
Bottom: Exquisite Fairy Wrasse - see page 80

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WHERE TO FIND

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INFORMATION FOR MARINE FISHKEEPERS pages 7, 12, 15, 28, 32, 42, 48, 54, 60, 80, 84, 88, 97, 102, 107, 122, and 146.

INFORMATION FOR COLDWATER & POND HOBBYISTS pages 7, 8, 12, 15, 28, 32, 42, 48, 54, 60, 72, 102, 107, 114, 122, 128, 132, and 148.

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Bretton, Peterborough PE3 8DZ
Tel: 0733 264666

MARINES

REVIEWS

NEWS & OPINION

HUMOUR

PONDS

COMPETITION

Cover: An unidentified cichlid, probably Pseudocrenilabrus leopardus. Pic by Max Gibbs, The Goldfish Bowl, Oxford.

crack called the doorway. Once in the dining room, all eight men were needed to lift the 600lb tank onto its base.

Filtration

The tank has 50 kg each of coral sand and gravel and 300 kg of rock, which Jay brought back from a local quarry. The rock was in just three pieces when it arrived and needed to be hammered into the correct sizes for the set-up. There's no silicone sealer holding the pieces together – they're all carefully balanced on top of each other. The odd piece of Giant Vallis provides a pleasant diversion from all that rock.

Good filtration and maintenance are essential in the overcrowded conditions of a Mbuna tank so the set-up utilises four different methods of filtration.

Most of the tank is served by an undergravel system but there's also an external power filter, in the shape of a Fluval 403, which is filled with ceramic rings and carbon. In addition to this, Jay has designed a trickle filter, powered by an Eheim 1250. Media here consists of plastic rings, zeolite and Siporax. Due to the large farming industry in his area, nitrates are high, so a nitrate filter has been incorporated, based on the DIY model made by Nick Dakin in PFK May '91, and Jay uses a Nitragen when he carries out a water change.

Heating is by 3 x 300W heaterstats. (Most of the breeding and raising tanks in the dining room don't contain a heater, as it works out cheaper to heat the room instead. These small tanks are filtered with a sponge filter.)

Maintenance

The tank has been up and running for eight months: pH is 7.8, with 15° GH and 12° KH. Jay carries out a 30 gallon water change every three weeks and reckons his total maintenance for all 21 tanks averages out to about one hour per day.

At the moment, the Malawi set-up holds about 60 fish, which are fed on a mixture of brine shrimp, cooked chicken, peas and cichlid pellets. His breeding tanks are all full. Jay sells many of his home-bred fish to the trade.

There's only one cloud on the horizon. The Chandlers may be looking to move house in the next year or so. It could turn out to be a big job.

■ Anyone wishing to buy some of Jay's young Malawis can contact him on **0939 250513.**

Above: *the male* Aulonacara nyassae.

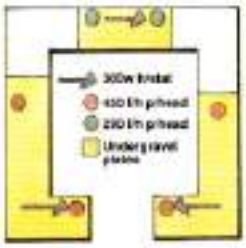
Below: *Part of the complicated but successful filter system.*

The diagrams show how the three filter systems function.

Bottom: Ps lombardoi.

CURRENT STOCK

Pseudotropheus:	
elongatus	1 male
elongatus mpanga	2 male 3 female
aurora	1 male
tropheops membe	2 male
livingstoni	1 male 2 female
patricki	3 male 5 female
socolofi	1 male
lombardoi	2 male
crabro	1 male
Red zebra	1 male
Melanochromis:	
auratus	3 male 1 female
lepidophage	4 juvenile
labrosus	4 juvenile
johanni	8 juvenile
Haplochromis:	
quadrimaculatus	1 male 3 female
taeniolatus	1 male 1 female
moori	1 female
electra	1 male 1 female
Aulonacara:	
walteri	1 male 2 female
nyassae	1 male
Labidochromis:	
caeruleus	2 male
Catfish:	
Blue-Eyed Panaque	1
Synodontis nyassae	1



Undergravel Filtration

Canister Filtration

Trickle Filtration

OLD FISHFINGER'S FORUM

Old Fishfinger is a living fossil from the great days of fishkeeping. His experience ranges over ninety years - knowledge that no book could possibly print. He writes expletively for PFK and welcomes the chance to share his huge experience with our readers. It makes a change from blowing hot air into his tank...

ARE YOU A KEEN FISHKEEPER?

Old Fishfinger has been flicking through *Move* magazine which, of course, he only reads for the fishkeeping tips, and has discovered the questionnaires that they print (Who is your sole mate? Does your man love his Oscar more than you? Is your Guppy promiscuous? and so on). Never one to waste a good idea, Old FF proudly presents:

The Fishkeeping Questionnaire -

HOW KEEN A FISHKEEPER ARE YOU?

1. You come home to find your Snakehead chasing your wife around the lounge. Do you
a) Rush to your copy of PFK and search for advice about live food?
b) Encourage her to run faster as exercise is good for him?
c) Grab her handbag and look for the means to buy a new tank hood?

2. You meet a man who has a catfish named after him. Do you
a) Say "Yes, you've got a lot of spots and scaley skin too..."
b) Tell him you can't see the physical resemblance?
c) Address him in faultless Latin?

3. You are offered a tankbuster for which you have no tank. Do you
a) Give up bathing?
b) Start painting the lounge with pond sealant?
c) Hope noone will miss the 'phonebox on the corner...

4. You meet a talking fish. Do you
a) Start teaching him to read so he'll behave like the experts say he should?
b) Ask him if fish really get turned on by eating bloodworm?
c) Appoint him editor of Practical Fishkeeping?

5. You come home to find your children swimming in the Koi pond. Do you
a) Use it as an excuse to convert their bedroom into an indoor pond?
b) As a precaution check PFK for a cure for a Koi with acne?
c) Tell them that blanketweed is a fashion accessory?

6. A mystery creature crawls from your living rock and eats your entire family. Do you
a) Step up your filtration to deal with the resulting waste?
b) Ring the natural history museum for a positive identification?
c) Ask your mother-in-law round for supper?

7. Your new girlfriend appears on the centrefold of Sub-agua Answers. Do you
a) Tell her that the Grouper looked great?
b) Advise her to wear gloves (at least) when holding a Conger Eel?
c) Tell her it was reader's drives - not reader's wives?

8. After accidentally swallowing a certain brand of flake, you find you are irresistible to females. Do you
a) Make a fortune selling out difficult fish for breeders?
b) Rush out and make hay before you reach your sell-by-date?
c) Write and remind the editor of PFK that it's no fun being a female fishkeeper who's irresistible to women....

9. In mid-summer due to global warming your tanks are at a constant 90°F. Do you
a) Rush out and buy a £500 cooler system?
b) Rush out and buy 30 ice cube trays and a supply of plastic bags?
c) Move to somewhere cooler - like the Amazon rain forests?

10. You see a stunning fish at your local shop - but it's priced at £350. Do you?
a) Buy six and get one free?
b) Buy two £175 fish and go on about the bargain you've got?
c) Buy seven £50 fish then rush out in search of a £1000 systemised tank to keep them in?

HOW DO YOU RATE?

MOSTLY A'S: You are a fanatical (if rather smelly) fishkeeper, with no interest in the opposite sex and probably severe facial contusions caused by a man with a catfish named after him. You have no money and very little sense, and may well be invited to write a regular column for *PFK*.

MOSTLY B'S: You are deeply immersed in fishkeeping (especially after you flood the lounge) despite your preoccupation with sex and habit of gnawing on dried bloodworm blocks. You own two very expensive fish, or should do if they've survived their last attack of acne.

MOSTLY C'S: You are in prison (for stealing a handbag, phone box, and the attempted manslaughter of your mother-in-law) where your gift for Latin is greatly in demand by those scouring law books. Your attempt to flee to Brazil was thwarted when the police caught your children smoking blanketweed. You should resist the impulse to buy £1,000 tanks - at least until you get out in July 2023 when that sort of money should comfortably get you a 2' x 1'.

Old Fishfinger is a regular visitor to the PFK offices (every time we forget to lock the door) and occasionally stays less than eight hours. He is desperate to receive fan mail at the following address:
Old Fishfinger, C/O The Editor, Practical Fishkeeping, Bretton Court, Bretton, Peterborough PE3 8DZ
• Please do not enclose an SAE for a reply as Old Fishfinger's dictionary is a few letters short of an alphabet.

Totally Tro

If you don't have a pond you may have missed out on our series on waterlilies. But in a conservatory of large fishtanks you could be keeping your own tropical beauties. Lily expert HARRY HOOPER has some details.

Tropical waterlilies have been admired for generations due to their exquisite blooms and overall beauty. According to historians, the flowers of *Nymphaea coerulea* the blue lily of the Nile were used by the ancient Eygptians during the burial ceremonies of the pharaohs.

Although the French waterlily hybridiser Joseph Latour Marliac concentrated on producing hardy varieties it is believed that he used the semi tropical waterlily *N. marliacea* to create some of the popular varieties available today.

Above, left and below: Examples of typically tropical waterlilies. Note how they hold their heads high above the surface.

pical

What Marliac contributed to the cultivation of hardy waterlilies varieties, George H. Pring gave to the cultivation of tropical waterlilies. He produced many of the beautiful hybrid varieties that are still sought after by tropical waterlily enthusiasts - although now devoted tropical water lily growers are developing new strains every year.

Conservatory flowers

During the Victorian era the conservatory became extremely fashionable and with almost primitive methods, plant enthusiasts of that period were able to experiment in the growing of a limited range of the more exotic plants including some tropical and sub-tropical species of aquatic plants. In recent years the heated greenhouse or conservatory has become popular again and with this Victorian fashion reborn - plus today's modern methods of plant cultivation - the conservatory can provide the right conditions to be able to grow plants that would not normally survive our climate.

Keen pond owners enjoy growing a good selection of aquatic plants especially waterlilies - given the facilities why not try experimenting with tropical waterlilies?

Cultivation

This group of *Nymphaea* can provide some of the most beautiful and exquisite blooms, quite different to the hardy cultivars.

Growing tropical *nymphaea* is basically the same procedure as with "hardies" providing you ensure the following:

- **A fertile growing medium.**
- **Plenty of sunlight**
- **A water temperature held at a steady 70°F.**

When growing tropical waterlilies in smaller containers, an aquarium heater is normally sufficient to keep the water temperature steady.

Although there are many species of tropical waterlilies the hybrid types are usually more sought-after due to the outstanding blooms they produce. Tropical waterlilies normally hold their blooms well above the water surface adding to the grace and elegance of this group of plants.

Night bloomers

Another advantage of growing tropical waterlilies is that some of the varieties open their blooms after dark, and these night bloomers are normally far more fragrant than the day blooming varieties.

Buying

In most cases tropical waterlilies are purchased from specialist nurseries that remove plants from the tuber in early summer, but on occasions it is possible to obtain tubers that have just started to come into growth earlier in the year.

Given the right conditions the growth of the foliage will be quite fast and as the days get longer the flower buds will start to appear. This is when adequate sunlight is necessary even for the night bloomers.

From seed

Tropical waterlilies are often grown from seed and although this is a tedious process, it is also where new varieties are developed. There are also several varieties that are viviparous - where the plants reproduce themselves by producing young plants vegetatively between the leaf sinus.

These plantlets will, if cared for properly, eventually become established plants.

Overwintering

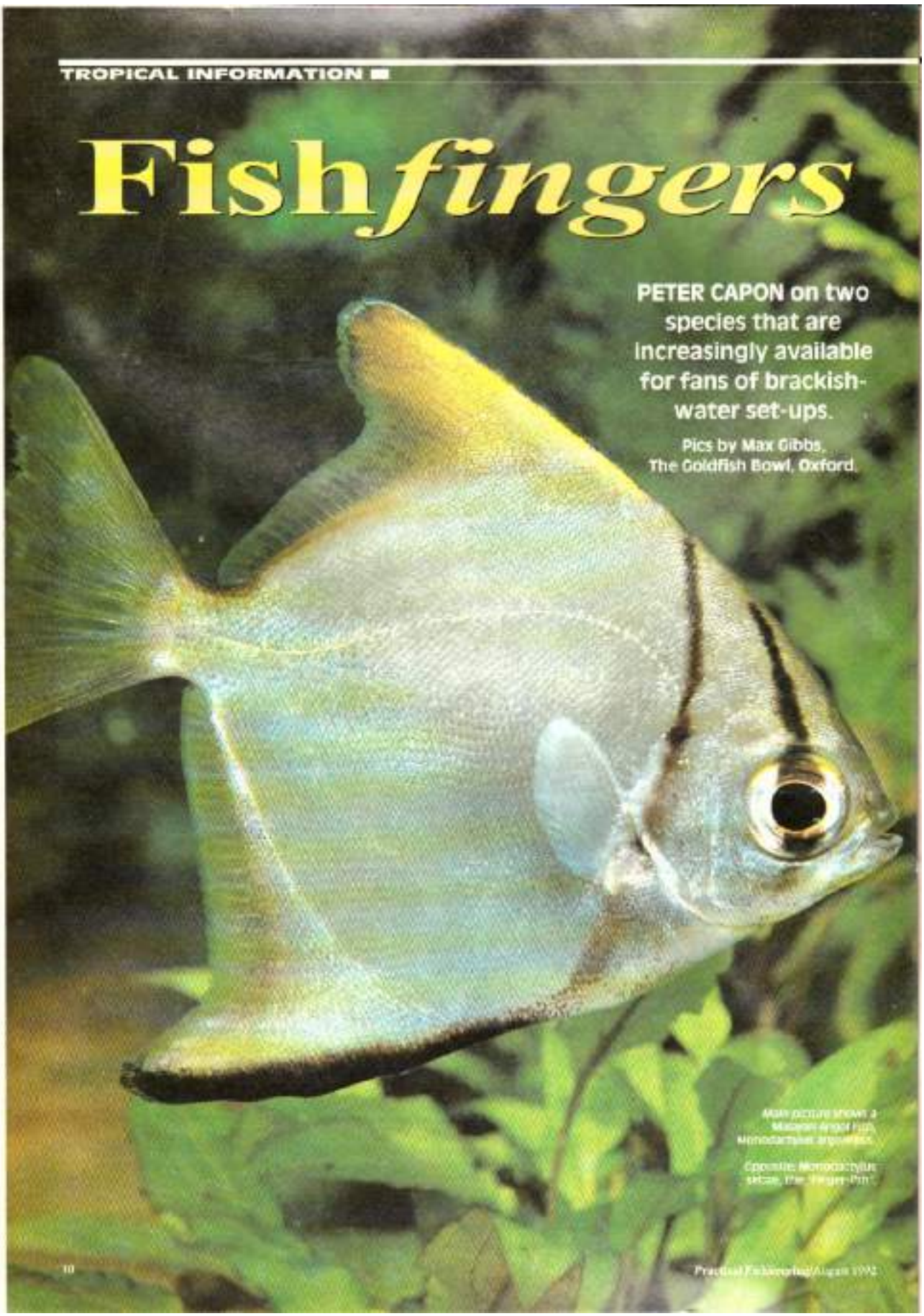
During the winter months the tubers of tropical waterlilies can be stored in damp sand well away from frost and can be brought back into growth the following year - but it does pay to check them at regular intervals. ■

■ HARRY HOOPER is Secretary of the U.K. Branch of the I.W.L.S. He will be pleased to forward information on the society to potential members. Write to Harry Hooper, Mill Lane Nursery and Water Gardens, Mill Lane, Bradfield, Manningtree, Essex CO11 2QP. Please enclose an SAE.

Fish*fingers*

PETER CAPON on two species that are increasingly available for fans of brackish-water set-ups.

Pics by Max Gibbs, The Goldfish Bowl, Oxford.



Main picture shows a Malayan Angel Fish, Monodactylus argenteus.

Opposite: Monodactylus sebae, the Striped-Fin.

The *Monodactylus* genus contains two species *M. argenteus* and *M. sebae* both of which are available from time to time in the aquarium trade. Although *M.argenteus* is more commonly imported. The name *Monodactylus* means 'one finger' hence the alternative common name of "finger-fish".

Fresh or brackish?

They belong to the family *Monodactylidae* which also contains two species of *Schuettea* and one species of *Psettias*. Indeed, at one time the Malayan Angel *argenteus* was included in the genus *Psettias*. Members of the *Monodactylidae* family are marine fish that spend a portion of their lives in fresh or brackish water. Young *Monodactylus* are able to tolerate freshwater conditions but it is not usual for them to survive in a totally freshwater environment beyond a body length of 5cm. They can be adapted while young to either fresh or marine water but a slow transition is necessary to avoid shock or even death.

Feeding

Almost all foods are taken but they are reluctant to pick food from the floor of the aquarium. They are particularly fond of vegetable foods and will invariably devour tender aquatic plants.

Shoaling

In the wild they are found in shoals so ideally a group of four or five individuals at least should be kept together.

If there are only two specimens in the aquarium in all likelihood the weaker specimen will be bullied to death. It is quite possible to keep a lone specimen but to see them at their best a group is preferable. When kept as individuals in a mixed community they can bully other smaller species but they are in the main more peaceable than the average marine fish.

Salt

To allow them to live out their natural life-span it is necessary to slowly convert them to a marine environment as they reach a body length of 5cm. Larger fish will, however, put up with a freshwater environment for a short time.

Monodactylus argenteus

This species is found in coastal waters around the Indian Ocean. Most of the imports reaching the U.K. reach us via Singapore so presumably these are wild-caught specimens from the vicinity of the Malay Archipelago.

This species is commonly known as the Malayan Angel-fish, Momo and more rarely the Fingerfish.

The body is disc-shaped and strongly compressed. The small almost invisible ctenoid scales extend onto the dorsal, anal, and ventral fins in addition to the head area. The ground colour is a bright burnished silver with a black band across the eye from the nape of the neck. A second black bar extends from the leading edge of the dorsal fin in a wide curve across the body to end in the anal fin. The dorsal and anal fins also usually carry a yellow to orange mark.

Healthy specimens should be active and the body should be slightly convex and fish that show fin flanks should not be purchased. In common with the *Pterophyllum* species any fish that show really intense colour and exaggerated black bars should be regarded with suspicion as this is often an indication that they are not long for this world.

Wild fish can reach a length of 25cm but 15cm would be regarded as a good size in aquarium-raised fish. Momo's were first introduced to the European fishkeeper in 1908, but they were known to Linnaeus as far back as 1758.

A temperature in the mid-70's F is ideal and the addition of salt is necessary as previously mentioned. When purchasing Malayan Angels give them a large tank with plenty of swimming space and room to grow. To date it does not appear that this species has been bred in captivity.

Monodactylus sebae

This fish is similar to *M. argenteus* in many respects but it is a much deeper fish with more elongated dorsal and anal fins complimenting its extraordinarily-deep body. Mature adults are usually deeper in the body than they are long.

The wild fish grows to 20cm or so but the aquarium-kept specimen is unlikely to reach 15cm. The ground colour is silver with the body and parts of the fins covered in fine scales. There are from two to five dark bands on the body of which, normally, only three are prominent. The first band crosses the eye, the second extends from the tip of the dorsal across the body to the tip of the anal fin, and the third is to be found on the caudal peduncle. These black bands tend to fade with age. The vertical fins are marked with yellow and the ventral just consist of a few rays.

Monodactylus sebae is an effortless swimmer but it does tend to panic when it is frightened. It is less boisterous than *M. argenteus* but like its relation is happiest in a shoal. Again, although it can tolerate freshwater for a while it is best kept in brackish water graduating to marine water prior to maturity.

This fish has not been given a common name and is usually refered to as the "sebae".

The first recorded aquarium introduction was in 1914 but the fish was first described for science in 1831 by Cuvier and Valenciennes. The natural habitat is the coastal waters of West Africa between the Rivers Senegal and Congo, where it makes occasional excursions into freshwater.

There is one recorded spawning of this species, to my knowledge, credited to Hiroshi Azuma in the mid-1970's. He reported a spawning in alkaline tap-water to which a teaspoon of salt had been added for each gallon of water. The pair were about two years old and 15 and 20cm respectively in height. The female could only be identified by her slightly heavier shape prior to the spawning.

The spawning was a brief affair with some thousand or so eggs being scattered and fertilised in a matter of seconds. The eggs were clear and had a diameter of between 0.6 and 0.9 mm and mostly floated at the water surface.

It is said that in marine water the eggs float but that in freshwater they tend to sink.

Azuma recorded that at 79°F it took 24 hours for the eggs to hatch. Unfortunately there is no record of any fry being raised, indeed, many of the fry appeared to starve.

Possibly in nature the eggs are scattered at the surface of the sea among minute plankton which serves as food for the fry and the almost freshwater in the spawning aquarium was a contributing factor to the loss of the fry. ■

■ The Monodactylus species are interesting and hardy aquarium subjects provided that their eventual need for salt water is born in mind. When first imported they are often in almost freshwater, but will appreciate an addition of salt as they are really a marine fish that can exist in freshwater for a while.

IGGY TAVARES Ph.D. looks at worms – your fish's favourite live food – and how to obtain them.

A diet of WORM

Modern commercial brands of fish foods come in a variety of shapes, size and colour and ranges from flake to pellets and from freeze-dried to frozen.

These foods are prepared from the highest quality ingredients and contain all the nutrients and vitamins that fish require. On these healthy diets, many species of fish will be conditioned for spawning and the resulting fry can also be fed commercial fry food.

That said, you know, I know and more importantly the fish know exactly what they like, and that is live food. Moreover, the live food that all fish are particularly fond of is worms.

A whole range of worms is available to fishkeepers, though some of them are more suitable than others, especially since we know that live foods can be a source of infection.

Earthworms

Earthworms as their name implies, live in tunnels which they burrow in the earth, where they feed on decaying plant matter. Their presence, particularly under a lawn, is betrayed by the worm casts which are easily spotted between the green grass. My garden yields at least three species of worm - a small red type, a cream-coloured type and a pale-pink type, all of which are greedily eaten by any cichlids. Earthworms, about an inch long, can be fed whole to medium-sized fish.

Earthworms are easily collected by turning over the garden soil with a hand trowel or with a spade or fork. The greatest number of worms are found under the lawn, but not wishing to destroy the lawn and since digging is not my forte I sometimes resort to other methods.

One such method involves sprinkling the lawn with water at dusk. This can stimulate the worms to come to the surface when it is dark and they can then be collected with the aid of a flashlight, providing one is eagle-eyed.

Left: Earthworms – creamy type.

Above centre: Male P. zebra eating earthworm.

Right: Young swordtails greedily eating small white worm.

Far right: Earthworms – red type.

A second method involves sprinkling the lawn with a very dilute solution of potassium permanganate (200 mg/ 5 litres). This irritates the worms sufficiently to cause them to crawl up to the surface immediately, where they can be collected easily in daylight.

Potassium permanganate, an oxidising agent, may be ordered from some chemists but should be handled with care and be kept out of reach of children. Any spillages on the skin should immediately be washed with lots of water just like one would do with bleach.

Earthworms obtained in this way should be given a good rinse immediately - but use of the dilute permanganate solution does not damage the lawn and the well rinsed earthworms are perfectly safe to feed to fish.

The permanganate sprinkling method is less successful in wet weather, during which time I usually resort to carefully lifting a square foot of lawn with a spade. After removing ten to fifteen worms from the upturned roots the piece of lawn is returned to its original position, patted down firmly and is none the worse within a week or two. Alternatively, digging round the compost heap will usually yield a lot of earthworms.

Small earthworms can be fed whole to fish, while the bigger ones need chopping up. This can be done easily using a scalpel blade, an old fashioned razor blade or a small sharp knife which is used solely for this purpose.

Some fishkeepers freeze clean earthworm for later use, but I always tend to use them fresh. With the milder winters we are experiencing nowadays, earthworms are available all the year round. Earthworms can also be stored alive in damp leaf mould placed in an icecream tub which has had small holes punched in the lid. It is important to keep these storage containers in a cool place, possibly in a well shaded part of the garden or the shed.

MS

Left: Earthworms – pink type.

Below: Whiteworms. Note different sizes.

Earthworms provide the perfect snack for most cichlids and are also relished by every other type of fish that can manage them. Moreover, since they are not aquatic, earthworms do not carry the usual parasites and bacteria that lead to fish diseases.

In over ten years of supplementing fish food with earthworms, I have not been able to relate fish death to earthworm feeding as I have done for tubifex. However, following use of a weed killer on the lawn, earthworms should not be collected for at least four weeks from this site.

White worm

White worm are small thin worms which can reach just over an inch in length and are of course white in colour. Although occuring naturally in the soil, for fish feeding, they are best cultured. Cultures of white worm are advertised in the back pages of *Practical Fishkeeping* but are not usually available at your regular fish store.

A suitable medium for culturing white worm consists of equal parts of loam and peat which is just moist. An ice-cream tub with a lid which has very small holes punched in it makes a good container for the culture. The white worm are introduced into the tub and are initially fed very small amounts of processed cereal, as required. Large amounts of food should be avoided, since it lies uneaten, turns sour and invariably fouls the whole tub.

White worm thrive on small

pieces of bread or rice crispies soaked in sweetened milk or even on porridge.

In a well established tub, I tend to dig five shallow holes, one at each corner and one in the middle. Into these holes are placed half inch square pieces of milk soaked bread and a large pebble is then used to cover the food. Within a few days each hole is teeming with worms, with a large proportion being on the pebble. Harvesting of clean white worm simply involves picking up the pebbles and dipping them in a small container of cold water. This simple method avoids having to laboriously pick up the worms one by one.

I use white worm to supplement the food of fish fry. The harvested worm ranges in size from less than one tenth of an inch (microworm size), to half inch (grindal worm size), to full grown at one inch.

The worms can be graded according to size, simply by shaking the harvested worms in some water in a small bottle. Large worms quickly sink to the bottom leaving smaller worms in suspension which can then be poured off into another bottle and used to feed very small fry.

Larger worms are used to feed larger fry. This range of white worm size makes it unnecessary to culture either microworm or grindal worm.

I bought a worm culture through the post some five years ago. Once I had established a tub full of white worm, every plant pot in the house was seeded with a small amount of worm and these are occasionally fed with a piece of moist bread.

This was done, in case my main culture got fouled by overfeeding and hence I was always able to start a new culture if necessary. However, a well looked after culture should last at least three to four months, at which time it is probably best to dump ninety percent of the medium and to then add fresh medium.

With cautious feeding the new culture should be well established in about two weeks. I usually have at least two tubs on the go at any given time which I prefer to keep indoors because white worm grow and multiply faster in a warm temperature.

White worm are safe to feed to fish fry, probably because they are ▶

White worm are safe to feed to fish fry, probably because they are terrestrial and do not carry aquatic parasites. In five years of feeding white worm I have not lost fry to any white worm related causes.

Grindal Worm

Grindal worm are a dwarf form of white worm, which they look like, except that they only reach a length of half an inch. Cultures can be purchased from livefood specialists and can be successfully cultivated, fed and harvested using the methods described for white worm. Grindal worm is safe to feed to fish fry and is also a suitable supplement for smaller fish.

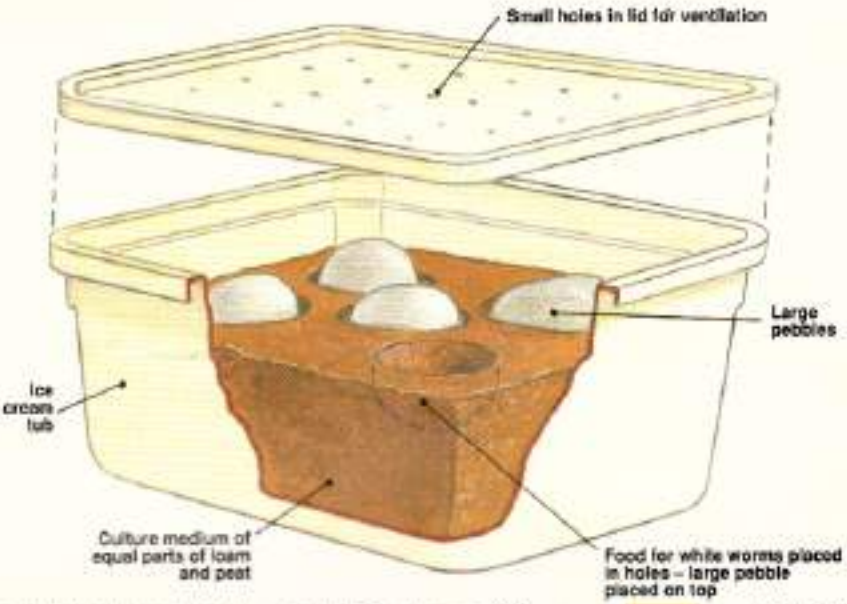
Microworm

Microworm are tiny nematodes which reach a length of only ½" but are very prolific. Cultures can be purchased from livefood specialists by mail order.

Microworm are best cultured in small plastic containers such as well washed half pound margarine tubs with a few small holes pierced into the lid. A thin layer of cooked cold porridge is spread in the bottom of the tub to which is added the microworm starter culture. The tub is kept in a warm place and within a few days is crawling with worms.

The microworm can be harvested by placing lots of cocktail sticks crisscross across the top of the porridge. The worms crawl onto the sticks, which can then be picked up and dipped directly into the fry tank. Since cultures tend to go sour after about two or three weeks when they are best thrown out, it is best to start a new culture every ten days or so.

Microworm make an excellent first food for all small fry but because of their size are not able to satisfy the appetite of larger fry unless fed in vast quantities.



Tubifex

Tubifex is the worm that most fishkeepers are familiar with because they are sold at many tropical fish outlets. Tubifex are very thin, long red aquatic larvae which live in the mud of slow flowing rivers and ponds.

They tend to congregate in groups, and burrow tunnels in the mud from which they hang out, slowly oscillating in the water, quickly disappearing into their burrows if disturbed.

Tubifex is collected by scooping up the mud patch containing the worms, and then washing the mud away to leave clean worms which tend to gather in a tight ball.

Most aquatic outlets try to supply clean, well washed tubifex by maintaining their supply in running tap water. However because the habit of free tubifex is to form tight clumps, worms in the middle of the clump invariably die off, leading to decay and bacterial infections. Tubifex can carry a range of pathogenic bacteria which are a source of fish diseases.

All fish love eating tubifex and will gorge themselves silly on the worm. In the absence of other worm supplies it may be hard to resist the temptation of feeding tubifex, particularly if one has not yet had any casualties following feeding.

If tubifex is fed, proper precautions should be taken. This includes breaking up the worm clumps by agitation with a stick and then thoroughly washing the worms under a slow-flowing tap for at least five minutes. Storing the worms is not recommended unless it is done under running water.

Tubifex should be fed sparingly and only about once a month and should never be given to fish fry or young fish.

Nowadays, I never ever feed tubifex to my fish. I have found that fish fry are particularly prone to tubifex-related bacterial attack. Not only have I lost a whole brickful of young swords, but also young *Apistogramma cacatuoides* and more recently young *Aulnocara nyassae*, all within two to five hours of feeding apparently clean, washed tubifex.

Conclusion

In nature, live food forms an important, if not the major part of all fish diets and it is not surprising that fish are keen to eat this particular kind of food.

In the aquarium, however, live food from aquatic sources can be carriers of harmful bacteria and parasites, and none more so than the aquatic worm, tubifex. On the other hand, earthworms, white worm, grindal worm and microworm are relatively safe to feed to fish in the aquarium. They make an excellent supplement to the commercial foods and promote growth and spawning.

Microworm, sifted very small white worm or grindal worm make an invaluable first food for very small fry. My preference is the white worm culture because it provides a large range of worm sizes for fry feeding.

Not only is it very much easier to culture than brine shrimp, but it also much cheaper and is probably more nutritious as well. Moreover all fish fry, even very small ones such as tetras, barbs or *Apistogramma*, can take the smallest white worm, ensuring their survival and rapid growth.

Fish fry fed with some white worm definitely grow faster than those fed commercial food alone. ■

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Encyclopedia of Tropical Fishes. H. R. Axelrod and W. Vorderwinkler, 1974, T.F.H. Publications, Inc. Ltd.

Atlas of Freshwater Aquarium Fishes, Mini-Edition, H. R. Axelrod, W. E. Burgess, C. W. Emmens, N. Pronek, J. W. Wells and R. Hunziker, 1987, T.F.H. Publications, Inc. Ltd.

PRACTICAL Fishkeeping COMPETITION

John Allan

WIN A PANAVISION TANK & SET-UP FROM JOHN ALLAN

John Allan Aquarium's Ltd., are celebrating their 30th birthday by offering this month's prize - a 48" x 12" x 18" Panavision 200F tank complete with teak finish cabinet and hood and waterproof lighting - plus an Eheim Thermofilter to complete the set-up.

John Allan Aquarium's Ltd., are Britain's oldest-established aquarium manufacturers celebrating 30 years in business this month. The company moved from london in 1964 to its present site - and has expanded ever since.

Today their premises cover 15000 square feet with a new office block planned within the next two years.

All production facilities are in house with plastic mouldings, paint plant, metal forming and welding through to joinery and glazing.

Their own delivery fleet takes products nationwide with many being exported to countries as diverse as Denmark and Teneriffe

The company was the first to use plastic framing and silicones as they became available.

In 1973 the company became UK distributors for Eheim.

Exciting new additions to the John Allan range will be announced in *PFK* later this year.

THE RULES

■ This month's competition begins on *JULY 14* and to enter all you have to do is study the three questions below.

When you think you have the correct answers, dial our competition hotline on 0891 600 067.

■ The recorded message will read out the questions in the order they appear below, and the choice of answers (a, b, or c). All you have to do is say "yes" to the answers you think are correct.

■ If you answer all three questions correctly, you will be asked to leave your name and address. Please state which you would prefer, and whether you would be willing to receive details of any further promotions.

■ Keep the competition handy when you phone.

Win a 4' Panavision tank.

Calls cost 36p per minute cheap rate and 48p per minute at all other times.

■ The names and addresses of all the correct entrants will go into a draw after the closing date, which is AUGUST 13. The first name drawn will win the tank.

QUESTIONS

1. How long has John Allan been in existence?
   a) 20 years
   b) 30 years
   c) 60 years
2. Who were the first tank manufacturers to use silicone sealant
   a) John Smith
   b) Allan Smith
   c) John Allan
3. Among the countries John Allan export to are:
   a) Denmark
   b) Tibet
   c) Iceland

• DIAL 0891 600 067 •

Having introduced us to the widely ranging Cichlasoma family, and given their ideas of how to keep them, our three cichlid experts, JEFF CHALLANDS, MARTIN CHANDLER AND PHIL ROBINSON move on to the nitty-gritty of tanks and equipment.

A WORLD OF CICHLIDS WITH PRACTICAL FISHKEEPING

The Cichlas Aquarium

The two most important areas to be considered when setting up with large fish, not just cichlids, or any fish for that matter, are the aquarium and filtration. That is to say that these are the absolute minimum basic pieces of equipment needed to start out.

Tanks

As we are dealing with the larger species of *Cichlasoma* our suggestions will be aimed at this group of fish. Ideally tanks should be as large as is possible when setting up for large fish (not only cichlids). Actual tank size will depend on the species being kept, their numbers and eventual size.

For the single specimen, the standard 36" x 12" x 15" should be the absolute minimum tank size.

A pair would need a standard tank with dimensions of 48" x 12" x 15" with a community aquarium being **no less than** 48" x 24" x 24". While you can get away with using small aquaria to breed these fish in, provided all other parameters are correct, problems will soon occur and so it is always good practice to start out as you mean to go on.

C. dovii has the distinction of being the world's second largest cichlid and will require a very large tank to reach its potential.

The smallest tank found to be adequate to breed a large pair of cichlids was 36" x 15" x 15" and one author had six of these tanks running with deep bed undergravel filtration with no serious problems for the five years.

To be practical it is advisable to use a tank with the minimum dimensions of 36" x 18" x 18" for a pair of large cichlids to breed in. The standard shop bought 48" x 12" x 15" deep would also give about the same water area and content.

You need a spare tank on hand should a pair decide they are going to fill out and a 24" x 12" x 15" would suffice for a short-term solution. Better still a tank divider could solve the problem while still letting the fish see each other.

oma

Filtration

This one area in fish keeping gets more attention than any other as can be seen from what is available on the market nowadays. Choice of filtration method for a large cichlid tank is a matter of personal preference and can be as cheap or as expensive as we wish to make it. Every system has its good points and drawbacks and, in the end, it is up to the cichlid keeper himself to decide which to use.

Air Driven Undergravel Filter Plates - pros and cons

These are probably the most basic, simple and commonly-used pieces of equipment to be found in home aquaria.Undergravel filters work on the principle of the water and any suspended material being drawn into the gravel, where the debris is trapped, and the water is returned to the tank via the uplift tubes.

For the most part they will suffice in the cichlid tank. In the community tank where the decor consists of numerous caves made from rockwork, with a good depth of gravel to act as a filter medium, and where the fish tend to dig less than in a tank especially set up for breeding, then undergravel filtration will be adequate once the biological action in the gravel has become firmly established.

There are situations where this type of filtration would not be sufficient on its own, perhaps with large and messy eaters like the Oscar. Here they can be backed up by using a powerfilter, external or internal.

In the case of the breeding tank, undergravel filters have been found to be more than adequate in most situations as long as a few basic concepts are followed. If the sectional open type of plate is used, then the fry can be trapped beneath them if the gaps where the water flow goes through are too large - the strength of the turnover rate can add to this problem.

Power Driven Undergravel filters - pros and cons

Although these work on the same principles as the above they could prove an expensive luxury as well as causing more problems than they solve.

For example, the idea behind their use is to turn the water over, through the undergravel plates and gravel, at a much faster rate. Also, often as not and depending on the turnover rate, air operated filters are just as efficient. Fit a powerhead and the water and suspended matter is drawn into the gravel in the same manner, but with a much stronger force.

Often as not it has to make several passes through the gravel before all of the suspended matter is finally trapped in the gravel. In the case of the breeding aquarium, even when gravel tidies are employed, the fry can end up being drawn through into the gravel, and lost. The turnover may have to be greatly reduced in this situation until the young fish are large enough to withstand the water flow, so why employ it in the first place?

A lot of cichlids will not like the water movement created by the powerheads. While large fish can withstand this force, small ones often have to expend a lot of energy trying to swim in the flow.

Internal Power Filters pros and cons

These come in variable sizes and power ratings and can prove useful in the right situation. They are not really suitable on their own where large, often messy-eating cichlids are concerned.

When compared to the surface area of the undergravel filter this type of filter has only a very small, and therefore, restricted filtering area, usually made of sponge, and would need very regular attention if employed in the large cichlid community tank. Often several are required to give satisfactory filtration. Apart from that, they can be an eyesore in a display tank. In the breeding aquarium they could suck in the fry and result in heavy losses.

They can prove useful if used in conjunction with the undergravel filters, as a method of clearing water that has been clouded by feeding heavily for instance.

Situations in which they can prove useful are in small and/or lightly-stocked tanks, and rearing tanks where feeding is rather heavy and regular, as long as the turnover rate is not too high so as to stress the young fish or drag them into the filter.

They are also useful as a short term solution where a pair of fish have had to be split with one being housed in a smaller tank used, for example, as a hospital tank.

External Power Filters

If electrically operated motorised filters are to be used, then an outside power filter would be the best choice, though not always ▶

Gravel tidies

No matter what type of filter plate is employed, it must be remembered that cichlids love to dig and should they remove the gravel down to the plate then, in effect, the filter ceases to function properly.

It has been found that, in the breeding tank at least, a three inch layer of gravel, not too small and not too large a grain, is best over the plates, then a ridged gravel tidy with another inch or two of gravel on top of that.

Gravel tidies have been found to be invaluable when it comes to fish digging. While they are only following their natural instincts, digging can cause very serious problems in the longer term. While commercial gravel tidies are available, these tend to be rather expensive, of a standard size and often as not, of an extremely fine mesh size which can soon block.

For small cichlids it is possible, for example, to use nylon net curtains as gravel tidies, but these would be no good when it comes to large cichlids as they tend to get hold of the soft material and pull it out of place. You can make your own gravel tidies in one of several ways. A piece of ridged plastic cut to size and drilled full of holes would be suitable. Small mesh stiff netting from the garden centre, suitably stretched and weighed down at the edges is another method.

As the pair of cichlids dig and move the gravel about the aquarium to suit themselves, they will expose the gravel tidy and be satisfied to use this as a spawning surface. In fact it has been found that even where several surfaces, like flat rocks and stones, have been provided, the fish will ignore these and lay their eggs on whatever flat, hard surface they expose with their digging behaviour.

While a gravel tidy with too fine a mesh will soon block, one with too large a mesh can see the fry ending up in the gravel bed below and the parents trying to get at them.

About ¼" is a suitable size for a close-meshed net, not larger than a quarter of an inch in the case of a home-made, drilled plate where the holes can be spaced more widely apart.

Before spawning in this artfully arranged cave, this pair of C. labiatum had cleared right down to the undergravel plate. Such thorough excavators probably need something other than undergravel filtration

the cheapest. They come in a variety of sizes as do the internal filters, but a much wider choice of filtering mediums is available and more than one can be employed at a time.

As an alternative to undergravel filters, funds permitting, the use of a power filter is the next best thing. For the cichlid community aquarium they are a boon as they will remove all and any debris in the water, have a large filtering area and therefore can hold much more waste than an internal filter.

Also while the undergravel filter is efficient it leaves the waste material in the tank while the external power filter removes it all.

While this type of filter can be used on the cichlid breeding aquarium, removing any debris that the digging cichlids stir up, it can have one serious drawback in that it will also remove any fry from the tank as well and has to be used with care in this situation, if at all.

If several tanks are in constant use, fitting them with power filters would prove very expensive indeed.

Our favoured method is undergravel filtration with internal powerfilters occasionally used to clean up tanks or supplement the undergravel systems.

One large external power filter is used when larger clean-up jobs are required. For example in the case of deep bed undergravel filters that have been running for years, a gravel cleaner is attached to the intake of the power filter and as the gravel is hoovered the mulm is trapped in the filter and clean water returned to the tank. The return pipe of the power filter can be inserted down the uplift pipe of the undergravel filter where the water flow pushes up the heavy mulm to the surface of the gravel, from where it is hoovered away.

These lips were made for digging - a wild grey-form C. labiatum

Home made filters

Because the authors have kept so many different cichlids over the years, the normal run of filters often prove to be unsuitable in a given situation. When more sophisticated equipment is called for they have often adapted things to suit their own particular needs.

Undergravel filters must just about be the most versatile type of filter that can be made at home. Virtually anything that is flat and ridged can be pressed into use in an emergency.

More often than not many of the commercially-available types of filter plate are too brittle. Many times we have set up a tank containing large and heavy items as part of the decor, only to find that the undergravel filter has either collapsed flat and broken in half.

The undergravel filter should cover at least three quarters of the aquarium base to give adequate performance. A lot of the standard size plates do not fit a large number of the large-sized, non-standard, aquaria, unless of course you use the type of filter plates that come in small sections that can be slotted together, which can prove to be very expensive when the budget is tight.

For large bed filter plates it has been found that just about any ridged or semi ridged plastic will suffice. For example, double or triple wall sheets that are used for glazing purposes in conservatories are ideal.

For tanks up to four foot in length these can be made as one item, larger tanks may need two. Cut the plastic to cover at least 75% of the tank's base, cut one or two holes along the back for the uplift tubes to fit in tightly, either just pushed in or siliconed. One inch internal diameter plastic waste pipe is ideal with a 90 degree elbow fitted to the top of the pipe for the water's return. A small hole just large enough to insert the airline should be drilled into the back of the elbow. An elbow can also be fitted to the bottom of the lift pipe to go under the filter plate.

Now drill numerous small holes all over the plate not larger than ⅛" - otherwise you could end up with gravel getting into them. This part of the task is very slow and time-consuming and if more than one plate is being constructed then they could be clamped together and all be drilled at the same time.

As the plastic is flat then it has to be lifted up off the base of the tank. This can be achieved by siliconing thick strips of glass to the base of the plate. Or you can use lengths of 15 or 25mm plastic waste pipe. This needs to be glued all around the edge of the plate to form a tight seal so that gravel does not get under the plate.

Even sweet jar lids can be used for undergravel filter plates where space is tight, like in a small tank. Just drill a hole in the middle of the lid large enough to take a 15mm 90 degree plastic elbow, to which the pipe is then fitted with another elbow at the top. Drill several small holes around the rest of the lid, either along the edge or on the top, and you have a very useful undergravel filter.

Power filters can be made from a sweet jar and powerhead. A length of pipe that is the diameter of the intake of the powerhead

Reader D. G. ROWLEY of Woolwich makes similar filters to those of the authors. Here's how it's done.

Back up jar filters

I use a lot of Nutrafin tubifex in 85gm or 135 gm sizes, and am left with nice-sized containers with screw tops. These, and other plastic jars can be pressed into service as back-up filters.

1. Drill or melt holes all around the bottom of the canister. If drilling use a very sharp drill and hold it straight, drilling onto wood if possible so that it doesn't crack the jar

2. Take the cardboard seal out of the lid and drill a circle of holes the same diameter as an uplift support (whichever you can get). Brush through using a sharp knife and tidy up the hole; whittle a sharp edge all round. Screw the uplift support into it (if the hole is none too accurate use silicone to seal it) and add a short piece of uplift.

The canister lid is removed and the canister filled with media- choose the media for back-up filtration - siporax, ceramics, gravel etc; or for emergency chemical filtration - charcoal or zeolite.

A powerhead with or without adaptor can then be fitted to the top - I find the Rena C20 excellent in this role.

should be cut so that it fits upright in the jar and comes level with the top edge. A hole is then cut in the lid large enough for the powerhead intake to go through and into the pipe.

Around the lid a number of small holes can be drilled for the water to pass through into the jar. A slot should then be cut, two if possible, near to the base of the return pipe.

As a layer of gravel will be put into the base of the jar to help weight it down these slots should be just about this layer otherwise a strong powerhead could pull it into the pipe and block it. Holding the pipe in place, the jar should then be filled with whatever filtering medium is being used, the lid and powerhead fitted and you have a very useful internal power filter.

Should you have several tanks of differing depths then you could obtain jars of different sizes but with similar sized lids. Apart from needing internal return pipes of different lengths, the lid and powerhead could then just be moved from jar to jar.

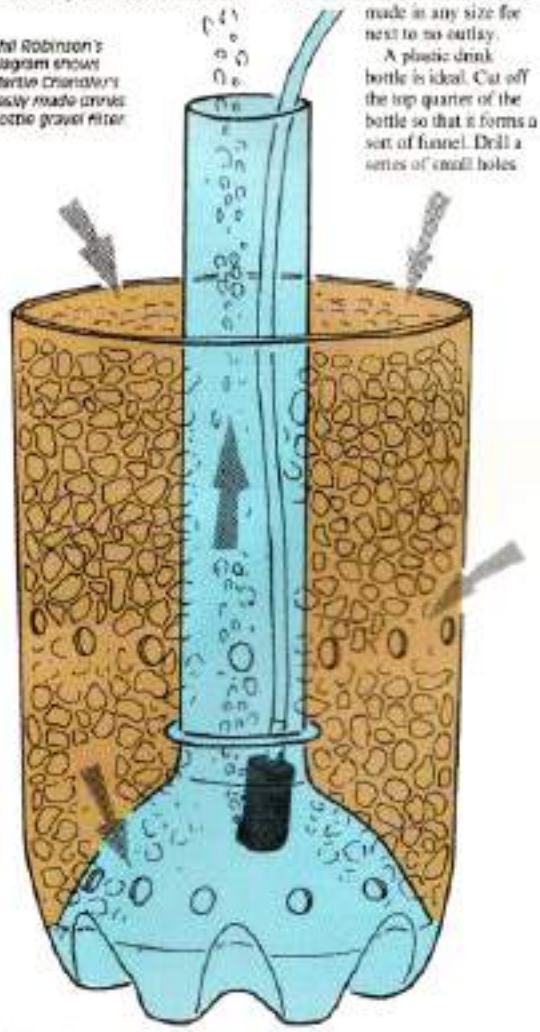
One of the easiest and most useful filters that can be made is one that can be used in the fry tank. Often as not fry have to be removed from their parents for any number of reasons and if a bare tank is used in which to grow them on, it is not always possible to have a suitable filter on hand to use in an emergency. Sponge filters are the ones that come to mind, but these work on the biological action and have to be allowed to mature before they become really effective.

One solution that can be used in such an emergency is a home made internal filter which can be made in any size for next to no outlay.

A plastic drink bottle is ideal. Cut off the top quarter of the bottle so that it forms a sort of funnel. Drill a series of small holes near to the neck of the funnel thus allowing water to enter and be returned to the tank. Cut the rest of the bottle to such a height that it fits under the water in the tank in which it is going. Add a length of plastic pipe over the top of the funnel so that it comes up to the top of the bottle. Insert the funnel into the base of the bottle, fill up with mature gravel from the aquarium, add an airstone down the neck of the funnel and you have a fry-proof filter.

As you are using gravel from an already established undergravel filter it will begin to function immediately. (See detailed drawing left).

Phil Robinson's diagram shows Martin Chandler's easily made drinks bottle gravel filter



Filter media

This is yet another area where the hobbyist can use his own initiative.

Gravel for use over undergravel filter plates comes in a very wide choice of materials and sizes, often having a high price to match. A cheap and as good alternative is the gravel found at builder's suppliers. We've used this for many years without any adverse effects.

Gravel that is about half an inch in diameter has been found to be large enough for the large cichlid community tank. For breeding aquaria where undergravel filtration is used, smaller sized gravel is more suited as fry tend to get trapped between the larger sizes.

At the garden centre you can obtain bags of granite chippings that can also be used as decor for the aquarium base, although it is no use where high turnover undergravel filtration is in use as it soon blocks and becomes covered in a blanket of waste matter. It can be used though for undergravel filtration in fry rearing tanks where high turnover is not required and the food size is very very small.

All of these types of gravel must be washed very thoroughly as they often contain lots of dust or other debris.

Household items that can be used for media include plastic pan scrubbers, and car or bath sponges.

All of the above can be rinsed out and used over and over again. One author has got plastic pan scrubbers that have been in use for nearly twenty years and are still going strong to this day. ■

Unsuitable Types of Filters

There are two, commonly-used types of filter that could prove to be of little, if any use, in the course of keeping large cichlids - the small corner box filter and the sponge filter.

While they can have their uses in the very short term or as a stop-gap measure, in reality they would be needed in very large numbers in any tank containing large cichlids.

The cichlids just seeing them as part of the overall decor would move them out of their way, often causing them to come apart making them useless.

A large pair of cichlasoma citrinellum displaying. Their digging has cleared right down to the gravel tray - without it they would have rendered the undergravel filter quite useless.

Cichlasoma confusion

Last month two pictures were incorrectly identified. The authors have correctly identified the *C. festae* picture as *C. aryphalmus*. Likewise the *C. macanicada* was infact *C. synspilum*. The pictures in question were not supplied by the authors.

Tropical *Answers*

Best and happiest in brook - and brackish water - Arius seemani. Pic by Max Gibbs, The Goldfish Bowl, Oxford.

Short-lived sharks should be in shoals

Q **My South American Aluminium Catfish seemed to settle in well, although I never saw it eat, dry or live food. It died suddenly the morning after a careful partial water change. My friend had a similar experience. I would be very grateful for any information on this fish, which I have seen in other shops as Shark Catfish.**
•S. Arnott, Hull.

A The species most often offered as Shark Catfish or South American Aluminium Catfish is *Arius seemani*. *Arius* are brackish water to marine fish, which means a tank especially for them.

They are shoaling fish, single ones often languish and die. A shoal makes an impressive sight, especially as they are one of the few catfish active by day.

If given space *A. seemani* will reach 25cm - in the wild they reach 60cm.

Offer a varied diet, consisting of shrimps, and pieces of fish chopped to a suitable size, supplemented with flake (for small specimens) and tablet foods.

Their bodies are naked, and easily damaged, so avoid sharp rocks, and take care when handling them. Take care of the stout fin spines, too, which have poison glands at the base. **GS**

■ Brackish plec?

My brackish water tank is built into a wall. Unfortunately it gets direct sunlight, and is afflicted with algae. As I cannot move the tank or the window, is there any algae eating fish like a pecostomus which will survive in brackish water?
Alan Gardiner, Peterhead.

There are no brackish fish that will eat enough algae to control it, and you cannot use algae controls sold for freshwater use.

Restrict photosynthesis by reducing the lighting, and block off the sunlight with kitchen foil, or if this affects viewing, use pingfilm, which stops U.V. light.

Clean rocks, plastic plants, etc in a bucket of warm water with a capful of household bleach. Leave it overnight (outside because of the smell) and rinse very well before replacing in the tank. **DF**

■ Osteopath for Oscar

One of my Oscars has developed a lower jaw which is twisted. It seems to have stopped growing, although it is swimming and eating O.K.
Ivor Swan.

It sounds as if the jaw has become dislocated during a bout of mouth wrestling - this is not uncommon in large Cichlids. Speak to your vet, who may be able to manipulate it back into place. **MB**

Solo Piranha

On his own again. Pic by Max Gibbs, The Goldfish Bowl, Oxford.

Q **I had three Red Bellied Piranhas, but only one is left, having eaten the others. He is now 7" long, and I transferred him to a 4ft tank.**

Could I keep another fish with him? Maybe a large catfish, or is it too late to find him a friend?
•Darren Hickman, Wolverhampton.

A Many people write to me asking "I have a Piranha, what can I keep with it?" and your experience confirms what I always tell them.

Piranhas eat any other fish you put in with them, including their own kind. They do live in shoals in the wild, but keeping a pair or small group in a tank is asking for trouble.

Raising Firemouths

Q **Thank you for your previous advice - I now keep Firemouths. Can I keep a Suckermouth Catfish, *Hypostomus plecostomus*, with them, or another catfish?**

Central American Cichlids **by Dave Sands says to use a 200W heater/stat for a 24" x 15" x 12" tank, and 2 x 150W for 36" x 18" x 12". What should I use for 30" x15" x 12"?**

At what age are Firemouths sexually mature?

Is a 20" x 12" x 15" tank suitable for raising the fry? With them could I keep a Red-tailed Shark, Sucking Loach, or Long-nosed Loach, perhaps using a breeding net?

Finally what hardness test kit do I need, carbonate, or general?
•Claire Hockerby, Basingstoke.

A You could keep most catfish, but not if you want to breed the Firemouths, as catfish will eat Cichlid eggs and fry. A scavenger is not necessary, as Cichlids themselves scavenge.

Firemouths think about brooding when upwards of 2".

You won't grow many fry to a saleable size in a 20" tank. You could raise a couple of dozen, either by culling, or leaving the remainder with the parents for recycling, unless you can get a 36" tank. Other fish with the fry are not a good idea, there is a danger of predation, and they would increase the level of metabolic wastes. To optimise growth keep wastes to a minimum.

It would be cruel to put a shark or loach in a breeding net, and fry in the net would be stunted.

Heater wattage depends on the tank's environment. In a warm room a 24" tank needs only100W, 200W should cope with any conditions. I prefer two low-wattage heater/stats, especially in a cold environment, in case one packs up. If one jams on it is less likely to heat the tank to lethal levels, too.

If you kept soft water fish you would need to test for general hardness. **MB**

Hi-Ho

Q **I am setting up a tank, 6' x 2' x 2', for dwarf cichlids, Egyptian Mouthbrooders, and single (not pairs of) Geophagines, especially *G. jurupari* and *G. balzanii*. How many pairs of dwarfs could be stocked, and what catfish would be suitable if I don't want all the fry eaten?**

Would the tank be best planted? What filtration would be suitable, if undergravel would affect the plants? Are any African cichlids compatible, and what non-cichlid fish?

• Paul Thomas, Aberystwyth.

A Although dwarfs would not be preyed on by *Geophagines*, I wonder if they would be frightened by them. It would be best to start with young *Geophagines*, allowing the dwarfs to get used to them as they grow.

Any catfish will eat cichlid eggs or fry, but if you have small catfish, and give the dwarfs plenty of plants, and caves with small entrances, some fry should be produced.

Because of the substrate sifting of *Geophagines*, allow the plants to root before introducing the fish. Leave unplanted areas to allow sifting.

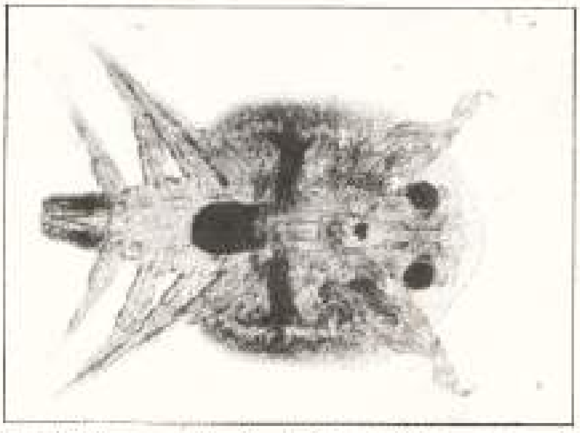
You can grow plants with u/g filters, if you allow them to root well before turning the filter on, and then use a low turnover rate. With a well planted tank the form of filtration isn't too critical.

Tetras and hatchetfish are normally kept with dwarves, and as *Geophagines* are not piscivorous, these should remain unmolested.

I would not put any African cichlids in such a slendid South American biotope, but if you must, *Pelvicachromis taeniatus* is a stunning fish.

Even in such a large tank the number of Cichlids depends on territorial requirements, rather than surface area or swimming space. A couple of pairs of *Geophagines* and 2 – 3 pairs or trios of *Apistogrammas* will utilise the available territory well. **MB**

A pair of Geophagus jurapari - top class substrate shifters.



Tropical fish lice are sometimes found in fish tanks - higher temperatures kill native lice.

Sounds like fish lice

Q **Two of my Bleeding Heart Tetras have developed a hemispherical black lump 2 to 3mm in diameter, towards the rear of the body.**

A small tuft, like white fungus, comes and goes, and the lump seems to migrate, leaving behind a black mark.

What is it, and how should I treat it?

• Derek Cooper, Letchworth

A Lumps which appear to migrate sound like Fish Lice. The crustacean responsible, *Argulus*, is up to 10mm diameter, disc-shaped, and attaches to the host with suckers.

The louse then feeds by sucking the fish's blood. Small dark lesions appear where the *Argulus* was attached, which may become infected with fungus.

To cure the louse problem use Cuprazin, as per the instructions. Treat any fungus with a commercial remedy. **PD**

■ Conditions for crabs

I have a soft water community of Discus, Clown Loach and Angels, to which I introduced two Red-Claw Crabs. Both crabs died after about two months, but I have been unable to find any information on them. Do you have any advice?
R. Briggs, Wolverhampton.

I, too, can find no information on Red-Claw Crabs, as very little is available on freshwater invertebrates at all.

One possible reason for your problem is your water. A crab, lobster, or snail has a shell constructed primarily of calcium extracted from the water. If your water is soft and acid, it will eat into the shell and dissolve it, and there are insufficient salts available for the animal to maintain it.

I suggest keeping crabs in a species-only set-up, with a chemical buffer to create alkaline conditions. You could add a piece of cuttlefish bone, which is high in calcium, and would dissolve in the water. It will also allow the crab to take particles in by mouth.

You cannot do this in your present tank, as the Discus will suffer. **PD**

■ Pots of Lobsters

I have decided to buy two Blue Lobsters to breed them. However, I have been told that I should only get one, because they eat each other. Is this correct?
P. McLaughlin, Surrey

The information you have been given is quite correct: the Lobsters will eat each other, so use separate tanks. In the wild, they have their own territory and in the breeding season a pair meeting at territorial boundaries will have a mating dance.

You can try introducing a pair (use gardening gloves if you need to handle them) and if the male does "scear" the female, separate them again. When the female has a clutch of young lobsters, remember they will have to find their own territories - so have another 50 tanks standing by! **DF**

Filament algae

My problem is filament algae, in my 3' x 1' x 1½' community tank.

It returned even after I stripped down the tank and started again.

The lights are on for twelve hours a day, and filtration is by two Fluval 4s. Temperature is 78°F.
N.D. Dinnage,
Barnstaple.

Your problem is caused by two factors, wrong lighting and overfiltration.

Lights that peak strongly in the blue and pink, resembling sunlight, encourage algae. Fit a so-called unnatural, soft light (e.g. Sunglo or similar), and you will see the difference.

Your tank, despite its length, holds only 240 litres, which should be turned over once every hour. Your filtration turns over 2000 litres - serious overfiltration.

Plants do not live in waterfalls; only algae will thrive in such an environment. **SG**

Filtration rate

Your query replies, and David Ford's article in the June issue, inspired me to care for my plants a little better.

However, by your reckoning my 50" x 15" x 12" tank, with about 20 inches of community fish should be filtered at about 90 l/h. My internal filter shifts 5-6 times that. Is there any way to slow it down?

The gap between your recommendations and the manufacturers' seems a large one. Will I sacrifice water quality by reducing filtration?
E Jenkins,
Swansea.

Bear in mind that the densely planted tank has only recently become popular. Filter manufacturers' recommendations are still based on tanks with few or no plants.

For the planted aquarium the total tank volume should be turned over a maximum of once every hour, and filtered gently, with no spraybars, aeration or jetting effect. **SG**

Old favourite - new name

Aquidens curviceps (above) and dorsiger are now prefixed as Laetacara

Q **I bought four Flag Cichlids, *Aequidens curviceps*, though they look more like *A. dorsiger* in my Cichlid book. They have a white band above the mouth, and small coloured circles in the dorsal fin.**

What are their requirements, water, food, tankmates etc?
•L.C. Cross, Leicester.

A Both species are now included in the genus *Laetacara*, meaning Happy Acara, referring to the light band above the mouth in both. Distinguishing features are the overall blue colour in curviceps, and the longer lateral band, reaching the caudal peduncle.

Laetacaras make good community fish, general or dwarf cichlid community, but must have sufficient territory if other cichlids are present. Two male *Laeta* are would not be a good idea, but they will share with *Apistogramma*, *Pelvicachromis*, and other soft water dwarfs.

Spawning is easy, so provide flat stones for spawning sites. **MB**

Pretty easy breeders

Q **I have recently purchased five young Pretty Tetras. Could you please give me some information on their care and breeding habits? My 36" x 12" x 15" tank also contains various other tetras, corydoras, Golden Barbs, Plecostomus, Guppies, Platies, White Cloud Mountain Minnows, Zebra Danios, Redeye Tetras and a Coolie Loach (approx 36 fish). Please could you tell me if this is overcrowded?**
• V. Hoosey, Essex.

A Your pretty Tetras *Hemigrammus pulcher*, originate from South America and reach a length of 5-6cm.

They prefer the middle water level, where they feed on Tubifex, Daphnia, Cyclops, dried food and small amounts of greenery. These attractive tetras make a good, peaceful community fish if the aquarium has dense vegetation with open water for swimming. Keep at a temperature of 25-28 C.

Captive-bred Pretty Tetras, have a much more brighter coloration than wild-caught specimens, the latter of which tend to loose this brightness over a period of time when kept in an aquarium.

From this you have probably guessed that this species can be bred in captivity. Before any breeding can take place, you must identify the females from the males.

Fortunately, this is quite easy. The female is larger and stouter than the male, and the male has a white from edge to the anal fin.

Breeding is usually possible when the fish are around 4 cm in length.

Although breeding may take place in your aquarium there is every chance that the eggs and hatchlings will be eaten by the other fish. If you are thinking about trying to breed them, this is best achieved in a smaller aquarium where the breeding fish are on their own.

The breeding tank, should be heavily stocked with plants and have a pH of about 6.8. Introduce the breeding pair into the tank during late evening. If after 72 hours, the female is no larger than when she was introduced, try introducing another male. Spawning usually takes place just below the surface and the eggs fall to the bottom, and hatch within 40 - 48 hours.

Feed the hatchlings on one of the commercial babyfish foods available from your local aquatic shop. As they begin to grow, change their diet to brine shrimp Daphnia, or bloodworm.

Providing the length of your fish (excluding tail) do not add up to more than 36 inches, your aquarium is not overcrowded. **PD**

Corydoras losing their whiskers is a common problem

The cat's whiskers

Q **I have problems with the barbels of my Corydoras wearing down. Is this caused by my undergravel filtration? The gravel is continually dirty, despite use of a gravel cleaner.**
•Simon Moore, Hove.

A Corydoras' barbels can wear down through using a coarse, sharp substrate, but I think your problem is bacterial.

When water changing, remove all the mulm. The gravel cleaner may be used in accessible areas and your fingers can gently disturb the gravel elsewhere, before syphoning out the debris.

Gentle giant

Q **I have purchased two 7 cm long Osphronemus gouramis, but can find no reference to them in my books.**

They are in a 3ft tank with Three Spot Gouramis, a 3" Pyjama Cat, Platies, and Tiger Barbs.

Which of these fish would have been responsible for the disappearance of my six Neon Tetras.

• Caroline Lukes, Glenrothes.

A It is generally advisable to find out something about a fish before purchasing it. When I tell you about your *Osphronemus goramy* you may wish you had done so.

Your appealing 7 cm fish, commonly known as the Giant Gourami, has the potential to reach 60 cm.

As it grows, the appearance changes, the head becomes more

Wide-ranging appetites - the Giant Gourami.

squat, the mouth increases in size and the body becomes a deep oval shape.

The striped brown colour changes, too, to uniform silvery cream, or olive/yellow/grey.

This gourami is found in quiet waters of S. E. Asia, where they are eaten as a valuable source of protein.

There are also found in poorly oxygenated ponds, where they can survive by breathing air. It is important to leave a gap between the water surface and the drip tray to allow this.

Despite its size the Giant Gourami is a peaceful community fish, but only with large tankmates. The disappearance of your Neons was probably down to your Osphronemus.

This gourami will accept a wide range of conditions, preferring : 24 - 26 C, pH 6.5 - 7.5, and hardness 8 DH.

Aquascape with rocks, bogwood and plants, including floating plants,under which they like to shelter.

Feed foodsticks, earthworms, and most meaty foods, and vegetable matter such as apple, lettuce etc.

The normal rule of stocking, 1" of fish to 12 sq.in. of water surface, should not be applied to these large fish.

They require a lot of swimming space, and will suffer if kept in a small aquarium.

This gourami is a friendly fish, with a personality, and comes to recognise its owner. **PD**

Pretty as a pictus

Q **Could you please give me any information on Pictus Cats? I have a young one with Neons, Platys, Glowlights, Corydoras, and a plec, in a 3ft tank.**

• P. D. Forster, Isle of Wight

Pims can be sensitive to the wrong water.

A *Pimelodus pictus* from Columbia and Peru, grows to about 12cm. Although fairly peaceful, it will eat small fish, like your Neons and Glowlights. *P. pictus* is sensitive to poor water conditions, resulting in degeneration of the barbels and fin membranes. Regular water changes are important, pH should be 6.6 - 7.4, hardness 8 - 12 DH, and temperature 22 - 25 C.

Suitable foods include flake and tablets, and live foods. **GS**

Avoid the Paddles

Q **I have recently seen two fish appear in my local aquatic shop called Mississippi Paddle Fish. They are extremely strange looking fish that are about 8" long with a long beak like protrusion of about 4" long and they are black in colour.**

I would be very grateful if you could give me any information on the tank and feeding requirements of these fish, plus where I could obtain some more literature on them as I cannot seem to find any at all.

• H. Farley, Hampshire

A Paddlefish, also called 'Spoonbills' are extraordinary fish, represented by only two species.

One is *Polyodon spathula* which is found throughout the Mississipi river, and the second is *Psephurus gladius* of the Yangtse river system of China.

I suspect the species your dealer has for sale is *P. spathula*. Both species have the 'paddle' snout, beneath which is a large mouth. The snout is used to stir up mud on the river floor, to expose worms, crustaceans and other small organisms on which the fish feeds.

Paddlefish are bony fish related to the Sturgeon. The skin is smooth and scaleless, though there are a few vestigial scales on the caudal fin. Some areas of their anatomy link them to the marine sharks. In fact, they are one of the missing links connecting these two groups together.

They are also primitive, as they, along with the sturgeons, are the sole surviving members of an order dating back almost 100 million years.

Paddlefish breed during the floods, when they congregate to release their eggs. These sink to the river bed where they adhere to pebbles. Each egg measures about 5 cm in diameter and hatches within 7 days.

The larvae are not born with a paddle, which appears 2-3 weeks after hatching. Initially it appears as a small bump, but grows rapidly.

The Mississippi Paddlefish is reputed to attain a weight of 68 kilos (150 lb) and measures almost 2m (6') in length. The Chinese paddlefish on the other hand is even larger, up to 6m (20'). If you are thinking about purchasing a paddlefish, I would think very carefully, unless you can house them in a very, large aquarium. **PD**

Big enough for Butterflies

I have a young Butterfly Plec and two *Platydoras costatus*. My local aquatic shop told me that the Plec wouldn't grow very big and all three would get on. Will my 36" x 15" x 12" tank be big enough for them when they are fully grown?

They are kept in a community tank containing a total of 25 fish, including Mollies, Albino Sharks, and an Angelfish.

Sue Wood, Staffs.

There are two Catfish available in the trade as Butterfly Plecs; *Platysqualchthys gibbiceps* and *Peckoltia pulcher*. *P. gibbiceps* is a loricariid which comes from the Peruvian and Brazilian Amazon. It is a majestic fish growing to about 450mm. Adults can be territorial. A herbivore, it likes lettuce, peas, and spinach, with the occasional treat of chopped prawn. They will also accept tablet foods.

P. pulcher is a much smaller loricariid, reaching a maximum of 100mm. A native of Colombia and Brazil, it feeds predominantly on vegetation and small invertebrates found among the algae. They can be territorial, so if keeping several specimens in the same aquarium allow plenty of hiding places. From your dealer's comment, it would seem you have this creature.

Platydoras costatus is a widespread doradid ranging from Peru to Brazil. You are unlikely to see much of the fish during the day as provide hiding places for it. Feed with a variety of foods — tablets, worms, chopped prawn, insect larvae, snails — after the lights go out.

It is tolerant of most water conditions, although very hard water may result in the fish's eyes becoming cloudy. Size is 200mm. It is not averse to eating any small fish it may come across during its night time forays.

Use caution when handling Platydoras. They are capable of inflicting nasty wounds to your fingers if they become trapped between the fish's very strong pectoral spines and the row of scutes on the body. These heavily-armoured dorads are easily entangled in fine nets so catch them with care.

Your tank has certainly reached its limits now, and some of the fish have yet to reach their full potential. Start saving for another tank! **GS**

Grow them up together

We are about to buy a new tank, 72" x 24" x 24", for a Red-Tailed Catfish. Which fish, if any, can we keep with it?
Hazel Greatwood, Wilts.

There is no reason why a Red-Tail should not be kept with other fish. Tinfoil Barbs would be perfectly reasonable. However, it is better if the "community" can grow up together rather than trying to persuade large, adult fish to forget all their territorial instincts and live harmoniously. Fish that have grown up together usually continue to live together quite happily, provided that the fishkeeper does nothing to upset the balance, such as introducing new fish, or re-arranging the tank decor, thus destroying territorial boundaries. **DS**

Shoaling fish

We have a lovely Ictalurus punctatus Catfish which is 12" long. Will it mix with a similarly sized Red-Tail? If not, what other fish would you suggest? What do you suggest in the way of decor?
Michael Clegg, Derby.

Ictalurus punctatus, the Black Bullhead, is a North American fish. Don't keep it with a Red-Tail. They will fight.

In the wild, the Black Bullhead is highly social, being found in shoals. They inhabit ponds, small lakes and river backwaters which have muddy substrates, slow moving water and only a few other fish species. They feed on crustaceans, molluscs, aquatic insects, live fish and will scavenge on dead fish. They mostly feed at dawn and dusk, so try feeding yours at these times, offering earthworms and pieces of fish. They grow to 40cm and may live for ten years or more.

If you have a very large aquarium, more Ictalurus *melas* would be ideal if your specimen is not too set in its ways to accept any newcomers.

Alternatively, some of the larger North American Sunfishes, such as *Lepomis gibbosus* would make suitable companions, provided they are not small enough to be eaten.

You could use rocks and wood to make your aquarium more attractive and, provided you have sufficient light, the more robust plants such as Amazon Swords and Java Fern should be fine. **DS**

An Arowana must have a large tank.

Arowana needs space

Q **I hope to keep an Arowana, *Osteoglossum bicirrhosum*, kept alone because of its size. I have heard sizes from 18" to 36", which is correct?**

What water conditions would suit it, and what should I feed it?
•R.E. Marlow, Birmingham.

A The most reliable data gives its size as 80cm (2'), so don't consider a tank of less than 4', and be prepared to go up to 6' as the fish matures.

Use robust plants, rocks and bogwood, and include some floating plants for this surface swimmer. They love to jump, so use a well-fitting hood.

Filtration should be good, but with minimal water surface movement, as Arowanas live in still and slow moving waters in South America.

Maintain a temperature of 25° C, pH 6.7, and hardness 8 DH.

Feed earthworms, strips of fish and insects. You may have to use live Guppies and Goldfish before weaning onto dead foods. **PD**

Pollution Solution

Q **In two months my two albino Oscars have grown from 1" to 3 - 4", feeding well on pellets, until recently.**

One day they went off their food and the two Plecostomus in with them died. I started regular water changes, and one fish now eats a little, but the other spits it out.
•K.W. Arrandale, Dukinfield.

A Particles of pellets have polluted the tank, the gravel acting as a reservoir of pollution, despite water changes.

With the fish in a bucket of tank water (aerated) stir up the substrate and let the mess settle. Syphon it off, or remove it with a power filter if available.

Change 30% of the water, every other day for two weeks, weekly thereafter.

Oscars are notorious for digestive troubles, and you can avoid future trouble by varying their diet. Feed mussels, bits of raw fish, earthworms, woodlice, prawns and maggots, as well as some pellets. **MB**

Spiny Eels

Q **I have a 4½" Spiny Eel and a 4" Fire Eel. They will soon share a 6' x 2' x 2' tank with a 10" Black Shark, 12" plec, 7" Pangasius, and two Reed Fish.**

They eat bloodworms, but do not touch chopped earthworms.

I cannot find much information on these fish, I only know they are meat eaters, and will grow big.
•William Scott, Corby.

A Both of these eels belong to the family *Mastacembelidae*, which includes some 50 species. All use their elongated snout as a taste organ.

The Spiny Eel, *Macrognathus aculeatus*, is found in S.E. Asia, and reaches about 30 cm.

This species has spawned in captivity (USSR, 1981), using two males to one female. The female is smaller than the male.

Spawning was in a shaded area, near a water current. Up to 2000 eggs may be laid. The eggs, approximately 1 mm in diameter, adhere to plant leaves, and hatch in around 24 hours. Feed the fry on Brine Shrimp *nauplii*.

The Fire Eel, *Mastacembelus erythrotaenia*, originates in Thailand, Sumatra and Borneo, and grow to around 100 cm. Coloration is typically black, with vivid red markings.

Unlike the Spiny Eel, the Fire Eel is aggressive towards its own kind, and should be kept in small groups, rather than pairs.

Ideally all spiny eels should be kept in a species system, but they will live happily other peaceful fish in a large aquarium with plenty of cover.

They appreciate an area of water current, and power filtration may be internal or external.

Provide soft (not sharp) sand, such as silver sand, into which the eels may burrow.

As they are nocturnal fish, if you wish to see your eels during the day, provide plenty of hiding places; caves, flower pots, bogwood, or dense plants.

Lighting should be subdued, and diffused through floating plants.

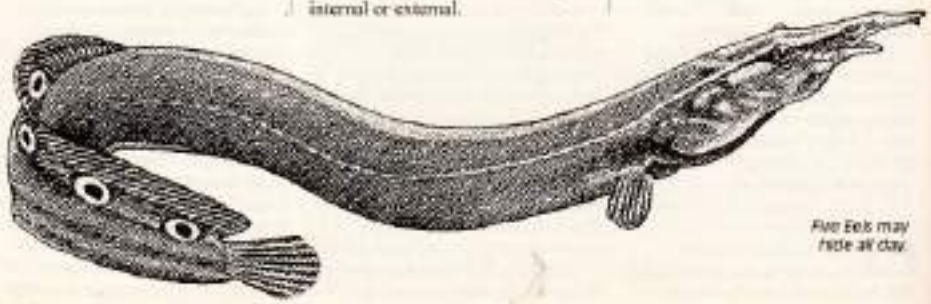
Water temperature should be 22 - 24° C, or they are susceptible to wounds and infections.

Aim for a pH of 7.0 - 7.5, and a hardness of 8 - 10° DH.

M. erythrotaenia will also live in water with 1 - 2 teaspoons of salt per 10 litres (2 gallons).

Both fish prefer live foods, such as worms, insect larvae and small fish.

If your fish will not take chopped worms, try small live ones. **PD**



Fire Eels may hide all day.

Cleaning sand

Q I plan to to use river/silver sand as the substrate in part of my tank, to give my catfish a more natural aquascape. It will be divided from the gravel and undergravel filter by a 3" tall strip of glass across the tank. How can I clean the river sand? A gravel cleaner would just suck it up.

Would the sand tend to compact, and need thorough cleaning or replacing every few months?

• Max Tinsley, Ebbw Vale.

A A 3" layer of sand will compact, and, as no nitrifying bacteria will live in the lower levels, it will turn black and upset the water chemistry. Restrict the depth to 1" or less.

Cleaning the sand while in situ can be done with an air powered aquarium vacuum cleaner - I tried it out before replying. Only a small amount of sand is sucked up if the air flow is kept low.

Maintain a check on the nitrite reading. If it remains high the undergravel filter bed may not be large enough to cope. You may have to add a small internal power filter. PD

Corydoras like this Napo Cory appreciate a sandy substrate. Pic: Max Gibbs, The Goldfish Bowl, Oxford.

■ FIND A CLUB

Readers often ask about Fishkeeping Clubs in their area.

The Federation of British Aquarists' Societies will forward a list of affiliated clubs on request. Please enclose SAE, and write to;

FBAS, Adrian J. Dempsey, 194 Greenhill Road, Greenhill, Herne Bay, Kent, CT6 7RS.

Red Cobra Guppy. Pic: Max Gibbs, The Goldfish Bowl, Oxford.

pH problems

Q I have a tropical community tank, but both fish and plants tend to die quickly. The tank now contains Guppies and a Black Molly, but they do not look healthy.

I check for nitrite, and nitrate, but the tests always show 0ppm. pH is maintained at 8.5, using Waterlife Buffer and Sera pH Minus.

I have an internal filter, and Grolux lighting.

• N.J. Haynes, Surrey.

A The problem is your pH. Guppies and Mollies require pH7 to pH8 (neutral to alkaline). Slowly reduce the use of acid buffers, and check the natural pH of your water. If it is between pH7 and pH8 you do not need a buffer, if it is acidic (below pH7) use an alkaline buffer.

Your plants will grow better with a more suitable light wavelength. Change to a more suitable tube, such as Powerglo or Triton. PD

Substrate advice

Q I run a 48" x 18" x 15" community tank of small tetras. Filtration is by Eheim 2213, and rainwater is used for changes. pH is 6.9, and total hardness 5°.

*Cryptocoryne*s, Madagascar Lace Plants, *Limnophila*, and all seem to thrive. However, Cabomba and many other plants just rot away.

I would like to change the fine gravel substrate, and possibly fit undergravel heating.

I was thinking of using Natalit, with peat plates underneath. Does filtering through peat assist plant growth?

Do you recommend any other additives, eg Everite M?

I am using two 36" tubes. Should I use 42", a third 36" tube, or three 42" tubes?

• Brian Latter, Whitstable.

A You should use a nutritious substrate. Do not use peat plates, or filter with peat. Peat is not a fertiliser.

An undergravel heating hose or cable will give a slow circulation in the substrate, unlike a heating mat.

Fit three 42" Surglo, or similar, tubes, with aluminium reflectors.

Consider also fitting CO_2 fertilisation. BG

TROPICAL ANSWERS is our FREE reader service designed to help YOU get more from your hobby

■ Answering general queries and specialising in "oddballs and tankbusters" is **PAUL DONOVAN.**

■ Plant problems are the realm of **BERTI GESTING** of Aquatic World.

■ Cichlid fans deal with **MARY BAILEY,** treasurer to the British Cichlid Association.

■ Discus queries go to **STEVE DUDLEY** of Euro-Discus.

■ For all your technical questions, you can write to Dr **DAVID FORD** of the 'Aquarian' Advisory Service.

■ If your problem concerns Catfish, send it to **GINA SANDFORD** of the Catfish Association of Great Britain.

Just tick the appropriate box below and attach the coupon to the front of your letter. Send with SAE to: Tropical Answers, Practical Fishkeeping, Bretton Court, Bretton, Peterborough, PE3 8DZ.

We regret that letters sent without an SAE will not receive a reply.

TROPICAL ANSWERS

- ☐ General queries; Paul Donovan
- ☐ Technical; David Ford
- ☐ Plants; Berti Gesting
- ☐ Catfish; Gina Sandford
- ☐ Discus; Steve Dudley
- ☐ Cichlids; Mary Bailey

PRACTICAL FISHKEEPING

One step to go before the final great switch on of your tank. But how to get that new set-up looking right? This month IAN LUCAS joins Editor STEVE WINDSOR to discuss your options.

From glass box to living stream

– FIRST FOR BEGINNERS

Having looked at the equipment and principles involved in setting up the tank, we now approach the art (and science) of aquarium decor.

Most fishkeepers try to recreate a natural-looking underwater scene in their community tanks, and also to conceal the equipment, increasing the natural effect. We should also bear in mind the environmental requirements of the kinds of fish we intend to keep.

Most community fish come from tropical streams and backwaters, and if we simulate this habitat we can meet their needs and ours.

How can I make a glass box look like a stream?

The best way is to decorate it with the materials found in nature, and attempt to soften the overall box shape.

You can lessen the effect of a rectangular box with a printed background scene depicting water plants, plain green or blue paper, or paint. All of these go on the *outside* of the rear glass. They also conceal electrical wiring, filter tubes, and any other clutter behind the tank.

You can further reduce the boxy look of the tank by disguising the inside back corners with decor materials.

What materials are suitable for tank decor?

The main materials used in **aquascaping** are; rock, wood and plants, each of which can be natural or artificial.

Where do I start?

As with many things, – at the bottom.

Cover the base of the tank with gravel. Use aquarium gravel, as it should not leach harmful substances into the water. A particle size of about 6mm (¼inch) is ideal.

Different colours are available; browns look natural, bright colours are popular with some fishkeepers, but may detract from the fish.

Black gravel shows the fish's colours well, but has not caught on in Britain as much as in Europe.

For the best plant growth you can mix the gravel with an aquarium **fertiliser substrate**, following the maker's instructions exactly.

Gravel can be landscaped, and terraced using rocks to hold up deeper areas towards the back.

Above: Plants, rocks, and bogwood create a natural aquascape. Opposite: Tropical community aquarium with yellow sandstone and natural plants, inset shows the same set-up with a mixture of natural and plastic plants.

SEVEN STEPS TO SUCCESS

1 Assemble your materials.
2 Clean everything well.
3 Landscape with gravel, adding growing substrate if required.
4 Fit the equipment.
5 Add and heat the water.
6 Arrange rocks and bogwood.
7 Plant the plants, real or plastic.

Rock

Rocks, like gravel, must not release anything into the water – **calcium** is the biggest problem, as many rocks are made of it.

Limestone, marble, and tufa are largely calcium carbonate, which will make the water hard and alkaline, which would be fine for Rift Valley Cichlids, but not for community fish such as tetras, danios, gouramis etc. Safe rocks include; granite, slate and sandstone.

TIPs: Shells and coral are not suitable for the normal tropical tank, being made of calcium carbonate, just like limestone.

If you are not sure about identifying rocks, buy them from a knowledgeable dealer, or garden centre, who may also stock safe artificial rocks. Ask for **non-calcareous**, or lime-free rock, or for granite, etc by name.

Water-worn or rounded pieces look more in keeping with the aquascape, and sharp corners must be avoided as they can injure your fish.

Wood

Fresh wood can poison fish with its sap and acids, and stress filters as it rots down. Use **driftwood** or **bogwood** or the various commercial long dead and sun-dried woods like Curiowood or Mopani wood.

Driftwood has had potentially harmful substances leached out already, but may have acquired salt from the sea and this must be soaked out with freshwater. Driftwood from freshwater should be dried out at least and probably boiled or disinfected to remove any insect inhabitants or potential fungus or bacterial problems.

Bogwood is semi-fossilised, and should not contain harmful substances, but it may stain the water dark brown. It, too, needs to be soaked.

Some fishkeepers prefer to seal dry bogwood with **polyurethane varnish.** It may then float, and needs to be attached to a rock with **silicone sealant.** Driftwood can be sealed and weighted in the same way. Soaked bogwood sinks by itself.

As with rocks, simulated wood can be purchased.

Plants

Plants are grown deliberately – so never say weed. Aquarium plants give the fish shade and hiding places, and look good. They also absorb some of the fish's waste products, helping to keep the water healthy.

Many species and varieties are available, many of them suitable for your community set-up. It may be an idea to check out any varieties that you fancy in a reputable book – some are hard to grow and need lots of light; other plants are still being sold that are really bog plants and should not be grown submerged.

Plastic plants can be used instead, or as well. They are particularly useful with boisterous fish (when they can be silicone to place), or herbivorous species.

How do I arrange all these materials?

■ If you decide to use an **undergravel filter,** fit the filter plates first, then add gravel. Remember that this type of filter needs at least 5 cm (2") of gravel.

Starting with the gravel, landscape it so that the back of the tank's floor is higher than the front, which tends to make the tank look bigger. You can use rocks to hold up deeper areas, relieving the flatness of the "floor".

TIPs: If your fish have hiding places you will actually see them better! Shelter gives them the confidence to come out in the open. Without shelter or shady places they may cower in the corners.

■ Put the heater/stat, filter, and any other equipment in position first, so that you can arrange the rocks and bogwood to conceal it as much as possible.

Remember, though, that you need to get at an internal filter for maintenance, so don't make it completely inaccessible.

■ Rocks look more natural if you bed them into the gravel slightly. ▶

Simulated woods and plants! can be useful.

as if they have been there for years.

You can exercise your artistic abilities in the arrangement of the rockwork, but always bear in mind your fishs' needs. Many fish species, including most catfish and cichlids, like shady caves under or between rocks, where they can take refuge from the bustle of the community tank.

If you stack rocks on top of each other make certain they cannot tumble; neither the fish, or the tank glass will appreciate a falling rock. For elaborate structures stick rocks together with silicone sealant, but let it cure completely before putting it into your tank water.

■ Bogwood can be placed to represent fallen branches or roots in the stream, and provides further shelter for the fish. Large bogwood is easier to use and lighter than large rocks, and relieves the flatness of the tank floor. Upright or semi-upright pieces increase the three dimensional effect of the aquascape.

Bogwood can also be very useful for concealing heaters, filters and so on, as it comes in many varied shapes.

■ Plants, real or plastic, if used, should be planted towards the back of the aquascape, leaving plenty of swimming space at the front for the more active fish. Lots of popular fish, such as danios, are hardly ever stationary, putting on a good lively display if given the room to feel at home.

A clear area of gravel also makes it easier to clean up any uneaten food from the tank base, one of the most important aspects of maintaining your aquarium. (Tank maintenance will be fully covered later in this series.)

If using a large specimen plant the tank will generally look less contrived if this is placed just off-centre.

Being mostly upright, plants can conceal filter tubes, airlines, heater wires and other hardware. Low-growing plants can be used in the foreground.

A few tall plants (or upright stones or bogwood) just in front of the back of the tank will add to the impression of depth, as they contrast with the background paper, breaking up its flatness.

TIP: It's much more pleasant to work in warm water, so let the heater bring the water up to temperature first.

SHOPPING LIST

Gravel About 10lb (5kg) per square foot of tank base.
Rocks A few well chosen pieces are more effective than crowded look.
Bogwood As with rocks.
Plants 20 small plants per square foot looks densely planted.

WHAT ON EARTH IS?

A **Aquascaping** arranging the decor materials to give a pleasing underwater scene.

B **Bogwood** semi-fossilised wood collected from bogs, which does not decompose in water. Available from dealers.

C **Calcium** soluble mineral found in limestone etc, which makes water unsuitable for most fish.

D **Driftwood** wood that has drifted in the sea (sometimes freshwater) and lost all soluble toxins.

F **Fertiliser substrate** compound mixed with gravel to promote plant growth. Garden or houseplant fertiliser is not suitable.

G **Gravel** rounded stone chips, coarser than sand. Non-calcareous rock which does not contain calcium.

P **Polyurethane varnish** non-toxic, waterproof varnish, available from D.I.Y. stores.

S **Silicone sealant** adhesive/sealer available from dealers. Builders or D.I.Y. shop sealant may not be non-toxic to fish.

U **Undergravel filtration** uses the gravel as filter medium. Filtration was discussed in April's *PFK*.

A planted tank shows your fish at their best.

Seeing the picture develop

When arranging the decor it is useful to work with water in the tank, as the visual effect will be different. But remember to unplug all the tank's electrical equipment before putting your hands into the water. Periodically view the effect under the tank's own lighting (dry your hands before switching on!).

Adding the gravel after the water can result in a little clouding, but if you have washed it well this soon clears, while the water is heating up.

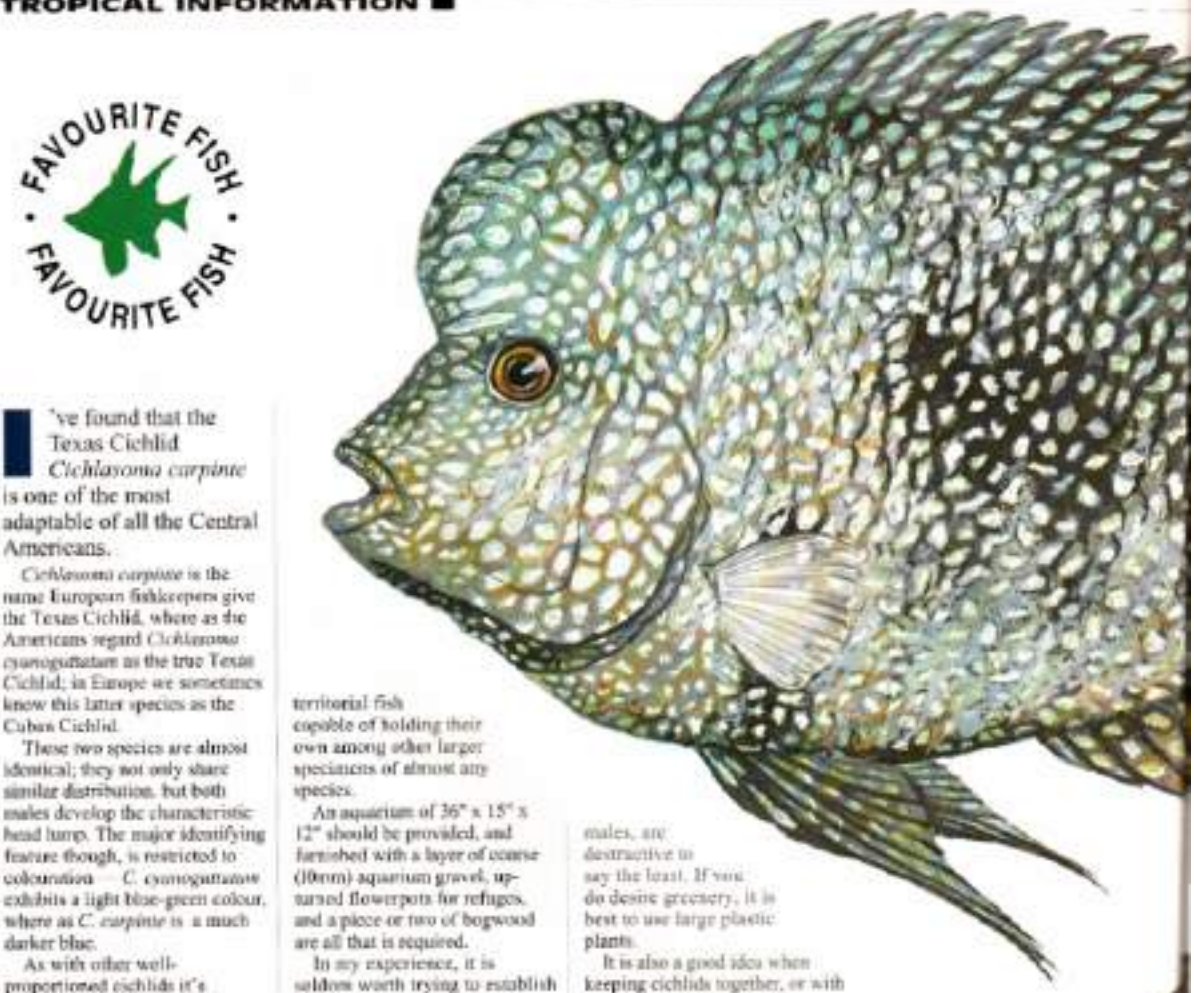
Many fishkeepers prefer to add the gravel first, so they can see to work in the tank straight away. When working this way, you can reduce the disturbance to the landscaped gravel by pouring water from your bucket or hose into a jug, placed on a dinner plate laid on the gravel.

Do not fill the tank completely yet, as the rocks and other decor will displace some water, raising the water level in the tank. ■

NEXT MONTH: A new tank set-up – step-by-step.

MAKE A CLEAN START

Gravel Put it in a bucket under the tap and keep the tap running as you stir the gravel. Keep stirring until the water runs clear. A small amount at a time will be much easier!
Rocks Wash well in tap water, removing any deposits or growths of algae, lichens etc. Sterilise with proprietary aquarium disinfectant.
Bogwood Remove any loose or soft parts, then soak in repeated changes of water until the water is not stained by the wood. (Sometimes several days)
Artificial materials These should only require rinsing.



Texas Cichlid

PAUL DONOVAN finds C. carpinte hardy and easy – but please don't confuse it with C. cyanoguttatum. PHILIP ROBINSON'S illustration points up the differences.

I've found that the Texas Cichlid *Cichlasoma carpinte* is one of the most adaptable of all the Central Americans.

Cichlasoma carpinte is the name European fishkeepers give the Texas Cichlid, where as the Americans regard *Cichlasoma cyanoguttatum* as the true Texas Cichlid; in Europe we sometimes know this latter species as the Cuban Cichlid.

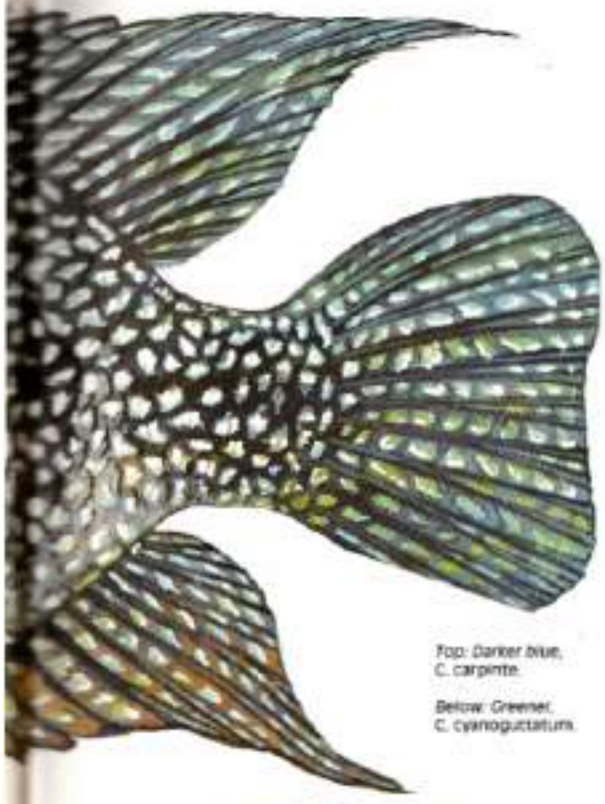
These two species are almost identical; they not only share similar distribution, but both males develop the characteristic head lump. The major identifying feature though, is restricted to colouration — *C. cyanoguttatum* exhibits a light blue-green colour, where as *C. carpinte* is a much darker blue.

As with other well-proportioned cichlids it's important to give this fish a large aquarium. These are territorial fish capable of holding their own among other larger specimens of almost any species.

An aquarium of 36" x 15" x 12" should be provided, and furnished with a layer of coarse (10mm) aquarium gravel, up-turned flowerpots for refuges, and a piece or two of bogwood are all that is required.

In my experience, it is seldom worth trying to establish natural plants, as these fish, particularly the dominant males, are destructive to say the least. If you do desire greenery, it is best to use large plastic plants.

It is also a good idea when keeping cichlids together, or with larger fish, to decorate the aquarium in such a way so as to



Top: Darker blue, *C. carpinte*.

Below: Greener, *C. cyanoguttatum*.

set out individual territories so each fish can establish its own personal niche.

This cichlid seems to be tolerant to most water conditions although neutral (pH 7.0) water is recommended. They also seem to be able to acclimatise themselves to lower temperatures than most other cichlids — as is indicated by the recommended temperature.

Few fishkeepers for whatever reason, seem interested in attempting to breed this cichlid in captivity. This may be due to its availability as a popular aquarium fish, but it certainly cannot be attributed to lack of sex identification.

The males develop a distinct hump on the head which increases in size as the fish reach maturity. They also develop an iridescent silvery blue sheen on the body. The females tend to have a lighter ventral region.

Most specimens made available through dealers, are commercially-bred. A breeding pair will choose a site for spawning and defend it with typical cichlid aggression. A large brood is spawned, and it is recommended some of the developing fry be removed from the parents within the first two weeks of them becoming free-swimming, so as to achieve a high survival rate.

As Cichlids go, this is a hardy, robust species, and a good fish for the beginner, provided you can give it a lot of space. It can be kept in a community environment though only with species larger than itself. ■

TEXAS CICHLID *Cichlasoma carpinte*

Family: Cichlidae

Feeding: Active

Environment: Community (with other large species)

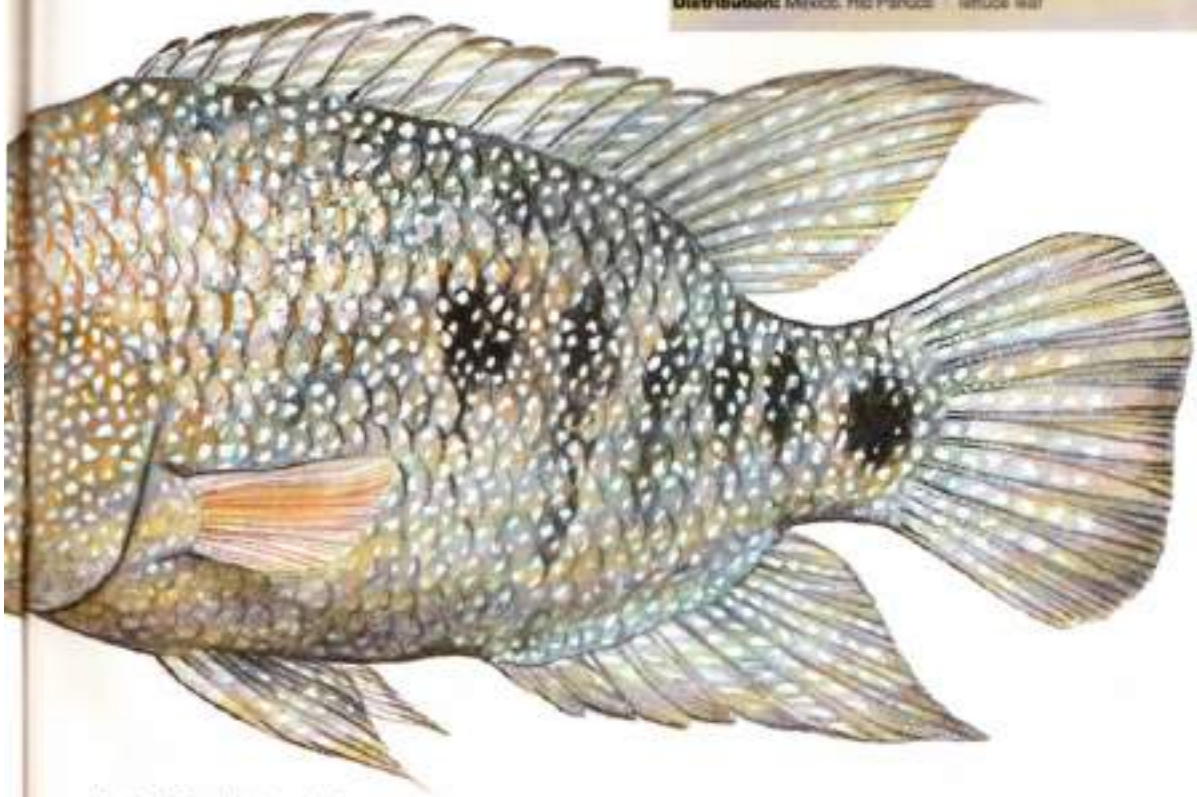
Tank position: All over

Temperature: 22-25°C

Distribution: Mexico, Rio Panuco

Size: 30cm

Diet: Feeding is no problem as they will take a range of food, as diverse as earthworms, flake food, shrimp, food sticks and greenery such as the occasional lettuce leaf



Practical Fishkeeping's A to Z OF FISH HEALTH

JERZY GAWOR comes to E in his A to Z - which brings him to tips on parasites, waste elimination, and water changes.

E

Ectoparasites

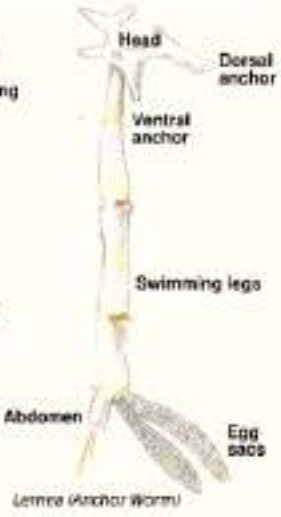
Inhabiting any external surface area of the fish including skin, fins and tissues these parasites come in a multitude of shapes and species. Their ultimate effect on the fish however is generally that of causing severe damage to the skin, fin and gill surfaces upon which they live and feed, and a steady if not rapid decline in the health of the fish.

Protozoal ectoparasites such as Ich, *Costia*, *Trichodina* and *Chilodonella* are quite well-known and documented in the literature, as are the larger ectoparasites such as Anchor-Worm, Fishlice and Leeches for example.

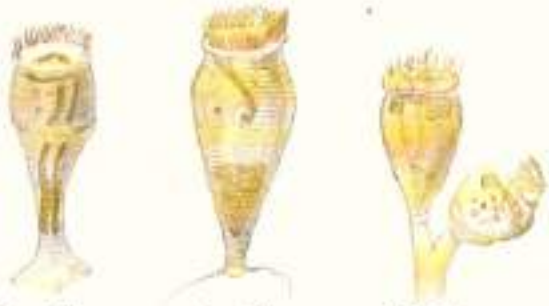
Some of these have already been covered in our A-Z series and others will receive attention in due course. For now I would like to describe two lesser-known parasites under the letter E that fishkeepers should be aware of.

Ergasilus - This parasite, which is specifically found in the gill tissue is common to coldwater fish. It is known more usually under the name Gill-maggot, because of the length and shape of the female's egg-sacs which look like miniature white maggots when viewed via the naked eye. It is a member of the Copepod family. Its secondary antennae have become adapted, forming claws with which it digs in and fastens itself to the delicate gill lamellae.

This causes a severe response in the fish with inflammation and mucus production causing the decay of tissue and thus opens pathways for further infection by bacteria, usually myxobacteria. A typical Copepod structure is retained.



Lernea (Anchor Worm)



The Scyphidia Complex

with the characteristic egg-sacs at the posterior end. It is interesting for the reader to compare this parasite to the Anchor worm - *Lernea* (also a Copepod), where the body segments have fused and the entire head and antennae structures have evolved to form the 'anchor' for attachment to the host fish tissue.

Epistylis - A minute protozoan almost resembling an inverted bell. Together with two other protozoans of similar shape - *Scyphidia* and *Glossatella*, it is occasionally found in coldwater and marine fish and known collectively as the *Scyphidia* Complex. Scientific reference to these protozoa has been made since the early 1930's.

They are generally found living on fish body tissues but merely for attachment purposes, actually filter-feeding on surrounding debris and organic matter.

However in certain situations, probably related to an organically polluted environment the growth of these protozoa can be so intense, entrapping much particulate matter, that a whitish coating can be seen on the fish, and 'wetmounts' taken for microscopy will show a mass of these stalked, bell-like organisms.

KEY FACTS

- **Good fish husbandry and maintenance of water quality is of paramount importance in keeping these and many other disease organisms in check.**
- **Always quarantine new stock if at all possible and treat with a general antiparasite solution to guard against the introduction of ectoparasites into your aquarium or pond.**
- **It is only the female Ergasilus which is parasitic to fish. The male dies shortly after fertilising the female.**

Excretion - Waste Elimination

Having eaten and digested its food deriving the necessary nutrients for health, growth and repair, fish, in common with all animals, excrete or eliminate the waste and other byproducts that are of no further use to the body.

In the Natural Environment with its unlimited potential for dilution, organic breakdown, photosynthesis and nitrification, such waste material has little, if any, immediate effect and is essentially absorbed and recycled into the biological chain of events. This is totally different to what happens in a 'closed' system such as our aquaria and ponds.

Because we are dealing with a relatively small volume of water, the danger of waste-products

rising to toxic levels and damaging our fish is waste.

Early fishkeepers realised this fact many years ago, even before filters of any sort were developed, and their success relied entirely on maintaining low stock levels, allowing fresh water to run continuously through an aquatic system or conducting partial water changes, as well as mass cultivation of aquatic plants to biologically absorb and utilise nitrogenous wastes.

Nowadays however, we have a vast selection of devices, manufactured from a wide range of materials that assure the fishkeeper of total elimination of fishwaste and associated products from their aquarium or pond.

Use of many of these products is sound practice, and it would be a poor 'expert' indeed that advised anyone to run a modern aquatic system without filtration of some kind or another.

There are three principal requirements to our modern concept of a filter system.

Mechanical straining, sedimentation or prefiltration - **solids removal**.

Biological oxidation of ammonia - **nitrification.**

Chemical **adsorption** e.g. activated carbon, zeolite, polyfilter.

KEY FACTS

- **When shopping around for your filter satisfy yourself that your final choice will provide you with all three benefits to safeguard your fish and keep your aquarium or pond water pure, clear and free from fish waste.**
- **Power filters are generally more efficient and versatile than simple undergravel filtration. The latter however is cheap to set-up and economical to run.**
- **All filters will require a short 'run-in' period of up to three or four weeks during which time you should keep stock and feed levels low and conduct extra partial water changes.**
- **Use of Ammonia, Nitrite and Nitrate test-kits will give you an accurate measure of how effective your bacterial filtration is.**

Equilibrium

This term refers to a situation of balance - a steady state. Fishkeepers should always bear in mind that the majority of their fish have over the period of evolution become adapted to live in a certain environment - sea, river, swamp, lake, etc., each with its own specific limits of water chemistry and quality.

To mimic the environment from which the fish have originated is the object of Aquarium or Pond keeping, as obviously the best conditions for any fish are those that are as close to what they 'call home' as possible.

Thus when choosing fish for the aquarium try to ensure you are providing correct water quality for the species you are acquiring.

Ensure that your filtration and routine maintenance/water changes are designed to maintain an equilibrium i. e. steady conditions of water quality.

It is little use allowing conditions to deteriorate for three months and then to conduct a total clean-out of the filter and a 100% water change. This is a severe shock to your fish and certainly not a way to maintain equilibrium. ■

KEY FACTS

- **I always advise regular part filter cleaning and maintenance together with partial water changes of 20-30%. Approximately every 4 weeks as a general rule (although weekly maintenance including 5-10% part water changes are also to be recommended) should keep your aquatic system and livestock in steady conditions and peak of health.**
- **Never rinse reusable filter materials in tap water and never use detergents or you will damage or totally destroy the beneficial bacteria that have built up the efficiency of the filter unit. Always rinse gently to remove the build-up of mulm and debris in a clean bucket of aquarium or pond water.**

■ **Jerzy Gawer is a Chartered Biologist, Member of the Institute of Biology and Member of the Institute of Fisheries Management. He has been involved in the Aquatic Industry for over fifteen years and runs his own Aquatic Consultancy Practice - Aquality. If you have any queries, questions or criticisms to put to Jerzy please contact him c/o Practical Fishkeeping enclosing an SAE. All correspondence will be answered personally.**

Peter Hamlett

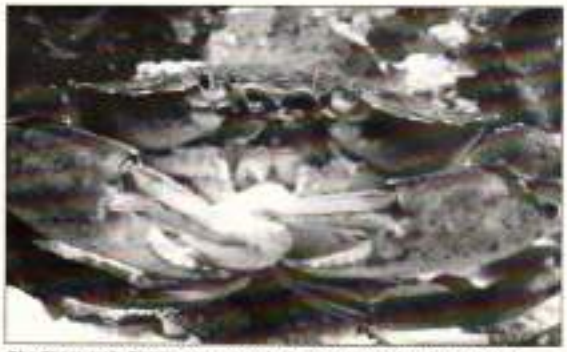
A large and greedy fish like the red tail cat requires both good filtration to deal with excreta - and stable conditions with everything in equilibrium.

Do you like to be beside the SEASIDE?

ANDY HORTON has tips for prospective holiday rockpoolers.

A visit to the any of the classic 'rockpooling' coasts in the south and west of England and Wales and Scotland, during the summer holidays is likely to prove interesting.

However, the 6095 plus miles of the British coastline are not always similarly blessed; the most obvious exceptions are the glorious sandy shores favoured by bathers and sun worshippers. Therefore, anybody interested in the wildlife of the seashore, especially the small, fish, crabs, prawns, and other attractive creatures found when the tide is out, is recommended to plan their trips to the coast, taking special account of the following factors.



The Shore crab, Carcinus maenus, is the commonest crab on almost every rocky shore.

1. Topography of the Shore

Topography is a useful word to describe the features of a geographical area, and is therefore very important in the study of the natural history and ecology of the seashore. Rocky terrain with relatively easy access is the shore to look for. Where soft sedimentary rocks have eroded away, leaving harder boulders and ample crevices with loosely embedded rocks, is the best habitat for the myriads of fascinating creatures.

In limestone and sandstone areas in sheltered bays, sculptured rock pools support a large selection of algaes (pretty coloured seaweeds, tufts of purple, scarlet and green), which in this aquarium-sized representation of the sea, support a host of small fish, especially young wrasse, and a community of prawns and other invertebrates, like the sea anemones and *gasteropod* (snail-like) molluscs.

Sometimes, it is possible to venture down when the tide is out without getting your feet wet. Slippery seaweeds abound on most shores, and the choice of footwear is either gumboots, or plimsolls or a pair of old strong shoes.

Ordnance survey maps and even road atlases will give an approximate guide to whether a shore is rocky, sandy, or shingle. However, these can only be a rough guide, and there is no replacement for experience of getting down among the crevices, ledges and pools.

2. Time of the Year

Although the sea is a much more stable environment than the air and the habitat enjoyed by land animals, fluctuations occur which have a special influence on the shore, where the extremes are greater, and cold air temperatures can influence the fauna in winter, and the concentrated rays of the sun can make some pools uninhabitable during the summer.

Summer is generally the most interesting if the tide is right. Definite seasonal variations occur, because of various factors, with the temperature of the water as the main influence, and this sets off a chain (ecological succession) of natural events, which can be learned only by experience.

General factors include the tendency for winter to be the barren time, where most fish, crabs, and mobile species will migrate to sublittoral waters offshore.

3. State of the Tides

When the tide springs up the shore the furthest, it also recedes the furthest - uncovering pools which may be accessible by foot for only a few hours each year. Experienced rockpoolers appreciate that these low level pools can prove to be the most interesting, with a varied selection of life, including many species which are not normally found on the shore.

Examples include the attractive Devonshire Cup Coral, *Caryophyllia smithi*, which is a warm water species with a rather restricted distribution in the south and west; or perhaps the attractive Leopard spotted Goby, *Thorogobius ephippiatus* a small fish known to be plentiful in the Mediterranean, but seen mostly by SCUBA divers.

The aggressive Tompot Blenny, *Parablennius gattorugine* is more usually an offshore fish, and consequently is more likely to be found in lower pools. Small Conger eels, *Conger conger* are occasionally to be found in holes where the land meets the sea, and blue Lobsters, *Homarus gammarus* are uncommon but likely to be discovered in some years.

Ethics and Conservation

Seaside rockpoolers have traditionally viewed the shore and estuaries as an interesting playground with a few resources that can be gathered for supper. Some, like the periwinkles are vulnerable to overcollection. Others like prawns and shrimps are effected by pollution and habitat alteration.

Collection of a few of the mostly common species for the home aquaria is unlikely to diminish the local fauna, except in a few special areas, which need to be respected. Collection for trade should also be resisted, because there is a danger of spoiling the fun for other rockpoolers and visitors.

For more information please write to the: **British Marine Life Study Society, 14 Corbyn Crescent, Shoreham-by-sea, Sussex BN43 6PQ.**

Rocky shore at Cullercoats, Newcastle-on-Tyne.

In the north and east the Curled or Lesser Octopus, *Eledone cirrhosa* may treat you with a colourful appearance.

4. Tidal Variations

It is helpful, but not essential, to understand the reason why the tides vary in height and time on different days. A Tide Table, available from newsagents and ship's chandlers in seaside towns is indispensable. Usually, only the times of high water in G.M.T. are shown (add one hour for B.S.T.,Summer Time), but expensive tables should also show low water.

In practice the rockpooler should ensure his arrival about four hours after high spring water, to give him approximately two hours twelve and one half minutes to follow the ebbing tide out before it turns.

Twice daily, the tide comes in, and each day it will be approximately 50 minutes later than the previous day. Astronomically, this is because as the Earth moves around on its axis every 24 hours, the Moon during the day and night moves through one-thirtieth of its orbit around the Earth. This means that it will be approximately one-thirtieth in a different position 24 hours later.

This, of course, influences the tides because of the importance of its gravitational pull on the world's oceans and seas. The water pull is best visualised as a horizontal movement, not as a vertical up and down movement as viewed from the shore. A few visits to the seashore will indicate that there is a considerable variation in the height of the tide from week to week.

Because of its nearness to the Earth, the gravitational pull of the Moon is the stronger influence than that of the Sun. As the Moon orbits around the Earth it exerts its gravitational pull as illustrated:

1. Highest Spring Tides - Moon and Sun in conjunction, with combined gravitational pull producing the highest tides. High tides on the opposite side are due to the centrifugal force of the Earth's rotation. The highest tides in England occur about two days after the New Moon.
2. Neap Tides - Moon's orbit moves towards 90° to that of the Sun, when they are at quadrature, and their relative pulls, about 7 to 3 in favour of the moon, result in Neap tides, with smaller variations.
3. Spring Tides - Moon and Sun in opposition, with combined gravitational pull.
4. Neap Tides - Moon's orbit moves toward the quadrature.

The highest spring tides of the year occur after the equinoxes in March and September, and these tides are often the best time to visit the shore. However, the weather may not be so good, and rain and gales are frequent. The Tide tables cannot be relied on for precise highs and lows of the tides. A strong wind blowing in the right direction can put at a metre on a high tide in exceptional circumstances, and the wind can also prevent the tide from receding as much as it should.

Common Hermit Crab, Pagurus bernhardus, in a whelk shell.

The Leopard-spot Goby, Thorogobius ephippiatus. Pic by Ron Barrett.

It is interesting to note that high spring tides occur at approximately the same time of the day every year in each location on the coast. This means that low springs occur at dawn and dusk in mid-Sussex (Brighton) but occur around the middle of the day in south Devon (Torbay). This has practical and social significance to rockpoolers. Tides around the Solent occur four times a day.

The configuration of the shore has a large bearing on tide heights and range, tending to increase in bays and funnel-shape inlets like the Bristol Channel and St Malo, near the Channel Islands, in France.

5. Equipment

For the casual visitor to the shore, who does not intend to take specimens back to a specially-prepared aquarium, very little equipment is required, perhaps, just a clean bucket, and a small aquarium net is useful. A strong prawn, or pond, net is an optional extra.

It is often not needed and because sometimes you require both hands free to clamber over slippery rocks, with sharp barnacle-encrusted boulders as the only hand-hold, superfluous equipment is to be avoided.

Many an interesting find requires no more than a wet hand and a sharp pair of eyes. The underside of rocks can be carefully examined to find small fish, (Rocklings, Blennies, Gobies, Butterfish) crabs, anemones, starfish, urchins, or nudibranchs (sea-slugs).

It is important to return the rocks in the same position and up the same way as they were found, as some of the animals will perish if the rock is replaced incorrectly.

Limpets, sponges, barnacles, mussels, and winkles, will be found on the surface of rocks. The aquarium net can be used in small pools, and can be useful with the slippery Butterfish.

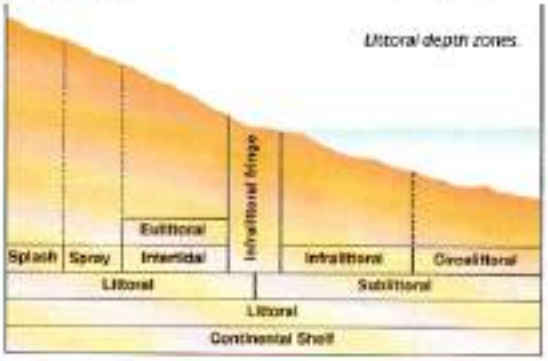
Do not pick up a small fish in your finger and thumb, as you can squeeze it and cause it injury. The trick is to cup your wet hands and tease the fish into it.

In open rock pools, Bullheads, *Taurulus bubalis*, Dragonets, and Gobies, are some of the small fish that be scooped up with a small net, together with Hermit Crabs that can be spied trundling over the bottom.

In the larger weedy pools, the longhandled net may prove to be useful, with captures of prawns, young Corkwing Wrasse, Bullheads, and Sea Sticklebacks *Spinachia spinachia* the most common in the south. In larger open pools, almost any fish can be encountered, with the fry of larger fish like Grey Mullet and Bass to be found in Sussex pools. Sand Smelt, and young Pollack, and Saithe, are also found depending on the location.

Other specialist methods of capture including the shrimp, or push, net, the drop-net, and rod and line fishing with barbless hooks, will be dealt with in a later article, as will the special methods of transporting the captives home on long journeys on a hot summer's day, which present special problems, which need to be overcome. ■

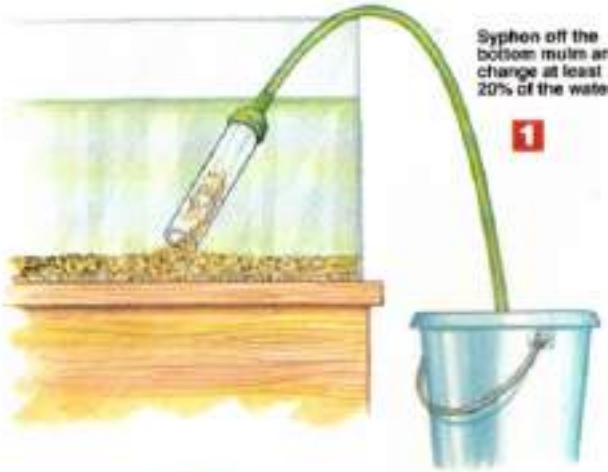
Colourful seaweeds are found in a variety of hues. They remain one of the challenges to keep successfully in special marine aquaria. For home enthusiasts, they are a temporary exhibit, and can be kept for six to one month in normal conditions.



GLOSSARY

The sea has a high Specific Heat relative to air, which means it takes longer and more energy to heat up and cool down. This makes for a more stable environment, but also means that the creatures of the sea tend to live within a smaller temperature amplitude than terrestrial creatures.

Sub-littoral is mostly known as the submerged seas over the Continental Shelf (see diagram). The intertidal zone is sometimes referred to as the littoral zone, but I use the term eulittoral. The expression spring tides is not derived from the season, but from the same etymon (root source) O.E. springan to leap up the shore, into life.



Syphon off the bottom mulm and change at least 20% of the water

1

Clean filters thoroughly

Switch off lights the day you go on holiday

3

For a normal two week vacation, holiday blocks are not necessary

2

Ask a neighbour to check the heating every day

Holiday checklist

1 Three days before you go away make sure you do a proper clean up of the tank. Syphon off the bottom mulm and change at least 20% of the water. Clean the filters out thoroughly and make sure all the fish are looking healthy. In fact all the things you should do every week but don't always find time for.

2 If you have a fish house which is space-heated it is a good idea to ask a friendly neighbour to check the heating every day to make sure it is working properly.

3 The day you go on holiday switch off the lights and forget about the fish.

You can buy a number of products which will allow your fish to feed while you are away, including automatic feeders and holiday blocks, but for a normal two week vacation your adult fish will do just fine on what they can find in the tank.

Very small fry may suffer so it is best to time your breeding efforts to avoid the holiday period. The plants may suffer because of the lack of light and fish picking at them but they will soon recover once things are back to normal when you return.

Your fish are safely tucked up at home - but then you see the fish of your dreams on some foreign shore. As DEREK LAMBERT explains, you may well be able to bring it home - but a little preparation is necessary...

But can I bring it back?

It is that time of year again when we all trail off around the world to some exotic destination to experience some real ethnic culture, or even Mrs Fishfinger's Bed & Breakfast in Blackpool.

Fido has been booked in to the kennels down the road and Fluffy has Mrs Jones coming in to feed her - but what about the fish?

In your absence

What to do for the best has been the subject of much discussion at local aquatic societies over the years. Horror stories of what can happen at the hands of a well-meaning but inexperienced neighbour are legion.

Personally my advice is as in the diagram above and the box - though when all is said and done, it's common sense, and you may know better.

Above and top: Polypterus ornatipinnis - even a large pair of these were not beyond Derek's ingenuity when it came to bringing them home from the USA.

Can you bring it back?

Sometimes when fishkeepers are abroad they come across that wonderful fish they have desired for years. This happened to me in May this year when I walked into "Pluggers" shop (Wet Pet of Detroit) and saw the most beautiful pair of Ornate Birchirs (*Polypterus ornatipinnis*) I had ever seen for sale.

For many years Plugger has specialised in searching out the rare and unusual fish which come into the American hobby, so I came prepared to take fish home with me - but nothing on this scale. The smallest fish was 13" long and the largest was 17" body length. Plugger promised to keep the pair for me until the day before I left so that they would have the shortest travelling time possible.

The fish were duly caught and placed one to a box, and taken to my friends home, to await their final packaging for the journey to England. The morning of my return journey, each bag was sealed, wrapped in newspaper and sealed again in another bag. These were placed in a very large polystyrene box, which was then sealed up with tape and the message, "Please reseal if opened" boldly written across the top.

Then the box was packed into a suitcase with a few clothes around it. The sealing tape was left in open view, so that if the box was opened by security during the journey, there would be something to reseal it with.

At this point I had better cover some of the regulations regarding the transport of live fish around the world. Depending on the country and the fish concerned it is generally legal to bring fish into the U.K. providing you obtain an import license first. This is obtainable from the Ministry of Agriculture, Fisheries and Food and you must ask for a form to fill in as early as possible before the trip.

The next thing to remember is that fish are live animals and you are not allowed to take them in the cabin of the aircraft. However, they can be placed in your normal luggage if they are properly packed and insulated. Since they look a little strange when X-Rayed, security may open your case to see what it is you have in there.

These days this happens when you check in and of course I was asked to open my suitcase to show them the contents. Then they needed to see what I had in the box. Then I had to open the bags so that they could actually see the fish. Finally I was given the go ahead and everything could be resealed.

Once in England you have to go through the Red Channel to declare your fish. If you bought them, keep the receipt so that you can prove how much they are worth. Your Import License should be dated and the number of fish you have with you needs to be noted. Since the license is valid a year make sure they give it back to you.

Quarantine

Legally no quarantine period is needed for tropical fish. However, personally I quarantine all new arrivals for a period of one month. Even waste water from water changes is not allowed to go into our sewage system during this period.

My pair of Birchirs have now settled down in their new home and are feeding very well on a plentiful supply of garden worms. Indeed Poly and Plugger as they have been christened look set to live long, happy and fruitful lives. ■

Young fis

KIT TIP

Fluorescent lighting

How does it work?

Fluorescent lighting needs two parts; the control gear which converts mains electricity into the form required, and the tube, which lights up. Use the correct controller for the tube length.

The controller is positioned away from splashes and condensation, just the tube goes inside the tank's hood.

The two are connected by end-caps, and those for fishkeeping use are splash-proof for safety.

What extra equipment do you need?

Tube-fixing clips are usually supplied with the control gear.

A reflector can be used to direct more of the light downwards.

A time switch is useful, but not essential.

How do you use it?

It seems simple, just switching on and off, but the length of time the lighting is on (the photoperiod) affects the success of the aquarium.

Ten to twelve hours a day is a good starting point, adjusting if too much light encourages algae or too little adversely affects the plants. A time switch can accurately control the photoperiod.

Good features

Although it costs more to buy, fluorescent lighting is much cheaper to use than light bulbs; it uses less electricity, and the tubes last much longer.

They run cool, whereas light bulbs may overheat the water in warm weather.

Are there any drawbacks?

Some tubes lose a lot of output with age, while appearing to work normally. Others stop working completely when they are past their best.

A tube's output is governed by its length, so if you need bright illumination (perhaps for marines, or a deep, planted tank) you need extra lights, rather than a more powerful tube.

Underwater Safari

In this month's safari we focus on the Dragonfly Nymph

The Dragonflies (Odonata) with its large caried wings is a familiar sight around the margins of lakes and rivers, in the fens and marshes and even on brackish lagoons. Most people know that they have and feed on other flies. They are one of the earliest known insects, fossils being found from the Carboniferous period, and today there are some 4,000 species worldwide.

Underwater, their nymph is just as efficient a predator and unlike the roaming adult, it lies in ambush for other insect nymphs, and larvae, for other aquatic bugs, and even for young fish fry.

As they grow, the larvae moult their skins and grow a new one.

● Pic by Peter Gathercole.

Something ELSE

All fish enjoy treats of shop-bought live food, but it is interesting, and cheaper, to grow your own.

You can breed *Daphnia* and *Cyclops*, in a small tub of water in the garden. Rain water is ideal, tap water needs to be left a few days to mature before stocking.

Breeding stock can be shop *Daphnia*, or caught for yourself. *Cyclops* are usually found with them.

Check for any potential pests, such as Water Tigers, Dragonfly larvae, etc. Do not collect live food for cultures, or for feeding, from water containing fish, or you may introduce disease into your tank.

Gnat and Mosquito larvae, including Bloodworms, cannot be bred, as they are the young stages of flying insects. The adults will lay their eggs in your tub, though, or even a small jar. Feed the larvae to your fish before they metamorphose into adults, or you will lose them!

These small animals all eat the algae and infusoria which naturally colonise the tub.

DID YOU KNOW...?

by Ian Lucas

■ Lots of our pet fish are regarded as food in their native countries.

Most of the Gouramis are eaten in the east, not only the two foot Osphronemus goramy but many smaller species too!

Catfish are popular worldwide, and Cichlids of the genus Tilapia are also eaten, - in their native Africa, and other countries, where they farmed to feed the people.

Even expensive marines, like Parrotfish, are considered food in many countries.

Where I live there is a large Indian community, and local fishmongers often have Tilapia, and Parrotfish, as imported delicacies, although they are cheaper to ship than live fish.

I have never had the heart to try them myself!

■ The Panama Canal could not have been built without the help of Guppies. Early attempts to link the Pacific and Atlantic Oceans failed because so many of the workers died of malaria. This disease is spread by mosquitoes, which bred in the swampy areas by the canal excavations. Guppies were introduced to these swamps, and soon ate huge numbers of mosquitoe larvae, reducing the adult population and allowing work to continue.

■ Mosses are mostly small plants, and often overlooked, but Fontinalis is a useful aquarium plant which many people do not recognise as a moss, although its common name is Willow Moss. Its strands can grow to a metre in length, making it the world's longest moss.

It is most at home in a coldwater tank, although it was popular in tropical tanks before the wide range of plants we have now was available. Java Moss, Vesicularia dubyana is a moss more suited to tropical temperatures.

■ Scientists at Lerner Marine laboratory, in the Bahamas, USA, have a device for measuring the force of a shark's bite. According to the wonderfully-named Snodgrass Gnathodynamometer, a two metre long Dusky Shark, Carchavlus obscurus can exert a pressure of 60 kg between its jaws, which is three tonnes/cm².

shkeeper

Quick tip

Test rocks for suitability by soaking in tap water for a few days, checking hardness and pH before and after. If there is no change the rocks should not affect your tank's water chemistry.

WIN A PLANT KIT & AUTOMATIC WATER CHANGER

Identify the equipment above and you could win these two great prizes

This month's prizes are: first a Plant Growth Set, and second, an Automatic Water Changer.

The Plant Kit, from Everglades Aquatic Products, consists of water softening resin, and two kinds of aquarium substrate additive, containing plant fertiliser, one for new set-ups, and one for established tanks.

The Automatic Aquarium Water Changer, by Interpet, connects to the tap, and tops up your tank as it removes used water, making partial changes easy.

To enter all you have to do is look at the pictures of parts of aquarium equipment, and match them to the types of equipment below:

a. AIR PUMP **Picture No** .....
b. EXTERNAL POWER FILTER **Picture No** .....
c. POWER HEAD **Picture No** .....
d. WATER CHANGER **Picture No** .....
e. THERMOMETER/HYDROMETER **Picture No** .....

Complete the entry form and send it to:

Young Fishkeeper Picture Competition, Bretton Court, Bretton, Peterborough, PE3 8DZ before the closing date, **August 14.**

You must be 17 or under to enter.

JUNE WINNERS

Thermal Compact De-Luxe 2: Darren Stephens, Swindon; **De-Luxe 1:** Deborah Flood, Northampton; **Standard Thermal Compact:** Neil Tryner, Launceston; Elicia Marie Gibson, Stoke-on-Trent.

Name .....

Address .....

.....

..... **Age** .....

Floyd by fran

Heat up - coo

Dr DAVID FORD of the 'Aquarian' Advisory Service writes about your free gift and offers hints and tips for its use.

The digital thermometer on the front of your magazine is the result of many new technologies combining to give a simple, effective, low cost (in this case free!), accurate and long-life product.

The '90s will probably be remembered one day as the time of technological advance. So many things that rely on new techniques are in the pipeline for consumers, such as interactive compact discs where you can see and hear, and choose or even change, sound and vision on your TV, satellite broadcasts for instant world news and events, liquid crystal displays (called LCDs) will replace our ageing CRTs (cathode ray tubes) so we can watch HDTV (high definition TV). Advances in computer technology are now so fast only computers themselves can keep pace with the data.

Help for the fishkeeper is no longer a "spin-off" from all this technology. The manufacturers are actively using the techniques to make life easier for the hobbyists and better for the fish themselves.

Computers are already used in the USA for fishkeeping data bases. There is a modern noticeboard called 'Fishnet' where hobbyists can leave messages or information via their computer. There will soon be a data base on fish husbandry for aquatic stores in the UK too.

What Temperature?

Experience has shown that the ideal temperature for freshwater tropical community fish is 24°C or 75°F, for marines 27°C or 80°F and for brackish waters 22°C or 72°F. Coolwater species such as North American fish need 20°C, 68°F and coldwater species such as Fancy Goldfish, should be kept at 18°C, 65°F.

A breeding tank for tropical species usually needs a higher temperature, with a rise in temperature often triggering spawning (about 5°C increase). This is one advantage of having an external control unit - the temperature rise is not only easy to do, but can be made slow or swift according to species.

Some species require a special temperature, which again means a controller is effective.

Discus are much happier at 32°C or 90°F, so too are some Livebearers such as *Belonesox belizanus* the Pike Topminnow, or *Gambusia affinis holbrooki* Holbrook's Mosquito-fish. Others prefer cooler waters such as the Bluegill *Lepomis macrochirus* or Bloodfin *Aphyocharax anisitsi*.

Many of our beliefs about conditions in the wild for fish can be wrong. At the Aquatic Convention '92 (Ilford DAS) a lecture by Steve Le'Thange revealed that some of the Blackwater streams in the Brazilian Amazon where he regularly fished are only 65°F.

Fish Houses

Space heating for the fish house is available in many forms. Before oil prices increased the most popular form of heating was a paraffin stove despite the smell and danger. Butane gas heaters are safer and cleaner, thanks to modern technology, but electric fan heaters coupled to a greenhouse space thermostat are simpler and almost as cost effective.

It is best to run space heaters fairly cool with top-up heating via heater thermostats in individual tanks. This allows greater control over breeding tanks and means a pleasant working environment.

Some fish-houses are now connected to the home central heating system which is probably the cheapest method of heating. Since aquaria will require supplemental heating the use of polystyrene lagging is very good in reducing heat loss. Experience shows that two ceiling tiles pinned or glued together are effective, stuck to all but the viewing glass of the aquarium.

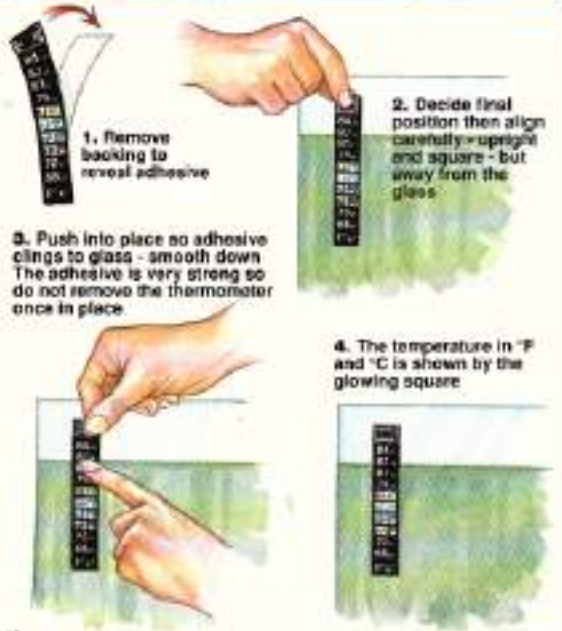
Two better than one

There are several advantages in using two heaterstats in a large aquaria. With precise control both units can be set to operate on and off at the same setting with consequent better heat distribution. The older type heaterstat will usually only operate one of the units because the make-and-break thermostat is relatively insensitive.

If one unit does fail in the off position, the second unit can take over until the problem is seen and corrected. Also, if the unit fails in the on position, the low wattage means that the temperature will not climb too

These Bloodfins prefer cooler water than most tropicals. Pic by Mike Dilos, The Goldfish Bowl Oxford

Using your free gift



d down

high before the problem is seen (with your free digital thermometer, of course).

If the aquarium has a separate box or trickle filter, the heaterstat can be usefully fitted thereto.

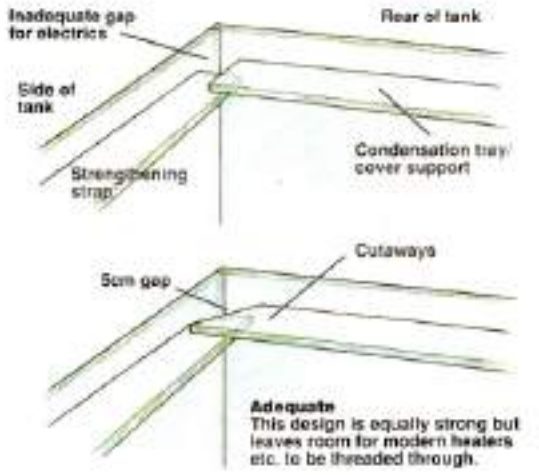
This leaves more space for plants in the main tank. The heat loss in pumping the water to the aquarium (especially in trickle filters) means that the filter unit can be run at 30°C or more, which makes the filter much more efficient since the nitrifying bacteria operate better at higher temperatures. The thermometer could be fixed to the outside of the filter to monitor its temperature.

Check the Temperature

Make a habit of noting the temperature every time you go to the aquarium, at daily feeding time for example. Place the digital thermometer in an easily-readable place.

It is important that that the temperature is stable, certainly for all marines and for most tropicals. Cooling creates stress in tropical fish and in the Coral Seas it is so often that coral fish will quickly die if chilled. Even when a problem is solved and the fish have apparently recovered it is common for tropicals to suffer an outbreak of White Spot and Costfish to get Oodinium a few days later.

A TIP:
If a power failure occurs (or the mains have to be turned off) temperature loss can be much reduced by just throwing a blanket from the bed over the aquarium.



Modern heaterstat control units will be electronic with no moving parts to wear - already 'Aquarian' have a model available and use a control box - not a thermostat. The thermostat goes under the water, with the heater. This senses the water temperature and sends a signal to the control box where it is processed in a microchip. A control knob is rotated to change the setting of the thermostat. The unit should not be cut or dismantled in any way - but there is no room for the heater/ control box to be passed through in some tanks. A 5cm/2" gap is needed.

■ If you want to know more about the Aquarian electronic thermostat drop me a line at the Aquarian Advisory Service, PO Box 67, Elland, W.Yorks, HX5 0SJ.

Make use of the digital thermometer from the cover of *Practical Fishkeeping*, it is your tropical fish's best friend! ■

Heating Calculations

A formula for calculating the heat required to operate a fish-house is: **P = F x A x dT**

P is the wattage required for a heater/thermostat.
F is the heat loss (estimate 0.06 for glass tanks but 0.03 if lagged)
A is the total surface area of tanks excluding the base in dm² (1dm² = 100cm²)
dT is the temperature difference, in °C, between the fish-house temperature and the required tank temperature.

This formula is for non thermostatically controlled heaters. Thermostatic heaters should be approximately double the calculated wattage, rounded up to the manufactured sizes. This gives the maximum life-span, and a margin for safety.

The calculation of wattages is simplified by accurate heaterstats. The new electronic models fall into 100, 200 or 300 watts for all sizes groups, where aquaria up to 24" x 12" x 12" or 60 x 30 x 30cm or near require a 100 watt electronic heaterstat, 36" or 90cm aquaria need 200 watts and larger tanks need 300 watts or better still, two separate 200 watt models.

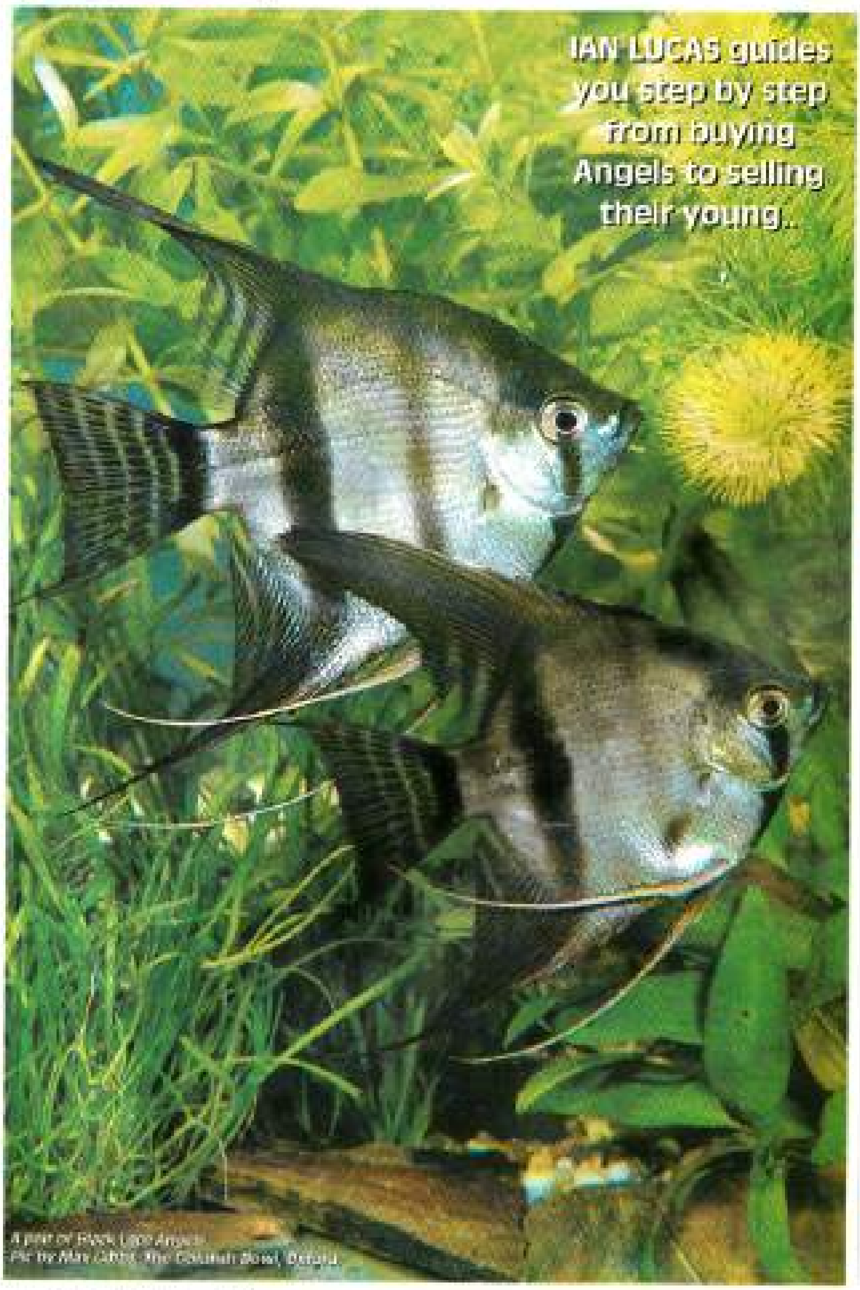
The good old formula for converting Centigrade (or Celsius) and Fahrenheit is:

°C x 1.8 + 32 = °F
°F - 32 x 0.556 = °C

PFK PROJECTS

Breeding Angelfish

IAN LUCAS guides you step by step from buying Angels to selling their young..



A pair of Black Lace Angels.
Pic by Max Gibbs, The Goldfish Bowl, Oxford

Angel fish are among the most popular aquarium pets. Though quite easy to keep, even for the beginner, they do have the reputation of being hard to breed. This need not be so, and the small trouble involved is well worthwhile, for the chance to watch the behaviour, and see the young grow up. Their enduring popularity ensures that disposing of young Angels is easy, unlike some easily-bred fish.

Step one: Good breeding stock

The first requirement is good breeding stock; poor specimens produce poor offspring. Shop around for good fish; active and robust, with well-developed fins and good colour.

Adult Angels are rarely sold, and expensive, but youngsters reach breeding age after about six to eight months. Angels are notoriously difficult to sex, especially without experience, so buy several and let them choose their own mates.

The normally striped variety is the hardiest, followed by the gold. Many others are available, including black, ghost, koi, blushing, marbled, black lace, zebra, pearlscale, and each with normal or 'veiltail' finnage. Each has its fans, while others would not give it tank space.

Step two: The right water

Although their ancestors are native to the soft, acid waters of the Amazon, commercially available fish are happy in the ►

conditions of most community tanks, and if yours were locally bred they are probably used to your tap water.

My Angels live, and breed at pH 7.8, and a hardness of 17°DH.

Step three: Temperature

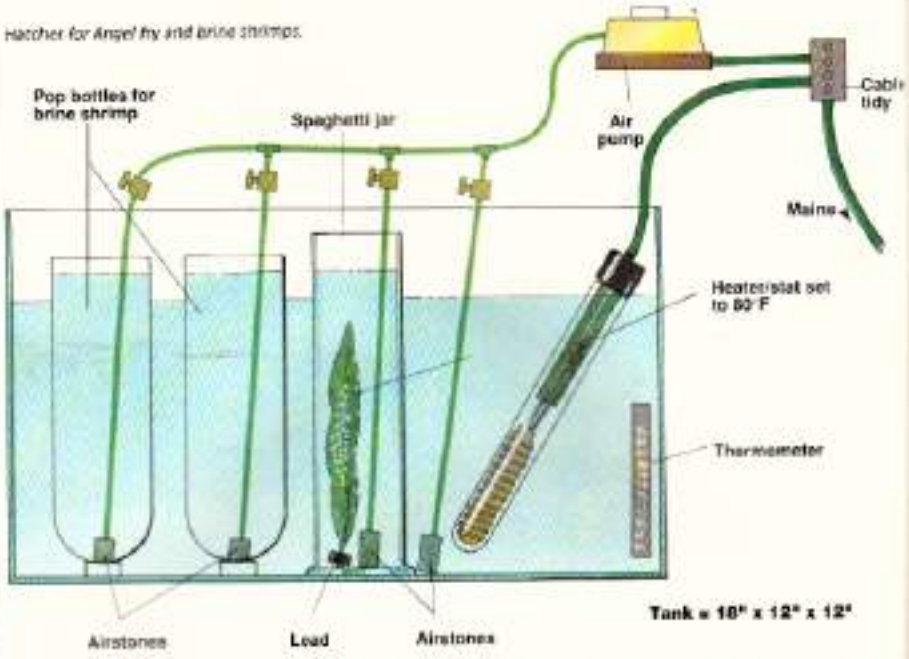
Suitable temperatures range from about 75°F to 85°F. I keep my Angel tanks at 80°F, as this suits various tankmates. (Remember that, though considered a good beginner's community fish, Angels grow big enough to eat fish the size of Neon Tetras.)

A young female laying eggs

Step four: Tank preparation

A well-planted tank is appreciated, and shows Angels off at their best.

Hatcher for Angel fry and brine shrimps



Tank = 18" x 12" x 12"

Amazon swords are my favourite, growing well in my tanks, but you will have your own preferences. In my set-up we usually have three pairs in a 36" tank.

Include plenty of broad-leaved plants, as many Angels lay their eggs on them. Others prefer a solid object, such as a filter tube, tank wall, or even a rock or flower pot. Perhaps they don't read the text books.

Step five: Conditioning

When adult, Angels come into spawning condition readily, in the presence of other angels; separating pairs does not work for me. A good diet is all my pairs require to keep breeding regularly; a top name flake, supplemented with various live foods, according to season.

Step six: Pairing

The three pairs in my tank will all have paired and spawned together before being moved into the 36" tank.

There is some aggression as a pair prepares to spawn, but provided the adults are not overcrowded, no real harm is done. One of my pairs is actually reluctant to spawn if there is no-one from whom to defend their territory.

The fish tend to spawn all around the same time and pay attention to their own broods - equally the parents will see off any attempt by another pair to eat their brood.

Step seven: Sexing

You can identify the female of newly-matched pair by her body swelling up with eggs, although less so on her first spawning, which often yields fewer eggs than later ones. By the time the breeding tubes are visible, the sexes are more readily distinguished, the female's tube being considerably thicker than the male's.

You could check at this time that there is actually a male present, as two females sometimes act out the spawning procedure, producing infertile eggs: I have not seen this where

An older pair tending their spawn

males were available, so do not be too hasty too split up a pair, especially if you are not yet confident about sexing your Angels.

Step eight: The spawning site and laying

The pair prepare their chosen site together, cleaning the leaf or other object, sometimes cleaning more than one before making the final choice. Experienced, mature Angelfish can fill two or three Amazon Sword leaves with eggs, but newly-weds often lay about fifty in their first batch.

Step nine: incubation and parental care

Once the eggs are laid you must decide what to do with them; I suggest leaving the parents to try to raise them, as it is so interesting to watch.

Taking the early batches of eggs or fry away may interfere with the parents' ability to raise later batches, so I leave a few batches with a new pair until they get the knack, which may not be at the first attempt.

Step ten: Fry

Often the first batch or two are lost, or eaten by the parents, for no obvious reason, but patience is usually rewarded, as practice usually makes perfect.

In a shared tank the parents' real problems begin when the fry are free-swimming, as they are easy prey for other fish. I remove the fry just before this stage, gently syphoning them from their leaf, and then treating them as for fry hatched artificially. ■

Right, Hatcher for Angel fry and brine shrimps.

Below: A female moves the sacfry to a fresh leaf.

Black Angels - special feeding

Black, Half Black, and Black Lace varieties should be weaned onto larger live foods, as well as flake, and should be raised separately from other varieties. These strains are prone to wasting away, which has been assumed to be due to constitutional weakness. Recent research (by Don Walz in the U.S.A.) shows that the black pigmentation uses so much protein that there may be insufficient left over for normal growth and health.

ARTIFICIAL REARING

If you want to produce as many young as possible, it is best to hatch and rear them away from the parents. A large jar is ideal for hatching the eggs.

Step one: The incubator

I half fill a spaghetti jar with tank water, adding fungus preventative. The jar stands in a small tank of water, along with Brine Shrimp hatching bottles. A heater/stat in this tank keeps everything at 80°F, matching the parents' tank, and aeration distributes the temperature evenly.

Step two: Preventing fungus

One drop of Methylene Blue to each pint of jar water helps to prevent fungus attacking the eggs or fry, and strong aeration keeps them clean and healthy, emulating the fanning of the parents' fins.

Step three: Moving the eggs

A leaf carrying eggs is easily removed for hatching, and weighted with lead. Eggs attached to an immovable surface can be dislodged with a large feather and collected in a fine net. Loose eggs will hatch if vigorous aeration keeps them in constant motion.

Step four: Preventing pollution

I add a cupful of water from the incubation tank to the jar daily, to gradually adjust the water chemistry to match that of the tank and eventually to dilute the fry's waste.

Step five: Hatching

The eggs hatch in two or three days, and the larvae cling to the leaf for a similar period, unless dislodged by the aeration (this does them no harm). When the fry are swirling in the air stone's current, I stop the aeration temporarily, and observe whether they settle, or jerk around, having become free swimming.

Step six: Feeding

I start the first brine shrimp culture when the fry become free swimming, and it is ready to harvest two days later, when the fry are ready to feed. Frequent feeding is the key to producing good offspring, assuming they inherit the potential from their parents.

After about four weeks of generous feeding, the fry change from fish shaped to Angelfish shaped. I now wean them onto prepared food.

First I add a little powdered flake with the brine shrimps, then substitute powder for alternate feeds, finally discontinuing the brine shrimps when even the smallest fry are taking flake readily.

Step seven: Into the brood tank

After two days of feeding I release the fry into the tank, the water is now similar to the jar water, and the temperature is, of course, identical.

I swirl the jar with tank water to release any fry stuck to it.

Step eight: Filtering the fry tank

A foam filter both aerates, and bio-filters the tank. The tank floor must be kept clean, to minimise the risk of infection of the small fins, which may prevent proper development later.

Step nine: Growing on

Once the young are feeding happily on flake they require no special treatment; a larger tank will soon be needed, and regular partial water changes will encourage rapid growth and good health.

Step ten: Disposing of the young

The final problem, that of disposing of the young, is easily taken care of in the case of Angels; friends, clubmates, and dealers are usually keen to acquire good Angels. Some other species are hard to find homes for, even for free.

Car

Without doubt the Cardinal Tetra is thought of as a fish that can be difficult to breed.

This article is based on notes kept over the years since the late 1970s. During this period Cardinals were being bred by a well known fishkeeper who lived in Cornwall and this stirred my interest in attempting to do the same.

But it was not until 1990 that I had my first spawning, and raised fry.

Prior to this I had used many strange concoctions for the hopeful parents to swim in, even a brew made with oak leaves. The ideas for all previous attempts were mainly taken from my library of magazine cuttings and books collected on this fish.

In 1990 I noticed in my community tank, a pair of Cardinal Tetras performing their spawning dance. The female appeared to be in condition and willing to spawn. To be honest I have never seen this happen in a community tank, where as Neon Tetras will even spawn in this environment. The pair of fish were removed from the community tank and placed in separate tanks in my fish house.

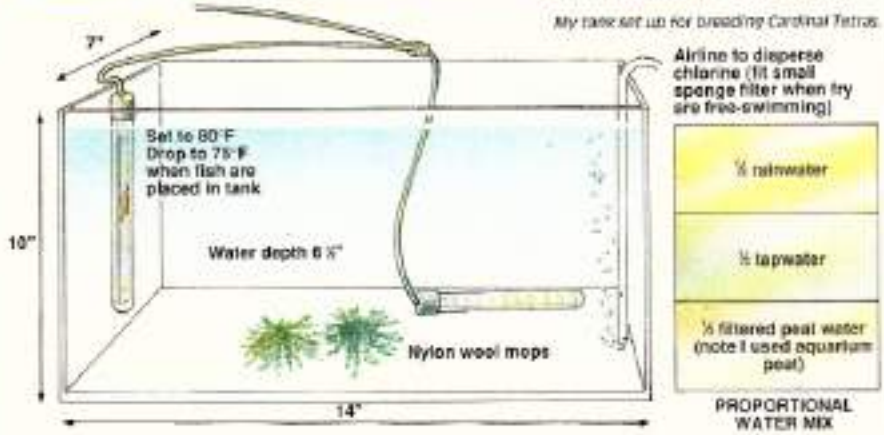
Sexing Cardinal Tetras

With Cardinals there is no defined colour difference between the sexes, but they may be easily sexed by body profile. The females being more robust compared to the slim males.

The breeding tank

Without doubt the water the brood fish are placed in is a vital factor in obtaining a spawning. In Plymouth at present the water from the tap will be in the range of 7 to 7.2

My tank set up for breeding Cardinal Tetras



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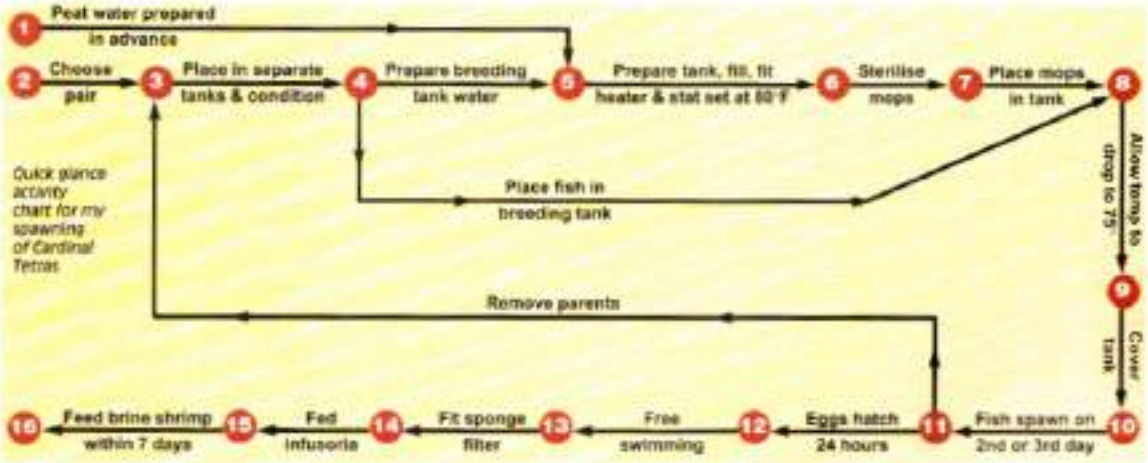


pH and a 1 to 6 GH. The pH is fairly constant, while the hardness varies.

The pH does tend to drop over a period of time in bare tanks (that is tanks without any substrate or plants. This can be controlled by frequent water changes).

According to the records I had collected on other fishkeeper's spawnings their water chemistry was 5.5 to 6.2 pH and 3 to 5.8 DH. This would give me a base to aim for.

My brew for this breeding attempt was to be tap water, rain water and tap water filtered through peat in equal measures, which gave me readings of 6pH and 2DH.

A small all glass tank 14" x 10" x 7" was well cleaned with a strong salt solution prior to filling with the selected water mix.

An airline (to help disperse any chlorine in the tapwater), along with a heater and thermostat were placed in the tank. No filtration was used at this stage. After 24 hours the temperature settled at 80°F (27°C).

Nylon wool mops to be used as the spawning medium were sterilized by boiling. Just two mops were placed on the tank floor, and as the water depth was only 6 ½" the mops did not take up too much tank space.

Spawning

The pair of Cardinals who since being removed from the community tank had been separated, were now placed together in the breeding tank.

I then covered the tank completely (newspapers were used) as according to my information Cardinal Tetras are "dark spawners", meaning that in their natural biotope spawning takes place during the night in low light intensities.

This could be correct as I have never seen them spawn, as other tetras, in the early morning. My next action was to disconnect the heater to allow the temperature to drop to around 75°F(24°C). This was the fish house temperature.

Again I had read that the flooding of the rivers and the drop in water temperature in the rainy season is a trigger for the breeding to start. This starts between March and the beginning of April and lasts until the end of June.

For two days nothing happened, but on the third morning I checked the tank and found that the fish had spawned. The parents were removed and I estimated that I had over a hundred eggs. The tank was still covered as I assumed the eggs to be light sensitive.

I must admit at this stage I thought I had cracked it but I should have known after many years of breeding fish, success is not guaranteed.

Fry care

The next day I could not resist a peep under the covers, and saw a brief movement among the mops.

The tank was then left for four days on the assumption that the fry would be free-swimming in five days. On the fifth day the covers were removed and I saw a tiny fish swimming on the surface.

All the spawning mops were removed and I hoped to see a shoal of young Cardinal Tetras.

Peering into the tank using a strong eye-glass I could only see a few fry and I mean a few. There was no sign of any eggs attacked by fungus or eggs that were white - an indication of their not being fertilized.

A small sponge filter was placed in the tank and infusoria was fed as a first food. After a week the fry took Brine shrimp nauplii.

The size of the brood was only six fish but as these were my first Cardinal Tetras I treated them as a normal spawning, with partial weekly water changes.

Further spawnings

The six fish grew into fine glowing Cardinals and when they were seven months old I decided to try and breed a pair from this group.

The chosen pair were placed in separate tanks and cosseted with all the best foods until the female appeared to be in breeding condition. The identical method used to breed the parents was used to spawn this pair - and they did spawn.

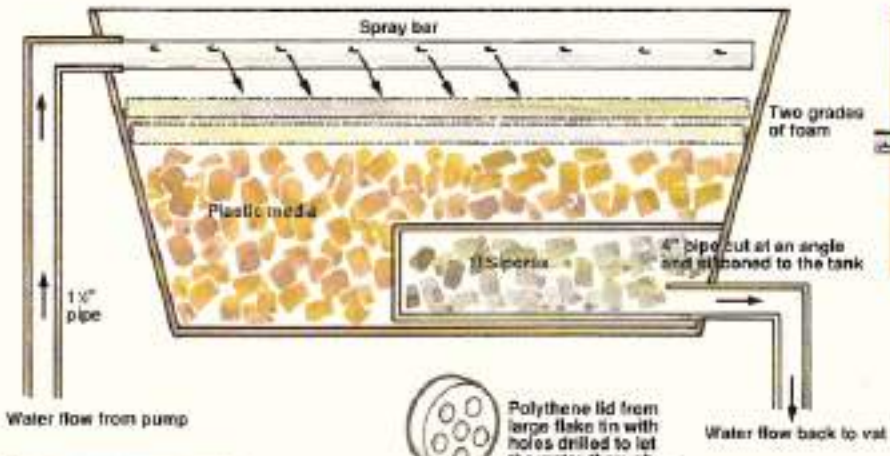
Again the same result - plenty of eggs but only eight young fish, two more than the first brood.

At the time of writing this article (1992) the largest brood is 15 fish.

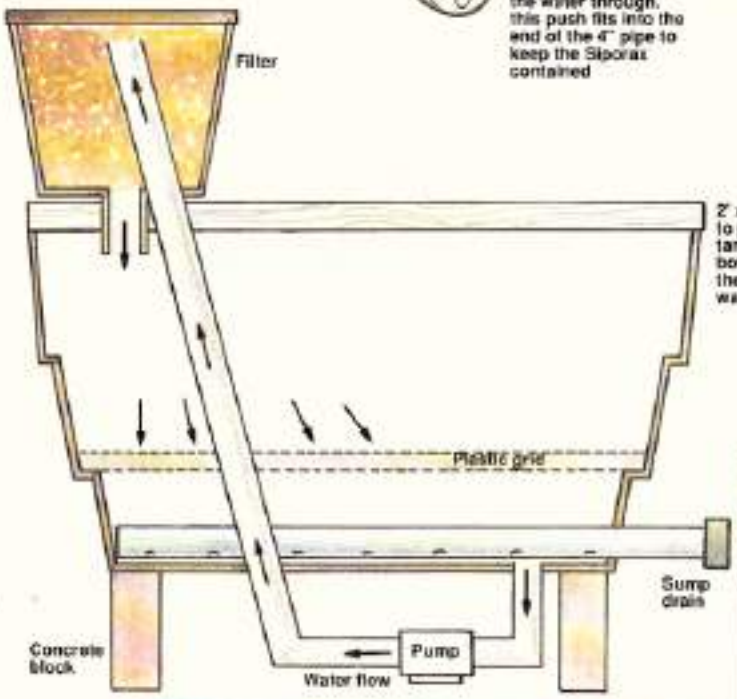
There are probably fish breeders who can claim a greater success rate then I have experienced. The point I think is not to count the numbers of fish raised, but to pass to fellow fishkeepers the knowledge gained. ■

Facts about Cardinal Tetras

- They can be found in Brazil, Colombia and Venezuela.
- They are caught annually in vast numbers in Brazil.
- Numbers exported from Manaus in Brazil.



Polythene lid from large flake tin with holes drilled to let the water through. this push fits into the end of the 4" pipe to keep the Siporax contained



Right: Top view of the vat.

Far right: Neat and not too bulky for the small garden.

uaran-tiny?

In the best of all possible worlds, we'd all quarantine our pond fish. But how many of us have got the space? PETE TREVETT describes how he overcame the problem.

My garden is what I would describe as fairly small, and typical of the back garden normally packaged with a terraced house.

At the present time the whole right half of the garden is taken up with "things fishy". This means a shed full of aquariums and two ponds interconnected with each other with a total water capacity of around 2000 gallons. I keep Koi in the main pond and goldfish in the other and like many fishkeepers (whom I suspect are in the same situation as I) I felt that I would be happier with some sort of quarantine/treatment facility for use when I purchased new fish.

The basic parts

Lack of garden space precluded any reasonably-sized vat of a permanent nature using brick or block construction - I dare not infringe on the last remaining vestiges of grass. I therefore decided that I would use one of the 4" water tanks available from builders' merchants as the vat, and add a smaller 18" water tank to this for the filtration.

A Grundvoss 3 speed Central Heating Circulator would be used to power the filter. Water would be drawn from the bottom of the vat at one end and returned via gravity from the filter, which would sit on the top of the vat at the opposite end. A sump drain would also be installed to draw off any detritus from the bottom of the vat.

Construction

Construction was fairly straightforward. Two holes were cut in the large tank, one in the bottom to feed the pump and the other at the end near the base to take the sump drain. Two ½" tank connectors were siliconed in place here and the connections constructed for the pump and sump drain as shown in the diagram.

Two pieces of 2" x 2" wood were cut to the length of the vat, painted with wood preserver and then screwed to the top of each side of the vat using self-tapping screws. This was to help stop the tank from bowing due to the weight of the water.

The whole assembly was then placed on two concrete blocks (one at each end) to raise it off the ground. Two pieces of 1½" x 1" wood were cut to size, painted with a non-toxic wood preserver and screwed (using self-tapping screws) to the top of the vat at the end opposite the pump inlet.

These would be used to support the filter box. I wanted a wet/dry type of trickle filter for use with the vat mainly because I did not want water retained in the filter for any length of time - this could have caused weight problems.

The components used were to be 1 litre of Siporax, plastic media (Flocor) and open cell foam. Holes were cut in the ends of the filter tank, one at the top the other at the bottom and ½ inch tank connectors were siliconed in place. The top connector is for the inlet from the pump and the bottom for the outlet to the vat.

The filter was constructed as shown in the diagram and then stood on the wooden crosspieces on top of the vat. The pipe connection from the pump was made and the electrical connection for the pump installed.

The pump is connected using an RCB (Circuit Breaker) for safety. Plastic Grids were placed in the bottom of the main vat to stop the fish from being sucked into the pump inlet.

Testing

Once everything had been checked I filled the vat with water and switched the pump on. This was set to speed 1 and it had no problem delivering the water to the filter.

■ Tip:
It is important to the exact water content when it comes to adding medications.

Recently I have increased the pump speed to 2 so that I have a higher turnover of water through the filter. At this setting it will be turning over the content of the vat about 8 times an hour.

If speed 3 is selected it literally blows the water out from the spray bar and would turn the vat contents over at least 12 times an hour.

There is a 50 gallon mark on the 4" tank but I have filled it higher than that and it is holding 65 gallons.

The final task was to construct some sort of cover to prevent the fish from jumping out. I made a frame from ½" x 1" wood and staple some black netting to this. The frame fits nicely on the top of the vat over the area not covered by the filter.

Quarantining

I have already quarantined 4 x 8" High Grade Japanese Koi in this vat for 3 weeks with no ill effects. To help minimise problems a ball airstone powered by a Hoffman pump has been introduced to aerate the water.

I also carry out two partial water changes a week (removing about 20% each time) - this is simply done by opening the sump drain.

One final tip - remember the Nitrite cycle. As with any new aquarium or pond the water quality must be monitored especially in the first 6 - 8 weeks. I helped this along by taking some Flocor from an established filter and placing it in the vat filter.

However, at the end of the second week I had a high ammonia reading and nitrite was starting to build up - this was diluted by frequent partial water changes.

After 6 weeks I had a small nitrite reading and there was no trace of ammonia.

As I write all water tests are reading zero.

Costs and benefits

The total cost of this project was around £100 and to anyone like myself who has a lack of space, it is well worth the money, especially when you consider that the only other option would be to place newly-purchased fish straight into your pond with your other prize specimens. There is always an inherent risk in doing this.

It is also extremely useful as a treatment facility. I can isolate my Koi and they are easy to catch if I need to give them short term baths. Because the total quantity of water is known, accurate quantities of medication can be added. ■

PFK PROJECTS

Mansfield reader FRED GREEN has checked with the British Cichlid Association and appears to be the first person to have spawned Green Chromides in the UK. But it wasn't that difficult as he shows.....

Spawning the "Green Chron

Etroplus suratensis known as the Green Chromide is a species of cichlid not so commonly kept in the hobby. Perhaps this is due to the erroneous descriptions of it in early texts as *"a large, dull, uninteresting fish, difficult to keep"*, coupled with confusion caused by some retail outlets offering the natural or "wild" form of Orange Chromide (*Etroplus maculatus*) as "Green Chromide".

First care

I obtained five small imported specimens of about 1½" and placed them in my fish room in a prepared 18" x 12" x 12" tank, leaving them to settle.

Returning, I found five panicking fish which then turned black and "died". This behaviour occured repeatedly over the next few days, the fish "playing dead" everytime I returned into their field of vision.

However, by keeping myself hidden, I could observe their "normal" boisterous behaviour so I decided that "dither fish" were needed.

I selected Scats for this purpose as their dietary and water requirements matched those of the green chromides.

The decision was also taken to move these fish to a larger tank (36" x 15" x 15") to cope with the added load of the extra fish. This tank was filtered using air-powered u/g plates and an overhead trickle-through filter powered by a Fluval 3.

The combination of the move and the reassuring presence of the Scats was successful, as they began to accept my visits, although they do remain somewhat "edgy" if anyone else enters the fish room.

Main picture: A Green Chromide parent.

Left: Fry feeding.

Bottom left: The fishroom.

"real" mide

Flourishing

Over the next four months my Green Chromides flourished, attaining an average size of approximately 4½".

At this stage I noticed that two of them were "pairing off" and defending a rock at one end of the tank, their main targets being the other chromides, although no damage was done to the "victims".

After about a week of this behaviour, and some digging, the pair spawned on the vertical side of this rock, laying several hundred thread-stalked brown eggs, which were guarded by both parents. The female played the major role in this, and often bullied the larger male into attending to his duties.

Three days post-spawning I planned to remove a percentage of the anticipated hatch to rear separately and began to prepare another tank, only to find the female eating the eggs before I was fully prepared.

Over the next eight months the pair remained together although no more spawning preparation took place.

At this stage a 36" x 24" x 24" tank became available and the decision was taken to once again move the Chromides and Scats to the larger tank, as the four Chromides (one had succumbed to swim-bladder trouble) and four Scats (three silver, one red) now averaged 6" plus.

This new tank had an u/g filter powered by an Aquaclear 301 plus an overhead trickle-through filter powered by a Fluval 4 which I knew could carry a much bigger load than required.

After a few weeks the female was observed "glancing" off the side of the male and both were developing breeding coloration. The next day they began digging a pit at the base of a rock.

What will they grow to?

In the wild this fish is reported as attaining a length of up to 15" with a weight of 1½lb although this would appear to be the exception as species of about 6" are more commonly the rule.

A good size to expect in captivity would be nearer 10" with breeding size attained at 4.5".

I recorded this spawning in my breeding log.

■ Day 1

The pair were spawning on the vertical side of their chosen rock facing away from the front of the tank. The eggs were difficult to see due to this positioning, but the topmost eggs occasionally come into view, swaying in the turbulence caused by the parents fanning.

Temp. 84°F, pH 7.6, water hard with 1.5 5ml spoons of marine salt added per gallon.

■ Days 2 & 3

Both parents were taking good care of the eggs. The two ▶

Scats proved to be the ideal dither fish

single Chromides were chased if they encroach within 9" of the spawning site. The Scats were allowed within 1" of the eggs before being gently nudged away.

Day 4
The parents were periodically leaving the eggs and picking in the gravel at the front of the tank. Closer investigation showed that two newly-hatched fry were being repeatedly sucked through the u/g filter and deposited at the front of the tank via the powerhead. That would teach me to fit gravel tidies in future!

This problem was regarded as not too conducive to the fry's well-being so I removed the rock holding the eggs to another tank of identical temperature and water conditions.

This is a step I didn't really want to take as the text books and scientific articles indicate that the fry feed on a mucus secretion on the parents flanks which is necessary to their health.

Feeding

Although in nature the feeding pattern of *Etroplus suratensis* is markedly herbivorous, in captivity the pattern is omnivorous, greedily devouring all of the usual cichlid foods ie. beef-heart, mussel, bloodworm, shrimp and pond pellets with the occasional lettuce thrown in for additional roughage.

Day 5
Hatching was completed after 30hrs. The fry were very active, hopping all over the substrate. The head and eyes were undeveloped, being difficult to distinguish even with a magnifying-glass, and giving the appearance of just a brown stomach with a tail.

Day 8
The head and eyes had now developed. A few fry were managing short glides over the substrate, so I started feeding with Liquifry 1.

Day 9
Most of the fry were now free-swimming. I continued feeding with Liquifry 1 moving up to Liquifry 2 for the last feed.

Day 10
The fry could now be seen feeding. I continued with Liquifry plus TetraMin Eggfayer babyfood.

Day 11
I again upgraded the feeding, and now the fry were taking TetraMin Eggfayer and Livebearer. I also gave one feed of brineshrimp nauplii (0.5 ml of brineshrimp eggs hatched in 0.5 litres of water containing two 5 ml spoons of salt. I have found the hatching rate to be greatly improved with the addition of 2-3 drops of Fincare).

Day 18
To date only two deformed fry had been removed. I was now recognised as the food provider. I continued feeding as before but increased the brineshrimp to 1 ml.

Day 19
Six under-developed fry were observed in a group, separate from the rest of the shoal.

Day 21
The six "runts" had gone. A proportion of the fry had changed colour pattern. The dark brown band from the dorsal around the stomach had lightened, and the two head spots behind the eyes had faded.

Day 24
I increased the brineshrimp to 1.5 ml.

Day 31
I was now feeding the coarser Nutrafin fry food and 2 ml brineshrimp.

Day 35
I removed another dead fry, to make nine lost in total. I still had 200+ fry approaching 0.5". Another tank was being prepared to take half the fry.

From the success so far, I had to conclude that the parental mucus was merely a dietary supplement and that Green Chromides can be reared in the same manner as the majority of cichlids.

• Throughout the spawning the Scats paid no attention to the eggs, being gently nudged away if they came too close. In the wild, the Green Chromides creche their young, a shoal being held together under the protection of the whole adult group, led by one dominant pair. This may account for the "pushing out" of the undersized fry.

Why not give this interesting species a try, perhaps including Orange Chromides in the tank to observe the symbiotic relationship of the two species?

For a large cichlid they must be classed as unaggressive and certainly they do not try to rearrange their surroundings.

If you do decide to keep this fish, and have difficulty obtaining stock, then I may know someone who has one or two to spare..... ■

Identification

Etroplus suratensis (first described by Bloch, Naturgeschichte der Ausländischen Fische, vol. 4, pl 217. 1790 as Chaetodon suratensis.) The deep body is almost oval and laterally compressed. The basic colouration is greyish-blue to green, with a pearly iridescence and blue to green iridescent patches on the scales. Six to eight diagonal transverse bands lie on the upper half of the body.

The scales on the lower half of the body carry black marks which show up as a black patterning the intensity of which depends on the fish's mood and condition.

The pectoral fins are yellowish with a deep black patch at the base; the other fins are grey-green to blue with an infusion of russet red.

Counts: Dorsal XVII or XIX, 14 or 15 Anal XII or XIII, 11 or 12. Pectoral 17 Scales 35 to 40.

Type locality: Surat, Sri Lanka.

The Orange or Red Chromide is far more commonly seen in the hobby.

Habitat

Etroplus suratensis is indigenous to Asia being restricted to southern India and the island of Sri Lanka.

In Sri Lanka this species, known as Gan Koraiya in Sinhala (the local tongue) is reported in brackish water coastal lagoons and freshwater lakes.

However, it shows a marked preference for the brackish water habitat which should be provided in captivity as it is prone to skin parasites and bacterial infections when kept in fresh water, no matter how hard and alkaline this may be.

References:
■ Ward, J. A. & Wyman, R. L. 1977. *Ethology and ecology of cichlid fishes of the genus Etroplus in Sri Lanka, preliminary findings.* Env. Biol. Fish. 2 (2): pp 137-145.
■ Ward, J. A. & Wyman, R. L. 1975. *The cichlids of the Resplendent Isle.* Oceans, Jan 1975. pp 42-47.
■ Loiselle, Dr. Paul V. 1985. *The Cichlid Aquarium.* Tetra-Press.

This C. rubriventralis is a male which, in the wild, will maintain a harem of females. The specimen pictured is displaying, either to an adjacent female in courtship, or to a competing male as a warning.

Sea Fighter

More commonly available is a strikingly marked species, *Cirrhilabrus rubriventralis*. Supplies of this pretty little wrasse are frequently received from The Maldives.

It may be marketed as a Sea Fighter or Social Fairy Wrasse. The main colouring is bright scarlet, set off by a snow-white underside with a margin of brilliant blue spots dividing the two colours. More spots of this azure blue adorn the anal, dorsal, and caudal fins. The edges of these fins are trimmed with the same blue colour. The shape of the elongated spikey dorsal fin is reflected in the sweep of the flowing ventral fins.

Males may spar and even fight when confined in a small aquarium without sufficient territory being available to the individuals, but they rarely cause trouble with other species. The adult size is a mere 7 or 8 cms.

Believe in fairies

It's inevitable that a fish photographer like MAX GIBBS of Oxford's Goldfish Bowl is entranced by the gorgeous colours of Fairy Wrasse. But better than that – they appeal to the marine fishkeeper in him too.

The marine fishkeeper is offered a wonderful array of colours. In the stunningly beautiful **Labridae** family alone there is a huge possible selection of delightful species to choose from.

That is, before considerations of compatibility or eventual adult size begin to limit the possibilities. Habits, body forms, growth potential, and colours are highly diverse and care should be taken when selecting species for a particular aquarium setting.

Some charming juveniles grow into rather gross, arguably even ugly adults, and should be avoided.

The **Reindeer Wrasse** *(Novaculichthys taeniourus)* is one such species, and the Twin **Spot Wrasse** *(Coris angulata)* is another. Both are often available, and popular as attractive youngsters, but can grow into disappointing liabilities.

However, there is a rewarding selection of exquisite species to grace the aquarium, which retain their beauty into maturity. The genus *Cirrhilabrus* embraces just such a highly colourful and generally-peaceful collection of species, often known as Fairy Wrasse, which keep to manageable sizes and maintain a radiant beauty throughout their lifetime.

Mystery Wrasse

Occasionally gem-like species which have not yet been identified, turn up in imported collections of fish. One such *cirrhilabrus* has been shipped from Fiji and may be marketed as a "Shimmering Parrot Wrasse." It is said to be found at depths of around 30 metres and is, therefore, unlikely to be shipped in other than very restricted numbers. The entire form of this species is a kaleidoscope of remarkable colours, from a yellow-patterned purple nose down to the red-banded, yellow tailed edged with royal blue. Without any data being available on this fish as yet, it is difficult to say what the adult size might be, but it would appear to be about 12cm.

A beautiful Cirrhilabrus from Fiji which is yet to be named, but has been dubbed the "Shimmering Parrot Wrasse". Only occasional specimens are received for the aquarium trade.

Lubbock's Fairy Wrasse is one of the smaller species and may be encountered in various colour variations. This specimen is typical of a foursome.

Lubbock's Fairy Wrasse

For the smaller aquarium the Lubbock's Fairy Wrasse *Cirrhilabrus lubbocki* is eminently suitable, as it grows to only about 7cm.

It is beautifully and variably coloured. The body has shining lilac-coloured areas with bright, cheerful, red "saddle-like" wedges of colour interposing. The dorsal fin is a strong yellow, as is the anal fin which also has a light purple edging.

This description fits a young fish of one variation, but the colours and patterning change somewhat as the fish matures. However, this species remains very pretty at whatever stage of development it is seen, and regardless of any variation of colour form.

Laboute's Fairy Wrasse

Cirrhilabrus laboutei is a riot of crimson, scarlet, orange, mauve, purple, and white, forming strong and striking patterns ornamenting the entire body of this magnificent fish. Dr John Randall states that Laboute's Fairy Wrasse may be found within a depth range of between 8 and 55 metres. Growing to about 12cms, it is yet another easily accommodated and very beautiful wrasse.

Aquarium care

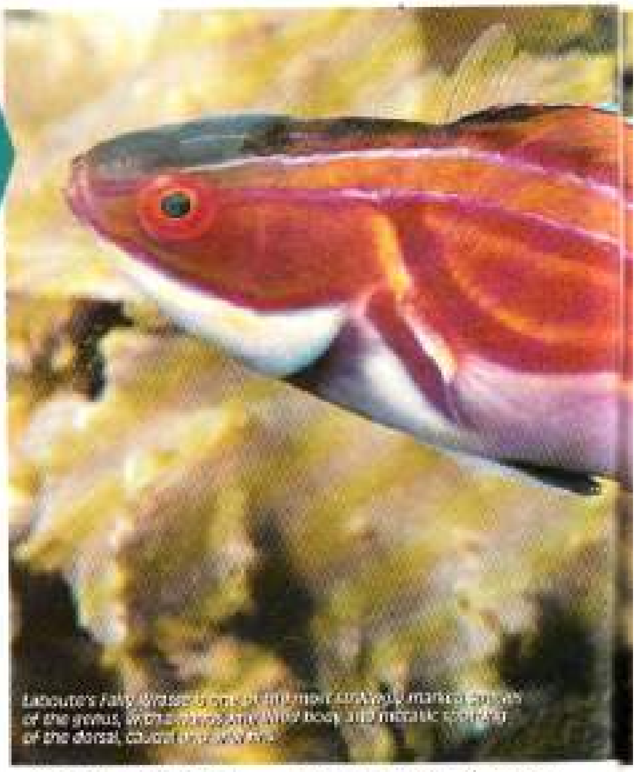
It is difficult to think of even a few "minus points" to set against the outstandingly beautiful and accommodating Fairy Wrasse. They appear to take to aquarium life quite readily and adapt to conditions which are obviously vastly different from those into which they have been born and become accustomed in the wild. Even those specimens collected from deep water seem to accept captive life in no more than a couple of feet of water quite happily.

Foods need to be as varied as conveniently possible, and occasional treats such as live artemia will be enthusiastically relished. With mature fish displaying as much colour as juveniles, and adult sizes remaining at manageable levels for most marine aquariums, there is so much to be said in their favour.

Pairs will enhance any marine aquascape and reward their owner with amusing antics, but individuals will easily and peacefully integrate with other species within the community.

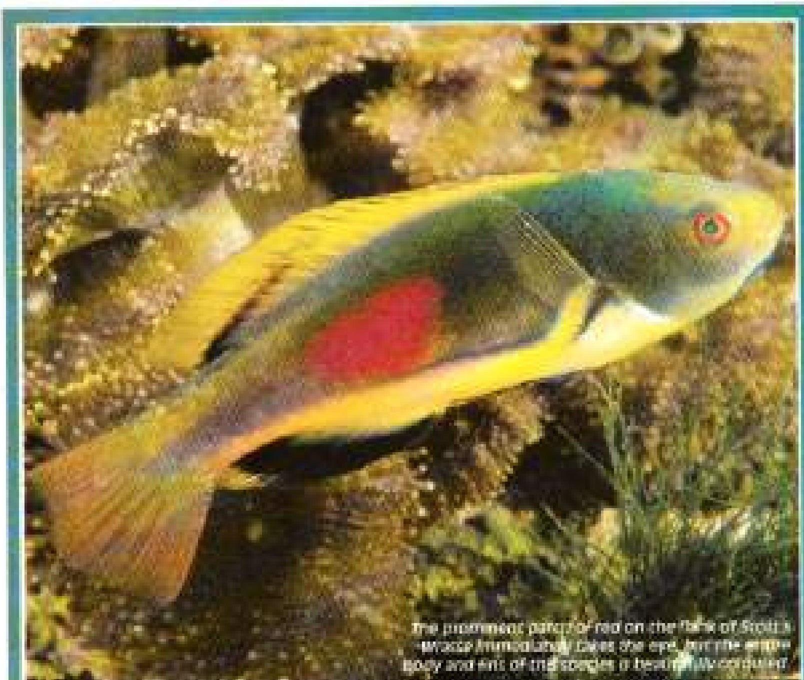
Some wrasse are quite unsuitable to be accommodated within the invertebrate, or reef, tank, but the genus *Cirrhilabrus* embraces a "full house" of species seemingly eminently suited to life in the reef aquarium.

They rarely interfere with sessile or other invertebrate life, and are certainly much happier in such surroundings. The crevices and caves associated with reef aquarium decor provide fairy wrasses with a comfortable feeling of security, reflected in their confident movements and vibrant colouration.



Laboute's Fairy Wrasse is one of the most [illegible] marked species of the genus, with a [illegible] body and metallic spotting of the dorsal, caudal and anal fins.

Reef tanks will also culture algaes and other encrustations on the rock surfaces which provide endless busy picking activity for the curious wrasse. The genus as a whole shares its virtuous qualities with few others in the marine aquarium hobby. ■



The prominent patch of red on the flank of Scott's Wrasse immediately takes the eye, but the entire body and fins of the species is beautifully coloured.

Scott's Wrasse

Subtly blended strong colours are the outstanding feature of the Scott's Wrasse (*Cirrhilabrus scottorum*). This richly-hued species was named by Randall and Pyle in 1989 in honour of Sir Peter and Lady Philippa Scott in recognition of their great contribution to nature conservation.

Found in the South Pacific from the Pitcairn group to the Great Barrier Reef and in depths of between 3 and 40 metres, the Scott's Wrasse is more often found in outer reef areas, rather than within the shelter of lagoons.

As with all *Cirrhilabrus* species, *scottorum* is principally a zooplankton feeder in the wild, and may be seen rising up in aggregations, composed mainly of females and juveniles, from the bottom to a metre or more when actively feeding, but in aquarium conditions it will take a variety of foods and readily adapt to a regular feeding programme.

The Exquisite Fairy Wrasse possesses a beauty which may only fully appreciated in the living fish. This picture can only hint at the intricacy of the colourful markings.

The Exquisite Fairy Wrasse

Cirrhilabrus exquisitus **is a well-named beauty from the genus. The colours of this species are rather more subtle than those described above. The basic body colour is a delicate moss-green, ornamented with rose-pink and mauve lines of colour. The golden anal and dorsal fins are edged and spotted with pale blue. Other spangles of colour combine to great effect in this beautiful fish. Growing to about 10cm it is suitable for most tanks.**

Red-finned Fairy Wrasse

Another attractive, smaller species is the Red Finned Fairy Wrasse *Cirrhilabrus rubripinnis* which rarely exceeds 7cm in length. The head and front half of the body of this fish is fire-orange/red with a distinctive patterning created by bold deeper red edging to the scales. The back half of the body is a strong yellow colour, giving the overall appearance of a strikingly beautiful fish.

Jordan's Fairy Wrasse is a feast of gold and red colouration combined to stunning effect in a streamlined shape.

C. rubripinnis is a modest sized fish, but has intense colouring from red to royal-gold throughout the length of a typical specimen, although variations do occur.

Jordan's Fairy Wrasse

This is another modest sized fish when mature at 10cm, but *Cirrhilabrus jordani* is extravagantly blessed with a display of rich colouring, shading from a brilliant fire-red back and tail down to a warm orange underside. Broad red lines of colour run from the nose over the eyes, into the red of the dorsal area, and from the mouth under the eyes to the pectoral fins.

Marine *Answers*

Well fed algae

Since changing my undergravel filtration to reverse flow, I have a growth of bright green algae on the substrate. Am I doing something wrong?
J. Hughes, Neath.

The algae is due to an increased supply of cleaner, well-oxygenated, water, and will do no harm. In fact it will purify the water even further. You can syphon it off if you find it unsightly.

Don't bare all in hospital

You recently advised the use of an undergravel filter in a quarantine/hospital tank. Wouldn't the medications used affect the beneficial bacteria? Would an internal filter be suitable?
Anthony Plant.

Most proprietary medications are designed not to kill filter bacteria.

Antibiotics will, of course, kill all bacteria, including beneficial kinds in the filter, whether this is undergravel or not.

Bare hospital tanks have their place, but are not popular with fish which prefer a sandy substrate. But the most important thing is to have a quarantine tank of any sort.

Irritated Angel

I recently had to treat my tank for White Spot, which seems to have cleared up, but my Emperor Angelfish is still scratching, although there is no external sign of White Spot. I am now using a polyfilter and carbon to remove the copper. What should I do now?
J. Simpson, Norwich.

Although you have killed the White Spot parasites, they have left scars and marks, which are still irritating your fish.

Use bactericide for the time being to guard against infection, but do nothing else which may further stress the fish.

Cleaner Shrimp are amusing and attractive creatures - but sensitive to copper treatments.

Give the Cleaner Shrimp a miss

Q **I am setting up a 36" x 12" x 18" tank, in which I hope to keep Clown Fish, a Yellow Tang, a Regal Tang, a Hawk Fish, a Fire Goby and a Cleaner Shrimp. The tank will have undergravel filtration, powered by an Aquaclear 201 powerhead, and a Bio-Life wet/dry filter.**

Is this adequate, or should I add a protein skimmer and/or external canister filter?

Would it cope with more sensitive species, such as butterfly fish and anemones?

Would reverse flow undergravel filtration be better?

I have a 30" Powerglo tube and a 30" Aquastar. Which of these would be more suitable?

Should I test for anything other than nitrite, nitrate, and pH?

• Ewan Wallace, Ross-shire.

A I would certainly fit a protein skimmer, and a canister filter packed with marine-grade activated carbon. If this is your first marine tank, I would not consider sensitive butterfly fish, or coral invertebrates. Anyway the two are not compatible.

I would also give the shrimp a miss, as tangs are very susceptible to Oodinium and White Spot, which need copper-based medication, which is fatal to crustaceans.

Your tubes then will be fine for a fish-only tank.

A test kit for ammonia is essential, as it is very toxic.

Spring Imbalance

Q **I am having a problem with thread algae, and brown slime. I use undergravel and external filtration, and a protein skimmer. Lighting is by 3 x 40W tubes for 10 - 12 hours a day.**

My 60" x 15" x 15" tank houses a Green Chromis, a Percula Clown, a Cleaner Wrasse, a small Hermit Crab, a Mala Anemone, and two Cleaner Shrimps. They all seem healthy, and were introduced over 4 months. Test readings are all good.

• Brian Russell, Fife.

Hermit Crabs have no objection to a spot of algae.

A Spring daylight can influence the biological equilibrium of a marine tank. The reasons are not clear, but there is an increase in nuisance algae in spring and autumn.

An alternative reason may be a gradual build up of tap-borne toxins.

Filtering your tap water may help. Otherwise the algae will probably decrease, but write again if you still have problems after the summer.

Ozone layer

Q **What is are best filter media to adsorb or disperse excess ozone?**

What is an automatic redox control unit, and how does it work with the ozoniser?

My Tetra KH Test for carbonate hardness suggests 7°DH for sea water, but my dealer says 14°DH, and my water is 12°DH. Who is right?

• Leonardo Mattioli, London.

A The best medium to adsorb excess ozone is activated carbon. This is essential if high levels are used, and the excess cannot be ducted out of the room.

Ozone increases redox potential (ORP) but steady levels are important. Therefore a sensing unit is employed to turn the ozone on and off. Automatic redox control units are expensive, and not of much use to the average hobbyist.

Most world authorities (Thiel, Wilkens, Moe) agree that carbonate hardness is best between 15 and 20°KH, however, many people have success at 7°. I don't think it is worth worrying that much, as with correct water changes and tank maintenance the level will always be correct.

LETTER OF THE MONTH

MARTIN MACMANUS of Belfast wins an Interpet test kit for this query

Q **I am about to set up a mixed fish/invertebrate tank, and I would be very grateful if you could tell me more about Kalkwasser, which fishkeepers in the USA are using to dose their marine systems.**

Is it a new remedy, or just a new gimmick on the market? Do you need to use it to keep corals (hard and soft), tubeworms, anemones, and the like alive?

• Martin McManus, Belfast.

A Kalkwasser is the German name for limewater. It is made from a solution of calcium hydroxide, and, as this implies, it is a calcium supplement.

The skeletal parts of hard corals are made of calcium carbonate, and if this is in short supply they can suffer. Many fishkeepers have found that dosing with kalkwasser benefits their hard and stony corals.

This is unnecessary in a tank with only one or two hard corals and regular water changes - or with no hard corals at all.

TIP OF THE MONTH

An Interpet test kit goes to JOHN SULLIVAN of Maldon for a simple solution to an old problem.

I wanted to increase the efficiency of my fluorescent tubes. They were housed in a type of guttering that had discoloured and so much of the light was lost. I therefore lined the guttering with sections of emergency foil blanket.

This is a little like kitchen foil, but is plastic based and inert (kitchen foil disintegrates after a short time). I stuck it on with silicone sealant glue and it is unaffected by salt spray or moderate heat.

It has noticeably improved the efficiency of my tubes. the material can be bought for €1.99 from camping shops and army surplus stores.

Use a Rena 301 to run the protein skimmer.

The kit for the job?

Q **I am about to set up a 6' x 2' x 2' tank with an Amiracle SL 250 Pro Plus filter. My dealer recommends an Aquaclear 802 powerhead. Will this also drive the protein skimmer, or do I also need a small powerhead (Rena C20) as in the instructions?**

Do I really need two airpumps, for the skimmer and the trickle filter, or will one pump do both? Which pump(s) would you recommend?

How often should I make water changes, and how should I mix the salt? How much of the recommended Bio-Sea biological elements, Hydrosafe, and P.A.T. will I need?

• John Chapman, Peterborough.

A I agree with your dealer's choice of powerhead. Two air pumps would be best, a Rena 301 for the protein skimmer, and a Rena 101 for the aeration of the filter.

Carry out 15 -20% water changes once a fortnight with good quality salt. Mixing instructions are usually on the pack. You will initially need enough to make up 150 gallons at S.G. 1.021.

As for the components required for the filter, I would follow the manufacturers' instructions.

Safe stocking

Q **My 80 gallon tank has undergravel filters with Aquaclear powerheads, a Tunze protein skimmer, two Hagen 55 gallon Bio-Life filters and a Fluval 303 external filter.**

With all this filtration could I overstock by 25%, to 25 inches of fish?

• P.S. Scouley, Portsmouth.

A The stocking rule, for a fish-only aquarium, is 1" of fish for every 4 gallons met (20" in your case) in the first six months, building up to 1" for every 2 gallons over the next month (40" for your tank).

By stocking slowly in the first six months you could increase this slightly, to 25". Stocking too quickly leads to disease and deaths, as the biological filter cannot cope with the load.

NICK DAKIN is your expert on the saltwater scene

You must include a stamped, addressed envelope and attach the Marine Answers coupon, below, when you write in with your query or your tip to:

Marine Answers, Practical Fishkeeping, Bretton Court, Bretton, Peterborough, PE3 8DZ.

We regret that queries sent without a stamped, addressed envelope will not receive a reply.

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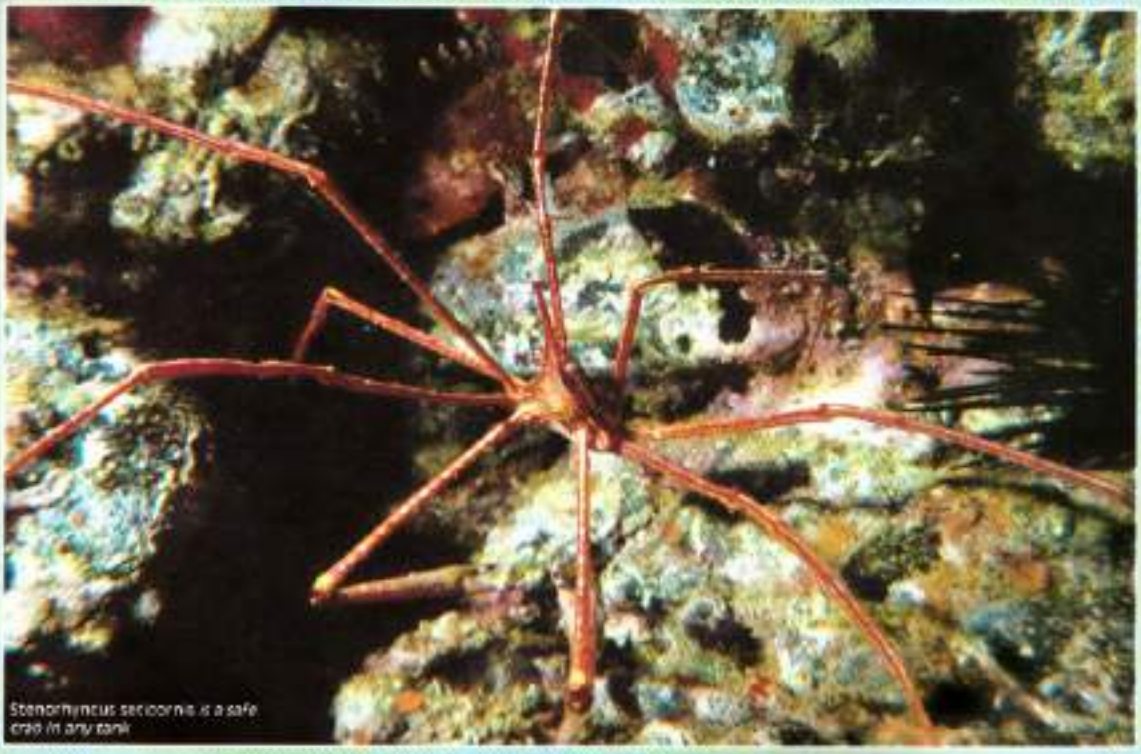
Use the address above for tips and letters.

MARINE ANSWERS

☐ **Nick Dakin**



Stenorhyncus seticornis is a safe crab in any tank

SILENT BATTLES

Peaceful though it may seem on the reef, it's actually a battleground for even the most motionless creatures suggests LES HOLLIDAY.

We discovered last month that one of the major challenges of keeping a marine aquarium is choosing fish which will live in harmony together and, where applicable those which will be compatible with the invertebrates sharing their aquarium. What is not perhaps as well understood is the art of keeping a range of invertebrates together without such conflicts.

It is understandable if we consider the wide diversity of marine invertebrates how difficult it can be to read from their behaviour just what is going on. Fish demonstrate their aggression quite plainly and it is obvious when they don't get along. The seemingly constant serenity of the invertebrate aquarium mirrors the harmony of the coral reef where masses of weird and wonderful creatures appear to live cheek by jowl quite happily together. Most are, after all, sessile non-moving creatures formed into an intricate tapestry of living organisms often closely interwoven with one another.

A form of harmony therefore no doubt exists as the animals, fixed to one spot, have learned to make best use of their environment to carve their own small niches in exploiting the possibilities of their habitat to the

Where these two colonial anemones meet there is a "dead" contact zone where one has killed the other.

Left: Heteractis anemones

Below: The Crown of Thorns can eat hard corals

very specific in their chosen prey and one member of the crustaceans falls into this category. The attractive Harlequin Shrimps (*Hymenocera* species) have showy white blotched with brown or mauve coloration and appear to be ideal aquarium subjects.

Unfortunately they feed exclusively upon live echinoderms attacking starfishes and sea urchins and cannot be acclimatised to substitute foods.

Harlequin shrimps are sometimes confused with a small group of *Periclimenes* shrimp species which live symbiotically with anemones and also with sea cucumbers, another form of echinoderm. *Periclimenes* shrimps are superficially similar in appearance to Harlequin Shrimp species but do not harm their host anemone or sea cucumber. These shrimps are therefore an excellent choice for the aquarium while harlequins are not really worth considering.

Molluscs

Molluscs belong to the largest phylum in the animal kingdom and are a very varied group of animals. The main divisions are the slug-like animals (gastropods) with or without a shell, the twin shelled molluscs (bivalves), instantly recognisable due to their commercial value as food, and octopi and squid (cephalopods).

Of these divisions only the gastropods and cephalopods contain predators and in terms of the home aquarium we only really need to consider gastropods as octopi and squid are so seldom offered on the hobbyist market.

Of the gastropods the major predators to find their way into the aquarium are the nudibranchs. These gaudy coloured sea slugs are all carnivorous and feed on a wide range of sessile or slow moving invertebrates. Their diet encompasses sponges, coelenterates, sea squirts and the eggs of crustaceans, molluscs and fishes. They are grazing carnivores using a rasp-like tongue to scrape off the flesh of the unfortunate prey.

Nudibranchs usually also have distinct dietary preferences and are adapted to feeding on one single form of prey. Many of the species offered for sale for the aquarium fall into this category, for example, the colourful dendrodorid nudibranchs which feed exclusively on encrusting sponges.

Attractive as they are, specialised feeders such as these will be doomed to starvation and death in a few short weeks in the aquarium.

There are a few exceptions amongst the sea slugs which are herbivorous belonging to the *Aplysia* family and commonly called sea hares. They do not hold a light to the more flamboyant and colourful dendrodorids but are nevertheless beautiful in a grotesque sort of way. Very easy to keep, these sea slugs require a continual supply of vegetable matter and are a valuable in the invertebrate aquarium in controlling unsightly hair algae and other nuisance forming algae species.

Among the shelled gastropods there are a number of carnivorous aquarium species. Examples can be found amongst the cowries including the Indo Pacific Egg Cowrie (*Ovulum ovum*) which feeds upon soft corals especially leather corals (*Sarcophyton* species) and the Caribbean Flamingo Tongue Cowrie (*Cyphoma gibbosum*) which has adapted to feeding on sea fans and sea whips.

Conversely there are many excellent non predatory species notably the Tiger Cowrie (*Cypraea tigris*) and the colourful Map Cowrie (*C. arabica*).

Conus, olives, murex, and tulip shells are also predators and should be avoided, the deadly Textile Cone (*Conus textile*) and *Conus geographicus* especially so, as their sting is potentially fatal to humans. Cone shells of these species are not the kind of subjects you would wish to brush against while cleaning the aquarium substrate where they usually lie buried during daylight hours.

Echinoderms

Finally, before anyone reminds me that there is a further important predatory invertebrate group, the Echinoderms, I better add a few lines. Among the starfish, sea urchins, featherstars and sea cucumbers that make up the phylum *Echinodermata* there are many of interest to the hobbyist. Fortunately, most are benign by nature and do not represent a threat in terms of predation. Indeed many hide during the day venturing out only at night.

There are, however, a small number of predatory species perhaps the most well known being the Crown of Thorns Starfish (*Acanthaster planci*) which has caused massive damage to many of the world's reefs. Sudden plagues of these creatures have been occurring over recent years which settle upon living reefs and devour the coral polyps. Imbalances in the ecology of the reefs has been put forward as a reason for these plagues caused by commercial fishing of the large predatory gastropod the triton (*Charonia tritonis*) one of the few predators of the Crown of Thorns.

There are few predatory starfish offered for the aquarium but thankfully there are some really excellent non-predatory species such as the Fromia starfishes, *Fromia elegans* and *Fromia monalis*, and the dramatic blue *Linckia laevigator*.

All of these species have vivid coloration, spend the greater part of the day on view and act as excellent scavengers.

Species to avoid are the Knobbed starfishes (*Protoreaster lincki*) and *Pentaceraster* species which are carnivorous grazers of all the sessile forms of life found in the invertebrate aquarium. These greedy predators are seldom offered for sale these days and should be reserved for aquariums stocked with fish and mobile invertebrate forms only. ■

Commercially bred conchs

One shelled gastropod the Queen Conch (Strombus gigas) has recently become available from a captive rearing station in the Caribbean. This species is quite attractive with a pink and gold shell and feeds upon algae and diatom detritus.

This is an excellent choice for the aquarium and by buying these captive bred animals each of us can contribute to the conservation of an important commercial food animal.

The main purpose of the rearing station is to re-introduce juvenile conchs into areas which have been depleted by non-sustainable fishing.

The latest fishkeeping equipment reviewed by Editor STEVE WINDSOR.

WHAT'S NEW?

Star ratings

Don't bother	★
Barely acceptable	★★
Average/adequate	★★★
Good	★★★★
Very good	★★★★★

NEW PRODUCT NEWS

The man from Atlantis goes Ginger

Atlantis is the name of of John Kennedy's new Wembley based company. Other new names to learn are **Ginger** - the trade name of the foods, tank cleaning equipment, and widgety filtration items and **Mydor** the name for the medications and treatment items all of which Atlantis import from the USA.

■ **Foods** The foods are distinctively packed in clear plastic jars, with metallic labeling which makes them very distinctive. The screw tops open directly onto the food, and there is no interior seal. This is just a bit worrying when you consider that the food has come from Toledo, Ohio, USA and bears no date stamp. No preservatives are used but the vitamin C is double stabilised. The ingredients are listed possibly in greater detail than on most British-made foods.

The range comes in Basic Flake; Spirulina (algae food); Brine Shrimp; Colour; Goldfish; and a variety of bulk floating and sinking stick and pellet foods. Sizes are a rather odd 1.2oz = 34grm; 3oz = 85 grm and 6oz =170grm.

• Recommended prices for the smallest size range from £1.99 for Goldfish to £2.52.

■ **Remedies** These products come under the Mydor name, and are all postfixed with name Ease. Hence we have the self-explanatory Fungus-Ease; Dechlor-ease; Ick-Ease and Wound-Ease; and the less obvious Clear-Ease which helps cloudy water and microbial blooms to clear; and Protect-Ease which is a general treatment suggested as a regular palliative.

• These have a recommended price of £1.43 for a fluid oz.

On guard in your pond?

This seems to be the year of a renewed preoccupation with the pump pre-filter. One conclusion seems to be that if you can't rely on the old sponges and the self-older scrubbers (and if your pump can't mush its way through the loose detritus and spit it out) you might as well put a fully-filtering unit on the front - not just a pre-filter but a unit that can actually do all the work of filtration while submerged in your pond.

We've looked at the A1 OSM unit; **Pondguard's In-Pond Filter System** is another unit aimed at this area.

This is basically a large polypropylene crate which is filled with up to 40 litres of media and placed over the inflow of your pump. Water is sucked through the crate's perforations and through whichever media or mix of media you like. In the heart of the media a perforated pipe feeds through adaptors to your pump.

Given pump power enough, you could double or triple team the units in a large enough pond.

The rate of thumb offered by the manufacturers is one unit per 750 gallons or 3412 litres - though you could argue that this is dependent on the chosen media.

The units come in a folded down form, and we found bits of the piping annoyingly difficult to unpack, though this couldn't be described as a problem, and the unit is very simple to assemble.

The pumps especially recommended for use with the unit include Amphibious, Mermaid and Oase, though it should be adaptable for many others. R.R.P. is £79

Drawbacks

The units should be placed in the depths of the pond, and hence has a problem that is inadequately explained in the literature.

Pondguard recommend cleaning the units every 3 to 4 months in the summer season (though our experience with other units recently suggests it may need to be cleaned more often).

Filter media of any sort will be comparatively heavy when placed in the box. Lytag is the recommended choice, and a load of wet Lytag, while not in the gravel league, will certainly weigh heavy. How is this device lifted up from the average pond without dragging it finally across the liner or giving the pondkeeper a triple hernia?

In most cases it will need to be close to the pond side, and lifted out with a direct upwards pull. Adding a tough rot-proof rope loop seems essential to this process.

Star rating

Quality	★★★★
Practicality	★★★
Price	★★

■ **Filtration** Ginger the manufacturers of the food above also have a range of filtration equipment, most of which is in the plastic widget area, but nonetheless interesting for all that.

They produce carbon and a carbon/zeolite mix in jars or in clever little cartridge systems, mainly designed to fit into the uplifts of their undergravel equipment.

This is based on a black plastic slotted undergravel which may prove slightly brittle. The uplifts from this (and from a small circular goldfish bowl model) can be fitted with small charcoal cartridges which will filter the water as it's returned to the tank. The role of charcoal in a tank with properly conditioned water, that's up and running is a little difficult to justify - it takes no part in the removal of ammonia or nitrites and is probably best used to pre-filter tap water or in a brand new tank - but if you disagree the convenience and comparative cheapness of the disposable cartridge is hard to beat and a zeolite/carbon cartridge is also available.

• As a price guide, a 36" x 12" undergravel, two uplifts and carbon cartridges has an RRP of £9.99; cartridges cost around £1.60 for two.

■ For those who use external hang on filters, Ginger offer an alternative source of disposable filter cartridges (a carbon stuffed filter matting pouch) to fit most units.

Z-ROCK is a difficult product to judge. It's white chalky lumps of Zeolite (Clinoptilolite) designed to decorate your tank while absorbing ammonia.

It will need regular removal, and re-charging in strong salted water and monitoring this could prove difficult, but as a nice white rock it's well ... a nice white rock.

• More on the Atlantis/Ginger range next month.

VERDICT: Ginger items come with cheap packaging and plenty of American "snake-oil-remedy" razzmatazz. Don't let this put you off. Price should be your guide to these perfectly well-made and often intriguing items.

• Atlantis, 110 Windermere Avenue, Wembley, Middlesex Tel: 081 904 3945

Everything you want

KOI

The North American Indians have a saying: "Never judge a man until you have walked in his moccasins for 30 days." In other words, to understand the workings of anybody's mind, and the actions they inspire, it is first necessary to develop an empathy with that person by sharing his experiences.

The keeper of Japanese Koi can appreciate his or her fish for their beauty alone, or attempt to go further, and see them in the context of the culture of the country from which they came.

From here, it is but a short step to recreate a Japanese garden around the pond: but to grasp the whys and wherefores is rather more difficult.

It requires an insight, not into one head, but into millions - and over a period of many centuries. That's how long it took the then land of Yamato to develop its uniquely self-disciplined culture. In the sixth century, Japan assimilated not only the Chinese script, but much political and philosophical thought: and Taoist-influenced Buddhism harmonised with the earliest Japanese religion, Shinto.

But everything the Japanese encountered, they modified and made their own. Ritual and symbolism are apparent even in the age of the microchip, and pervade everything Japanese, from the Noh play to the tea ceremony, from Sumo wrestling to the art of Bonsai. Even the Kamikaze pilots of World War Two were following, in a modern manner, the tradition of Bushido, the Samurai code of allegiance.

A reverence for Nature is understandable in a country wild and rugged, and for the Japanese it became central to their appreciation of art and of life itself.

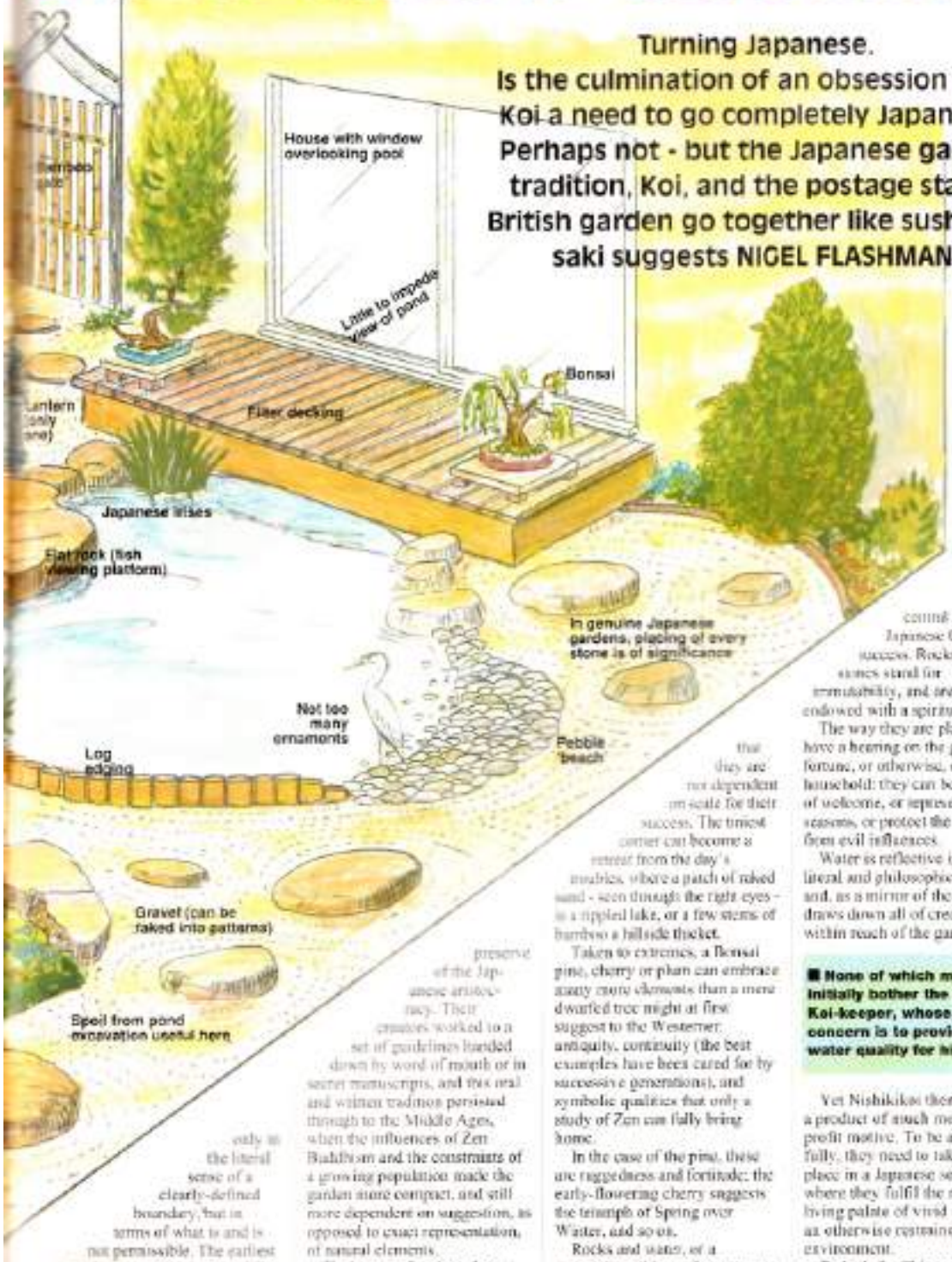
Their gardens sought to recreate, not Nature itself, but its essence: the feeling of awe and melancholy inspired by a lone pine tree struggling for survival on a barren cliff, or the tranquility of freshly fallen cherry blossom on a still pool. Suggestion and understatement were the key elements, along with a recognition that what you omit from a design is every bit as important as what you include.

Restraint is a feature of every successful Japanese garden, not

...ted to know about...

Turning Japanese.

Is the culmination of an obsession with Koi a need to go completely Japanese? Perhaps not - but the Japanese garden tradition, Koi, and the postage stamp British garden go together like sushi and saki suggests NIGEL FLASHMAN.



only in the literal sense of a clearly-defined boundary, but in terms of what is and is not permissible. The earliest gardens were spacious, and the preserve of the Japanese aristocracy. Their creators worked to a set of guidelines handed down by word of mouth or in secret manuscripts, and this oral and written tradition persisted through to the Middle Ages, when the influences of Zen Buddhism and the constraints of a growing population made the garden more compact, and still more dependent on suggestion, as opposed to exact representation, of natural elements.

The beauty of such gardens is that they are not dependent on scale for their success. The tiniest corner can become a retreat from the day's troubles, where a patch of raked sand - seen through the right eyes - is a ripple lake, or a few stems of bamboo a hillside thicket.

Taken to extremes, a Bonsai pine, cherry or plum can embrace many more elements than a mere dwarfed tree might at first suggest to the Westerner: antiquity, continuity (the best examples have been cared for by successive generations), and symbolic qualities that only a study of Zen can fully bring home.

In the case of the pine, these are ruggedness and fortitude; the early-flowering cherry suggests the triumph of Spring over Winter, and so on.

Rocks and water, or a suggestion of these elements, are central to any Japanese Garden's success. Rocks and stones stand for immutability, and are also endowed with a spiritual quality.

The way they are placed can have a bearing on the good fortune, or otherwise, of the household: they can be symbols of welcome, or represent the seasons, or protect the garden from evil influences.

Water is reflective in both the literal and philosophical sense and, as a mirror of the skies, draws down all of creation within reach of the gardener.

■ None of which may initially bother the Western Koi-keeper, whose main concern is to provide good water quality for his fish.

Yet Nishikikoi themselves are a product of much more than the profit motive. To be appreciated fully, they need to take their place in a Japanese setting, where they fulfil the role of a living palate of vivid colours in an otherwise restrained environment.

To both the Chinese and the

Just an English pond? The Japanese influence is seen in ornaments, bridge - and the Koi. Pic: Pete Trevett.

The culmination of years of selective breeding - Richard Tilbury rescues a Sanke. Pic: C. L. Wigens.

Japanese, carp have been a food source for centuries. The original, dark Magoi were farmed in flooded rice paddies to provide protein in areas whose remoteness meant that every community needed to be self-sufficient. But they also came to represent admired qualities: strength, longevity and triumph over adversity.

To say they were worshipped would be overstating the case but, as in so many cultures where people are dependent on an animal for existence (the Plains Indian and the buffalo, for example), the forerunners of modern Koi were respected at the same time they were exploited. The development of coloured carp appealed to the Oriental penchant for patience and order, for it took many generations to produce recognisable bloodlines of Kohaku, Sanke or Showa.

Had Koi then bred true, in the way of breeds of dog, it is debatable whether they would have captured and maintained the fascination of their keepers around the world. Perfection is always just out of reach, yet constantly sought.

I know of several UK Koi-keepers who, in the words of the song, seem to be "Going Japanese". They wear Kimonos around the house; their walls are decorated with fans, and some even learn the language - not just so as to be able to communicate with Koi farmers when they travel to Japan to buy fish, but to embrace the whole culture.

■ This is neither essential nor necessarily healthy for, by now, Koi-keeping in this country has been around long enough to develop a culture all its own.

In the best sense, this should combine the best elements of East and West. Happily, Japanese Gardens are not only beautiful, tranquil places to be, but inexpensive to set up, low on maintenance and, arguably, the most resourceful way to make use of limited space. This must strike a chord with anyone who has just taken possession of a modern house with a postage stamp for a plot of land.

Instead of lawn...ruler-straight path...shrubs (all of which can be

taken in at a single glance, and are as individual as frozen pizzas), why not make the eye work?

Even an area a few metres square can be turned into a mysterious little haven, where every turn of the path reveals something fresh and exciting. Japanese Gardens are not designed to be absorbed as a whole, but as a series of harmonious elements that can nevertheless be appreciated in isolation. *

And each time the observer walks through, there are subtle changes: wind in the leaves, ripples on the pool, even dew on a leaf.

This is so refreshing in our instant culture, where we are invited to 'do' the Lake District in a week! Not that it takes an age to construct a very convincing garden with strong Japanese elements.

We are lucky in that we can draw on centuries of experience and combine them with modern materials in a way that will be pleasing from year one.

Then, as trees and shrubs mature, stones weather and acquire the patina of moss, our garden can evolve and improve with each successive season.

■ If the above observations still leave the Koi-keeper unsure about the design of his or her garden, there is one further argument that may tip the balance in favour of digging up the lawn and the herbaceous border.

Koi ponds require filtration, which should be both effective and unobtrusive. Pipework and cables have to be laid and, if you deploy central heating pumps, they need to be housed in a way that enables them to be accessible, yet invisible.

This is near-impossible in a Western-style garden which relies so heavily on grass and flowerbeds, but relatively simple in the context of rocks and gravel.

The big danger, for the Westerner, is to go overboard: to cram too much into a small area, and to judge the 'success' of his or her Japanese garden by how many lanterns, pagodas and pieces of statuary it contains.

The worst examples of Kitsch (bad taste in the plaster flying ducks sense) (**Ed's note:** Or Art Bingo) can be seen in sheds, converted to resemble tea houses without regard to their position in the garden.

The sight of the original tea house was the culmination of a guest's journey through the host's garden, and by the time he reached this destination he would have undergone a slowing-down of life's hectic pace, ritual purification at the water basin and a whole series of social interactions based on hospitality and formalised responses to what had been encountered on the way.

Japanese Gardens to visit

■ **Compton Acres, Canford Cliffs Rd, Poole, Dorset. Tel: 0202 700778.** Open daily March 29 - October 31, 10.30 am to 6.30 pm.

■ **Capel Manor, Enfield, Middlesex. Tel: 0992 763849.** Open April October, 10 am to 4.30 pm, weekends 5.30 pm, November - March Monday to Saturday 10 am to 4.30 pm.

■ **Tatton Park, Knutsford, Cheshire. Tel: 0565 654822.** Open April September (closed Mondays, except Bank Holidays) 12 noon - 4 pm; October- March 12 noon to 3 pm.

■ **Newstead Abbey, Linstead, Notts. Tel: 0623 793557.** Open daily, 10 am - sunset.

■ **Heale House, Middle Woodford, Salisbury, Wilts. Tel: 0722 73207.** Open daily 10 am - 5 pm.

This does not mean, however, that a tea house is an anachronism today. A Japanese visitor to suburbia would be more upset by a straight path than he would by a strategically and discreetly placed converted shed - that nevertheless housed garden tools.

■ The best step to take for anyone contemplating designing a Japanese-style garden is to visit established examples and decide which elements are applicable on his own patch.

He would recognise the need for utility, the same need that provided for a discreetly-concealed compost and refuse heap in the ancient gardens of his homeland.

Compromises will certainly have to be made, notably in the positioning of the pond and selection of garden plants and shrubs, but the following tips may be of help:

1) Avoid symmetry, wherever possible. Nature rarely operates in straight lines, and these should be confined to the boundaries of the garden - bamboo screens, pantiled walls - rather than intrude into the garden itself.

2) Try and include as many Japanese-style plants as possible, but do not be afraid to experiment with others that conform to the general idea.

For example, it is not always possible to get moss to thrive, in which case dwarf cover plants can be substituted. Japanese irises are ideal to frame the pond, but the same foliage effect can be achieved with many ornamental grasses.

3) Avoid coloured gravel. Ordinary pea gravel or spar chippings are easier on the eye and the pocket.

4) Choose your ornaments carefully, making sure you don't mix cultures by placing Renaissance fountain ornaments next to Japanese stone lanterns. If you can afford them, or can make your own, rough-hewn granite water basins and lanterns are far preferable to mass-produced items of reconstituted stone, though even these will mellow with age.

5) Make a feature of your pond plumbing and electrics. Pump housings can be covered with slabs that double as stepping stones, or stands for Bonsai, while the decking over a gravity-fed filter chamber can be painted in the traditional red and black of a tea-house balcony or simple bridge.

6) Make every element of the garden accessible for regular maintenance. This is a different task from the usual lawn-mowing and conifer cutting, and is more likely to consist of sweeping of leaves from gravelled areas, and watering of moss, plus, of course, attention to the water quality of your pond.

7) Permanent fixtures should be solidly secured. If rocks are a feature, especially those positioned vertically, they must be firmly bedded in concrete, which can then be disguised by gravel. Stepping stones, for safety's sake, must not wobble when walked on or accumulate slippery algae, so brush them regularly.

8) Visit garden centres and keep an eye open for reject trees and shrubs. These are often sold off cheaply because they are asymmetrical, but this quality is an asset for plants in a Japanese garden.

9) Remember that things are not always what they seem, and that a feature may be suggested by something quite different to its original counterpart. Box, for example, would be quite out of place in its usual role of low, closely clipped regular border hedging, but in higher, mounded plantings it can represent distant hills or mountains.

10) The gardens of Japan were designed for recreation, and as places where friends could meet and talk, forgetting for a while the worries of the day. The trend in this country is increasingly to entertain outdoors. A patio and brick-built barbecue are the usual solution.

While sushi and sake by the Koi pool may never replace burned beefburgers and Black Label, it's a nice thought. ■

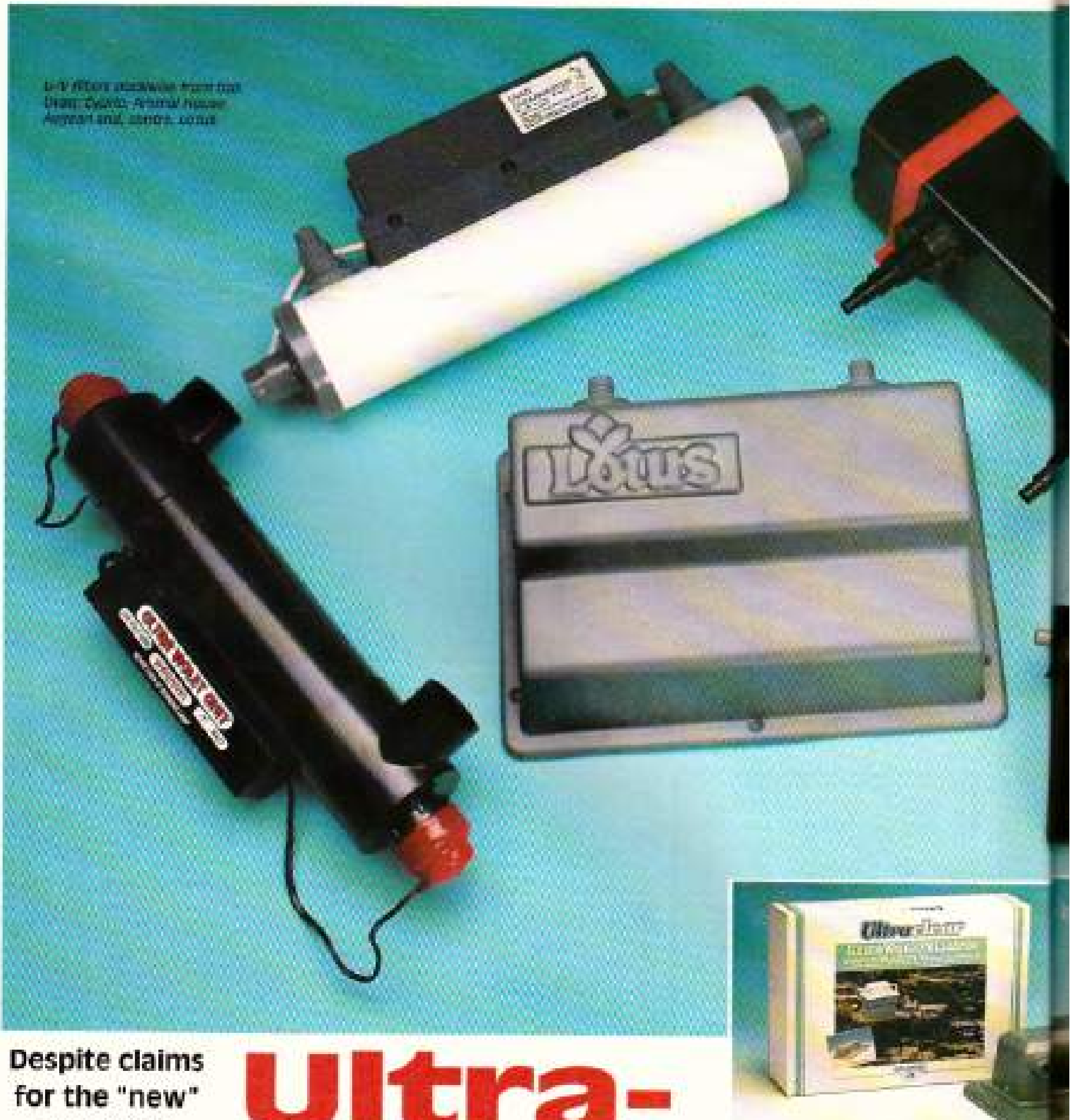
Suppliers of Japanese garden items

■ **Keith Gott, The Japanese Garden Company, 1 Stable Cottages, Morteagle Drive, Hornby, Lancaster LA2 8LD. Tel: 05242 22078.**

■ **Jungle Giants, Plough Farm, Wigmore, Herefordshire. Tel: 0568 86708** (live bamboo plants and large poles).

■ **Barthelmy & Co, The Nursery, 262 Wimborne Rd West, Wimborne, Dorset. Tel:0202 874283** (Japanese maples)

■ **Andrew Norfield Trees and Seeds, Lower Meend, St Briavels, Glos. Tel: 0594 530134** (Japanese maples)



U/V filters clockwise from top: Drais; Cyanis; Animal House Aquarium and, centre, Lotus

Despite claims for the "new" magnetic algae-control systems U/V remains the only reliable way to treat green algae.

Ultra-effective al solutions?

Left: The Ultraclear from Rennanold.

Algae

Green water is the curse of many pondkeepers - especially as warmer and warmer springs provide the necessary sunshine to fuel the growth of microscopic algae, all containing the green chlorophyll that colours the water. They thrive on the final product of good filtration - nitrates - so the best filter in the world won't solve green water problems on its own.

Probably the only effective cure for green water is a U/V filter. Yes, magnetic units claim success, and we've reported on many of these in the last few months. Chemical treatments can offer dramatic short results, but have drawbacks in terms of a sudden die-back and de-oxygenation of the water.

Well-run U/V, backed up by efficient filtration, is to date the only proven method to clear and continue to prevent green water.

Green water can actually be beneficial to your pond fish and a few weeks in a thick green soup can improve your fish's vitality and colour - but if you can't see the fish, there's not a lot of point in keeping them.

How do they work?

Passing green water through the beam of a UV damages and/or flocculates (clumps together) algae, when your filter can remove it.

At intense levels U/V light can be used to kill bacteria in the system. Modern pond U/Vs are not designed to do this, though some may claim to do so, so useful pond filter bacteria should remain (though see the Ilustron below).

Maintenance

This should be minimal and in a well-designed unit all you should have to do is replace the tube every six months or so, if used continuously. It may be necessary in some cases to clean the protective quartz sleeve around the U/V light.

Safety

U/V light is potentially damaging to the eyes, and you should never look directly at a lit-up tube. Virtually all manufacturers recommend fitting an RCD when using these units. Never run them dry, as some are water cooled.

A properly-made U/V unit will clean green water in one to 14 days, and all of the units supplied should perform this task if matched to the right size of pond.

The full range

SUPPLIER	UNIT	WATTAGE	POND SIZE	R.R. PRICE
Aegean	Algaebuster II	8 watt		£64.95
		15 watt		£84.95
		30 watt		£109.95
		60 watt		£224.95
Animal House	U.V. Clear			
	300	4 watts	500 gal	£49.99
	1250	8 watts	1250 gal	£59.99
	2750	15 watts	2,750 gal	£69.99
	600	30 watts	6,000 gal	£99.99
Cyprio	UVC 2000	1x9 watts	2000 gal	£79.95
	UVC 4000	2x9 watts	4000 gal	£99.95
	UVC 6000	3x9 watts	6000 gal	£192.40
	UVC 800	4x9 watts	8000 gal	£212.40
Rennanold	Ultraclear	8 watts	1500 gal	£91.81
		15 watts	3000 gal	£112.34
Uvaq (and larger units to order)	Clearmaster			
	4	4 watts	500 gal	£52.50
	8	8 watts	1250 gal	£71.45
	15	15 watts	2,750 gal	£87.95
	30	30 watts	6,000 gal	£120.95
Lotus	Clearpond			
	UV 8	8 watts	1500 gal	N/A
	UV 15	15 watts	3000 gal	N/A
	UV 30	30 watts	6000 gal	N/A
Infiltration	Biotron		2200 gal	£225
			11000 gal	£510

AEGEAN

Algae-Busters

These units claim a large water capacity radiation chamber, an entry inlet that creates turbulence to wash the water around the tube more thoroughly and a purpose-built outer casing that is extremely durable and in terms of outdoor use waterproof.

A medical quality quartz tube surrounds the U/V tube which has a 5,000 hour continuous use life. Larger sizes than the ones on the table can be ordered, as can aquarium bacteria units.

ANIMAL HOUSE

U.V. Clear

Described as compact units with a double insulated electrical enclosure which makes them weatherproof, these U/Vs are certainly attractively priced. The casings are also designed to resist the ravages of sunlight and temperature changes. All the large units are fitted with multiple hosetails in ¾" 1" and 1½". Four models are available from the smallest to the large pond of 6000 gallons. Again it's claimed that the smallest unit - the 300 - can be used on fishtanks.

CYPRIO

U.V.C. 2000/4000

A problem has beset Cyprio as they attempt to launch this new "EEC standard" U/V. A new enclosed design gets rid of the double ended tube system which was unacceptable in Europe, and replaces it with a Philips PLS long life Germicidal lamp.

The new system is cheaper to make, safer, and the tubes are still effective after a year's continual use.

What's the problem then? Malcolm Goodson of Cyprio explains "We have had great difficulty in satisfying orders for our new model U/VC.

"The sole reason for this is that Philips lighting have been unable to increase production to match our orders due to difficulties in obtaining glass for the lamps. This material is to a very high quality, obtainable from only two or three sources worldwide."

This problem has been so bad that the company has returned to temporarily producing its old-style model to bridge the gap.

The new unit is also available for aquarium use as a bacteria killer.

REMANOID

Ultraclear

A unit that is claimed to "remove algae and reduce the background level of bacteria". Algae removal is by flocculation, Remanoid says, and the unit operates at 77°F which is apparently the most effective temperature for the bath.

These units are also available attached to a filter lid to fit Remanoid filter units.

UVAQ

Clearmaster

(Also supplied by Animal House)

Uvaq claim to supply the Ministry of Agriculture. They have a wide range of units - the smallest suitable for indoor use on a tank and for ponds as small as 500 gallons. Their latest models have a sealed electrical enclosure and are more compact than earlier units.

LOTUS

Clearpond

Very similar to the Uvaq units, but finished in Lotus' grey colour casing to match their filter tanks.

INFILTRATION

Biotron

Not a standard U/V unit at all, but something that initially resembles a snooker table overhead light. It is hung over the last (open) chamber of a filter, and apparently uses ultra violet frequencies that

The Biotron from Infiltration.

are guaranteed not to destroy filter bacteria - only to disrupt algae/hydra spores.

The bulbs in this unit actually stop working at the end of their useful lives which can be up to five years.

As no water is pumped through the unit, no flow rate restrictions apply.

The company does not use or sell standard U/Vs. Clearly this type of set up is for the larger filter and pond.

Choosing

When buying take into account the ease with which the tube can be changed; safety; weather or waterproofness; size of the pond; and whether the unit can be tucked neatly away - or will stick out like a sore thumb. ■

CONTACTS

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Cypris Ltd., The Peterborough Koi Centre, 133 Eastgate, Deeping St James, Peterborough PE6 8RB Tel: 0778 344502

Remanoid, Unit 44, Number One Industrial Estate, Medomsley Road, Consett, Co Durham DH8 6SZ

UV Systems, Constitution Hill, Sudbury, Suffolk CO10 6QL Tel: 0787 76759

Lotus Water Garden Products Ltd., Junction St, Burnley, Lancashire BB12 0NA

Infiltration, Unit 13 Millingford Industrial Estate, Golborne, Warrington, Cheshire WA3 3QE Tel: 0942 724906

Sitting on the F

Londoner Ken Butler moved to the Fens 12 years ago, where space has never been at a premium, to carry on his profession of carpenter specialising in reproduction furniture.

The haulage yard near Ramsey was large and run-down, and it wasn't long before Ken's wife, Betty, was making an oasis of beauty in the flat fieldscape.

But it was Ken himself, with previous experience of keeping only tropical fish, who decided that a pond would be the answer to a particularly uninspiring corner of the site.

Koi Garden

From that modest beginning has grown Koi Garden, where the prices are as unpretentious as the boss, and the larger fish have all spent a year being grown-on before going on sale.

Unlike so many beginners to Koi-keeping, Ken's first pond was right on the button in terms of size, practicality and ease of maintenance. But you won't find many of his ideas in standard reference works: he wasn't swayed by dogma, nor did he spend the earth.

Eight years on, that DIY exercise has become the main display pool, and is working as well as ever.

The Influence of George

No local Koi fan can fail, sooner or later, to encounter George Peacock. He has the distinction of being among the very first in the country to "do Koi properly", and his 25 years' experience were passed on to Ken at meetings of the local section of the BKKS. "Three years ago, pondkeeping became big business, and I started selling goldfish and a few small Koi," said Ken.

"Demand was so good that it expanded from there, and George was happy to act as consultant, in return for being given some ground space at Ramsey to grow on Bonsai - his current passion."

A question of scale

That might have been that: one more competent but fairly low-key Koi dealer among many. But Ken's experience in working with wood, coupled to a keen eye for design, was soon put to good use when customers asked him for ideas on pond layout, particularly those with a Japanese flavour.

Ken and Betty feed the Koi in the main display pond - note the large internal undergravel and novel way the secondary filtration system is disguised

"I decided that the best way to show what was possible was to build scaled-down, working models," said Ken.

His prototype was a three-foot fishtank representing a gravity-fed pool surrounded by a sparsely-furnished gravel garden. This, not surprisingly, was enhanced by miniature benches and wooden walling: a busman's holiday to a craftsman carpenter.

Since then, all the display vats in the undercover sales area have been treated the same way, turning what could easily be run-of-the-mill fish transit into a feast for the inquiring eye.

Barn

There's a lot of work still to do in the barn. Ken plans to put a false roof over the sales area, bringing down the ceiling to create a more intimate atmosphere.

Some of the dry goods are housed here, but to find a host of Koi-related decorative items you enter a building that would not look out of place in a Japanese tea garden. Inside you cross a simple, slatted bridge of English beech: two curved struts cut on a bandsaw, with slats of ½" timber. It's the sort of feature anyone half handy can make for their own water garden.

Original pond

Back to that original pond, where it all began. It was dug straight out of the clay, including the profile for the undergravel filter - which was reinforced with boards and carpeting before the PVC liner was laid over it. (Heavy clay is the ideal ground to excavate for a pond, providing you spray it while work goes on, to prevent cracks and shrinkage).

The filter bed is filled with three or four tons of gravel ½" diameter to a depth of 12", overlaid with three inches of pea gravel, the whole thing over a perforated grid of 6" pipework feeding two Grundfos central heating pumps.

These each turn over about 900 gph. One has a straightforward venturi return, but the other outlet is an ingenious surface-skimmer/solids collector (see the diagram).

The nylon stocking collects a "phenomenal" amount of muck in a 24-hour period, says Ken. This filtration system alone would probably be biologically sufficient for a 2,500 gallon domestic pool, but Ken has added another to give that 'polish' and show the fish off to their best advantage.

• The magic starts with a further Grundfos whose inlet rests on top of the gravel bed. This pulls water into a vertical butt, adapted to act like the biological chamber of an above-ground filter, with perforated grid, gravel and - believe it or not - onion sacks (plentiful in the Fens!).

These substitute for open void media, and never block: besides, the water butt's drain cock comes in handy for back-flushing. From the butt, the water flows through a bath (you'd better believe it) containing more gravel and sacks. Ken has made full use of the overflow and plughole to circulate the water fully through the media before it returns to the pond via a glide cascade made of liner-covered wood.

Daily maintenance consists merely of giving the walls and floor of the pond a once-over with a soft-bristled broom, to keep down blanketweed: suspended matter is then whisked away to both filters, and what they miss is picked up by the skimmer.

To hide what could be an eyesore, Ken has built a housing around the water butt and bath that has echoes of the tea house without being obviously Japanese.

The three central heating pump chambers are equally well-disguised by building over each a raised plinth, topped by a removable slab. On these stand Japanese ornamental dogs.

Fish

As to the range of fish available, Ken's policy is to buy in four to six-inch high grade Japanese Koi and grow them on under cover for a year before they go on sale.

By this time, some are up to 14"- but because the original outlay on stock didn't break the bank, Ken can offer them remarkably reasonably-priced.

Many Koi bought by BKKS customers from London and Norwich have won prizes at shows, and the varieties include the 'Big Three' plus metallics, Gin-rin and Kawarimono.

Quite apart from the cost factor, this growing-on of fish means that all the Japanese Koi have overcome the teething problems

ens

NICK FLETCHER goes way out East to see a Koi outlet that breaks the mould.

Practical Pond

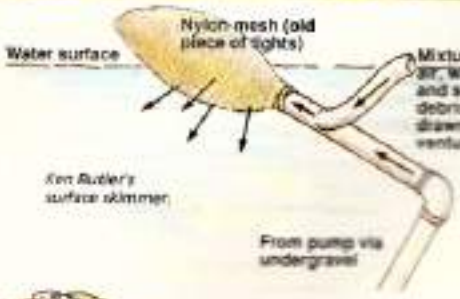
Left: Fish of this size and quality were all grown on from 4-6 inch youngsters in only a year.

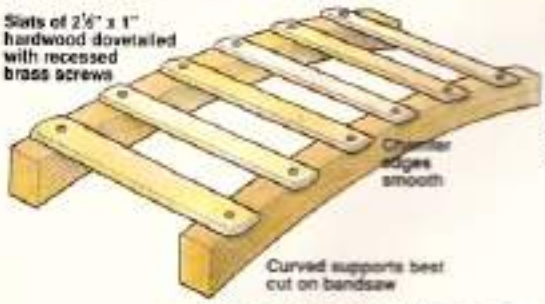
Below: Koi-related items mean the hobbyist can wear his heart (or his Koitaku) on his sleeve.

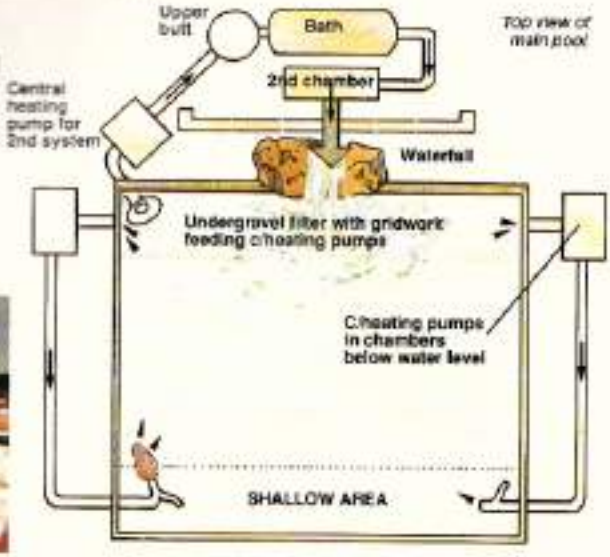
you associate with new imports.

There's also a smaller pond for the 'cheap and cheerful' Israeli Koi.

•Koi Garden is on the B1040 between Ramsey and Whittlesey, and is open six days a week, closed Mondays. For a wealth of ideas, or just beautiful fish without silly price-tags, it would be hard to find a better destination. ■







Above: Simple bridge construction.

Right: Miniature Japanese-style gardens surround the indoor display vats.