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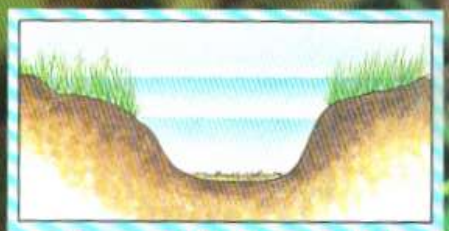

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ALL YOUR AQUATIC ANSWERS INDOORS AND OUT

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Above: Living Waters. See page 12.

Left: Fire Gobies. See page 62.

Above: Silver Sharks.

Right: Don't get a dose of something nasty in your pond. See page 118.

• *Cover pic. shows the Clown Loach, an Asian river inhabitant. See page 58. Photo by Max Gibbs; The Goldfish Bowl, Oxford.*

TROPICAL

PROJECTS

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Tropical *Answers*

Tank for Blockheads

I would like to know whether I can keep *Steatocranus casaurius*, the Blockhead Cichlid, in a 30" tank containing Kribensis, catfish and Zebra Danios.
William Davies, Oxford

I would be happier if you had a three foot tank, but I think the combination of Kribensis and Blockheads will work quite well. Both require soft, slightly acid water if possible, but will do alright in hard water if necessary. Provide a pile of rocks for the Blockheads and a couple of flowerpots for the Kribs.

I can see no objection to the other fish you suggest, except that catfish have a nasty habit of eating cichlid eggs during the night. **MB**

Pairing will be tricky

[illegible]

[illegible] Oscar. [illegible] to get another to try and breed them. What is the best way to go about this?
Clifford Porter, Kent

[illegible] you had written to me before buying your Oscar. It is virtually impossible to sex these fish and even if you knew what yours was, and could find one which was guaranteed to be the opposite sex, you would then have to try and persuade them to live together. This would require a divider, at least initially.

To be honest, you would be better off selling your Oscar and starting again with half a dozen youngsters and letting them pair off as they grow. **MB**

Cats for flowing waters

I have a three foot tank in which I intend to create a waterfall effect. Please could you advise me on some catfish which will do well in such a set-up? Decor will consist of plants and bogwood.
A. Ronald, Aberdeen

I would keep some catfish which would enjoy flowing waters, such as the suckermouths or *Loricariids* in the genus Chaetosoma, better known as the Bulldog Plecs.

There are also other fish, such as Asian Flying Foxes, which would enjoy this sort of water flow. **DS**

The total volume of a planted tank should be turned over a maximum of once every hour. Pic. by Pete Trevett.

Why won't my plants grow?

Q **I wish to set up a planted aquarium, without fish. The tank size is 48" x 12" x 15", with gravel mixed with Everite No.1 and lime-free sand on top. The filtration will be provided by a Fluval 2 and an Eheim 2209, with reduced flow, and I intend to use two 100W heaters and a 400W stat.**

I have read in PFK that undergravel heating is a big advantage in plant only aquariums and I'm planning to buy a Rena 50W heating cable.

Which type of lighting do you recommend?

• Chris Kilzer, Guernsey

A Your proposed set-up amounts to overkill. Your tank holds 130 litres. This total volume should be turned over a maximum of once every hour. The Fluval 2, with a capacity of 360 l/h is already too strong and a second filter would make matters worse. Any undergravel filter kills plants, reverse-flow or otherwise. Fit a Dennerle CO.C.200, which is fitted with a CO2 atomizer and therefore serves two purposes, which cuts your costs.

You only require one heater/stat of 100 or 150W.

A substrate heater (cable or heating hose - not a mat) is important to simulate the natural nutrition springs, dosing the right amount of nutrients in a constant supply and preventing stagnation of the substrate by causing a slow water circulation. However, a 50W heater cable is too warm for your four foot tank. Use either a 25W Dennerle heater cable or, even better, and more cost effective, a BioPlast heating hose which is operated and controlled by your normal aquarium heater.

For lighting, try two 40W Sun-Glo tubes with strong clip-on reflectors. **BG**

They grow, you know

Q **I have recently purchased two young Red Eared Terrapins which are very small. Please could you give me some information on their care?**

• Sonya Dix, Hereford

A I hope you realise that Red-Eared Terrapins can grow to an alarming size and that a 20 gallon tank should be provided, even for babies. This should contain a 4" bed of washed gravel, filtered by an undergravel with a cut-off uplift tube. At one end of the tank you should suspend a 60W bulb and provide a basking platform, such as a flat rock.

Water changes should be made weekly, but do not suck to start the syphon - Terrapins are known carriers of the Salmonella bacteria.

Terrapins are carnivores and appreciate earthworms, but will survive on pellet food. Supplement this with freeze-dried river shrimp and tubifex cubes.

A heater will not be required in a centrally heated room, in fact the light bulb will tend to raise the temperature under the lid to uncomfortable levels, so incorporate one or more perforated zinc panels.

Most problems with Red-Ears stem from foul water, leading to bacterial and fungal infection, while vitamin deficiency can lead to swollen eyes and deformed shells.

When carrying out water changes on your Terrapins, never suck to start the syphon. Terrapins are known carriers of the Salmonella bacteria. Pic. by Trevor McDonald.

Painted turtles *Chrysemys picta* or Musk Turtles *Sternotherus odoratus* reach less of a size and are arguably more interesting. **NF**

Gentle cats

Q **I have recently purchased three *Hoplosternum* catfish which I have housed in a tank along with six Harlequins. They are feeding well on tablet food. Could you give me any information on these catfish and also which filter would be the best, as they tend to stir up the gravel when feeding.**
• E. Whitton, West Sussex

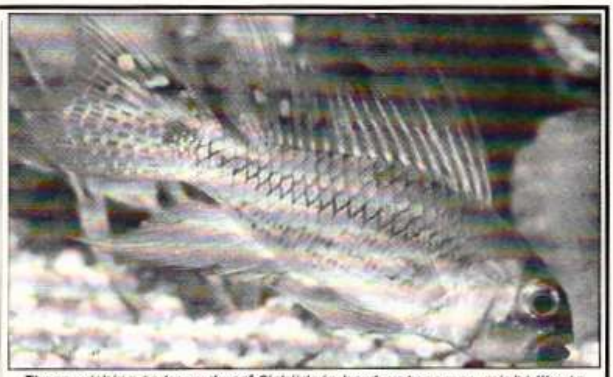
A *Hoplosternum thoracatum* can be treated as giant Corydoras, They're peaceful and active in a community aquarium. They are farm raised in the Far East in large quantities and sometimes strong individuals will outgrow weaker specimens. When larger they can be sexed when the male's pectoral fins thicken and the female becomes dumpy. They're suitable companions for most community fish.

Juveniles differ in colour pattern. Adults have less black spots and a grey body. They reach 4-5" in length.

You should employ a good internal power filter, such as Aquarian or Eheim and regularly use an Algarde gravel syphon cleaner which will clean up the bottom in minutes. If used every water change, it will prevent the tank from ever having to be stripped down. **DS**

Community dwarfs

Q **I have a three foot tropical community tank containing three Silver Tip Tetras, two Black Widows, and one each of Corydoras, Krib, Gold, Kissing and Dwarf Gourami and an Angelfish. The tank also houses two Spotted Puffers. Please could you tell me if there are any other cichlids which would fit in with my current stock?**
• Nick Mapp, Leicester



Those wishing to keep dwarf Cichlids in hard water areas, might like to try **Apistogramma cacatuoides.**

A I suggest you obtain a mate for your Krib. It's difficult for me to recommend other cichlids for your set-up without knowing details of your water chemistry. The majority of dwarf Cichlids which are suitable in temperament and size for your tank require - ideally in some cases, essentially in others - soft, acid water. If you have this type of water, you should be able to keep any type of Apistogramma or Rams.

If your water is hard then you will need to stick to more tolerant species such as *Anomalochromis thomasi, Nanacaras* or *Apistogramma cacatuoides.*

In a three foot tank you would have room for a pair of one species (as well as the Kribs), or a trio if you opt for Apistogrammas. Please do not try to fit in any more as there will not be room for them all to hold their territories.

One final point - Puffers are brackish water fish and inclined to be nippers. They are not at all suitable for your tank. **MB**

Protopterus aethiopicus, *alias the Congo Lungfish, can reach 1.4m in length.*

Heading for bigger things

Q **I am particularly interested in the African Lungfish. I believe there are four species. Please could you tell me what they are?**
• Steve Barnes, Brighton

A You are correct in thinking there are four species of African Lungfish. They are:

West African Lungfish *Protopterus annectens.* This species has a mottled colouration with dark irregular spots. It grows to 1m.

East African Lungfish *P. amphibius,* which is almost identical to the above, but has a generally darker base colour.

Congo Lungfish *P. aethiopicus.* This species comes from the Nile, Congo and Eastern Africa. It has a light base colour with dark, more regularly shaped blotches giving the appearance of marbling. It grows to around 1.4m.

P. dolloi. This species originates from the Zaiire basin. It is a uniform brown with small, dark blotches and pale lines on its head. It has a thin, tapering tail. It reaches about 80cm. **PD**

Use robust plants

Q **In my three foot tank I have a number of boisterous fish, including a Black Shark and some large catfish. I would like to add some plants, but I understand this will be difficult. Are there any which will tolerate the presence of rougher fish?**
• K. Woolsgrove, Sussex

A Growing plants and keeping robust catfish is not the easiest task as they tend to dig into the substrate in search of food. There are some tough plants which may survive in these conditions. One bulb grass, called the Onion Plant, from Singapore would survive if kept in a deep gravel bed. The other is Java Fern, which you may be able to obtain from a specialist plant supplier. Soft-leaved plants would not stand a chance. **DS**

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■ **Answering general queries are DR DAVID FORD, Senior Consultant to the 'Aquarian' Advisory Service, and NICK FLETCHER.**
■ **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.**
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Don't mix the two

I am planning a 6' x 2' x 18" tank for American cichlids, namely Firemouths, Gold Severums, Brown Acara, *C. synspilum*, *G. brasiliensis* and a Plec. At the moment these are in a three foot tank, which they are obviously going to outgrow.

Which type of filtration would you suggest for this large tank? What size of heater would be required?
Robert Meldrum, Tyne and Wear

I think it would be a great shame to waste the opportunities offered by such a large tank, by starting off with an incompatible mixture of cichlids.

At present you have a mixture of Central American (these tend to be assertive, or downright rough, with a requirement for moderately hard and alkaline water) and South American (quieter, requiring soft, acid water), which is never a good idea if you want to do things properly. It would be better to specialise in one group or the other.

I would go for an undergravel system, with a single power filter which is not in regular use, but brought into action if a "clean-up" is required.

Heating will depend on not only the tank size, but also where it is situated. Try it with 600W of heating, which should be adequate unless it is in very cold surroundings. Be prepared to add more heating if the heaters are on continuously and the temperature is only just up to par. **MB**

Predatory catfish

I recently purchased two *Mystus micracanthus* and I would be grateful if you could give me any information on them, such as water chemistry, diet and eventual size.
Craig Jennings, Cornwall

The two spot Asian Catfish *Mystus micracanthus* is from the scale-less Bagridae family.

The species grows to about 4" and is one of the most attractive of this large genus. They are exported from Indonesia and Singapore and they will thrive on a shrimp/earthworm diet, provided they are given spacious conditions and bright, fairly neutral aquarium water.

All Mystus are predatory but smaller species are ideal for medium-sized fish community aquaria. **DS**

The Indian Glassfish, **Chanda ranga**, *is a brackish species. It stays quite small, reaching only about 2" in length.*

Brackish is best

Q **My tropical community tank is four feet long. It contains various Tetras, Dwarf Gouramis, Guppies and Corydoras, along with a Red Tailed Black Shark. I recently purchased two Glassfish, but I have since been told that they prefer salt in their water. Is this correct?**
• C. Watts, Manchester

A The Indian Glassfish, *Chanda ranga*, is best in brackish water, with one or two teaspoons of salt to every two gallons, although it will do without. It is a peaceful species with a shy, almost nervous disposition. It prefers the company of its own kind and should be kept in groups of four or more. Glassfish are not ideally suited to the turmoil of a community tank.

A shoaling species

Q **Please could you give me some information on Silver Dollars? I understand they are vegetarian and mine eat plants and some fruit, but they also seem to enjoy flake and granular food.**

I have two of these fish in an 18" tank and at the moment they are only 2" in diameter but growing very fast.
• C. Thompson, Berks.

A The Silver Dollar will grow to about 5" and will eat all your plants. It is a peaceful fish which originates from the lower Amazon.

Due to their rapid growth rate and because it is so vegetarian it is not a fish recommended for home aquaria and is usually seen in public aquariums where a shoal looks splendid.

Your fish would be happier in a shoal, if you have room.

You cannot sex these fish but a pair can form from a shoal and they will breed in large tanks where they scatter eggs with up to 2000 fry. **DF**

Good shelter for fry

Q **Please could you give me some information on the Tropical Hornwort, *Ceratophyllum submersum*? I wish to incorporate it in my community tank.**
• B. Coombes, Merseyside

A *Ceratophyllum submersum* is a rootless plant with thin, much-branched stems bearing whorls of bristle-like foliage. It grows to between 50 and 100cm long.

Propagation is simple. Any piece which becomes detached from the mother plant will grow on and turn into a new plant.

Like all plants, it requires nutrition-rich, clean water and plenty of bright light. Otherwise it is undemanding.

It's an ideal floating plant which provides good shelter for fry. There is another variety: *C. demersum*, which has coarser foliage. **BG**

There are two species of Tropical Hornwort: **Ceratophylum submersum** *and* **C. demersum**, *as shown here. This type has coarser foliage.*

A secondary infection

Q I was shocked to find tufts of what looked like grey cotton wool with bits of food and gravel floating in my tropical tank. My dealer told me it was Saprolegnia and it is caused by overfeeding.

I eradicated it using a fungus treatment before it had a chance to harm my fish, but I wonder if you could advise me on the problem and ways to stop it re-occuring.

• S. Billington, Gwynedd

A Even in a well-maintained aquarium, fungus and fungal spores will be relatively common. Fortunately, most of these will be suppressed, by that I mean that they will be deprived of a "host" which they must have before they can establish themselves. Where over-feeding occurs or if a fish dies and is not removed, then this gives the fungi the host it requires and it begins to multiply at an alarming rate.

The spores from Saprolegnia may be transmitted from one fish to another or via decaying food. However, fish have a mucus lining covering the body and in a healthy specimen this will form an effective barrier against the fungus. If this lining becomes damaged through fighting, rough handling and suchlike, the fish will become susceptible to the fungus. Poor water conditions and sudden fluctuations in temperature may also lay the fish open to infection. Fish eggs can also be infected.

Fungus can be removed using a proprietary treatment which should be added as soon as the disease becomes evident - white, brown or grey cotton-wool like growths.

Keep an eye on the amount of food you give - particularly if feeding meat foods and clean the gravel regularly with a gravel cleaner. **PD**

Saprolegnia often sets in as a result of damage to the fish's protective mucus lining, or as a secondary infection. This magnified photo shows Saprolegnia combined with the White Spot virus.

Rams make good companions for Discus, as they usually stay at the bottom of the tank.

Soft water fish

Q I am setting up a four foot tank for Discus and I'd like to keep something else with them. Please could you suggest some fish which will be happy in the soft water conditions required by Discus and which will not antagonise them?

• Justin Merritt, West Sussex

A You may keep many different types of fish with your Discus. Most Tetras will do very well, especially if they are in large shoals. The small cichlids, such as Rams, Keyholes and Kribs are fine, as they usually stick to the bottom half of the tank. Clown Loaches are one of my favourites and they are happy in a large group.

Also, catfish such as *Ancistrus* and *Corydoras* do very well, feeding on left overs from the Discus. **SD**

Colouring up

Q I have a four foot tank containing various cichlids, including four Mozambique Mouthbrooders, which are very heavy with eggs.

Two of the Mouthbrooders change colour at random from their normal silvery-white to a darker grey coour, with pink pectoral and dorsal fins and more prominent vertical body stripes. Their eyes go very black.

Why do they do this?

• Gordon Brown, Essex

A The colour changes may look random to you but, believe me, to the fish they are very meaningful. Many cichlids and other fish change colour according to mood - which means not just happy, excited or frightened, but also expresses the relationship between one fish and another.

Thus the top fish will show splendid territorial colour in the presence of his nearest rival. This asserts his position as boss. If his rival also colours up he is issuing a challenge and a fight may ensue. Usually the rival will adopt a submissive "okay it's your tank" - colouration and swim away. Females will exhibit rivalry too, especially in the absence of a male.

Obviously a male will also colour up when a female goes by and she may signal "ready to spawn" or "I've got a headache" by her colour.

During the day, numerous encounters of this type occur and the fish change colour accordingly. **MB**

No eggs or fry

I bought some fish about seven months ago. They consisted of Mollies and Guppies, Swordtails and Angel fish. None of these have shown signs of becoming pregnant or laying eggs.
Please could you tell me why?
A. Aldyss

You cannot expect to breed any fish in a community aquarium...the other fish eat eggs and fry as soon as they are produced. In the wild the breeding pair have a nest or a cave and drive other species away. This is difficult in the confines of an aquarium.

To breed fish you should have a separate breeding tank to house the pair or one pregnant livebearer. Unless the species are good parents it is also wise to remove the adults after spawning.

Do not use breeding traps. These cause the female to panic and give birth prematurely with poor fry.

Interpet have published a good book on breeding via Salamander Books. It's called 'An Interpet Guide to Fish Breeding' by Dr. Chris Andrews. **DF**

Many people will be familiar with this fish in its pink guise, which is the commonest seen in the hobby. In fact there is also a silvery-green variety available, which was previously thought to be a separate species.

Although both colour forms have rows of small pebble-like scales running the length of the body, it is in the silvery-green variety that they are more pronounced.

A kiss is just a kiss

This is an active fish, with a main characteristic, as its common name implies, in the unusual behavioural activity of 'kissing' other fish of its own kind.

The lips, during the act of kissing, are 'puckered', and look like two sink plungers, before the kiss is actually made.

The Kissing Gourami has an irridescent beauty. Pic: Max Gibbs, the Goldfish Bowl, Oxford

FAVOURITE FISH • FAVOURITE FISH •

The Kissing Gourami

PAUL DONOVAN reminds us that when it comes to this gourami, a kiss is just a kiss....

Despite its appearance, the actual physical act of kissing is not a prelude to mating, and has no direct comparison with kissing in humans.

Neither is it an indication that spawning or any other form of sexual act is about to take place, and would therefore seem to only serve as a behavioural act.

Vegetable matter should be incorporated in the Gourami's diet.

In fact, it is often extended to other species, although these 'kisses' are generally placed on the side of the body, and could therefore be interpreted as a means by which the gourami wards off a tormentor or affirms its presence.

There are some reports of the fish becoming a bit 'pushy' as they mature, though I've not found this to be the case myself....yet.

Sexing and breeding

There are no reliable external differences between the sexes, although the female when viewed from above has a slightly distended abdomen.

Once mating has taken place, spawning usually occurs during the evening, when thousands of floating eggs are laid. If spawning is witnessed, the eggs are best removed to a separate tank for rearing.

Tank requirements

There are few specific requirements for the successful maintenance of this gourami in captivity. They seem, from my experience, to adapt to most water conditions, though I try and aim for neutral water of pH7 and a general hardness of 10 dH.

A robustly planted aquarium with stout plants will suit this fish, but plenty of open water should also be provided for swimming.

Feeding

It is important to include a certain amount of vegetable matter in the diet, either via the promotion of algal growth or, the introduction of small amounts of lettuce leaves.

Oh, and expect some plant nibbling. Their rasp-like teeth are quite capable of removing algae from rocks, branches and other surfaces. I even have one in my aquarium which, for some obscure reason only known to itself, likes to spend its time trying to suck non-existent algae from the aquarium glass.

Food will be taken from the surface, to which the fish will also migrate if there is a lack of oxygen in the water, to gulp air.

The addition of Kissing Gouramis, or any gourami come to that, in an aquarium, will help combat problems associated with hydra and Planaria worms, as gouramis thrive on them.

This gourami is a hardy, attractive fish whose behavioural habits give it a worthy place in the community aquarium of both beginner and experienced fishkeeper alike. Although I have yet to see a fully grown specimen, I imagine them to be an impressive fish. ■

KISSING GOURAMI *Helostoma temmincki*

Anabantidae.
Feeding: Peaceful.
Environment: Community fish.
Tank position: Middle.
Temperature: 24-28 C.
Distribution: Southeast Asia, Sumatra, Borneo, Thailand, Malay Peninsula.
Size: 30 cm.
Diet: Flake food, plant matter, earthworms, bloodworms, daphnia, tubifex, mosquito larvae.

◀ by a shedful of equipment comprising banks of UV, protein skimmers, towers filter chambers and fluidised sand beds, so in balance that the only regular maintenance required is rinsing of a single filter cartridge.

Fluidised sand filtration, also employed at the head of the river cascade feature, involves water being pumped into the base of a clear acrylic cylinder holding coral sand.

The nitrifying bacteria have a huge surface area to colonise because the sand is in constant suspension, and once the flow has settled into a laminar pattern there is no 'tracking' as you would get in a conventional biological bed.

Even the titanium exchange refrigeration plant is high-tech, using no harmful CFC gases.

Water levels, temperature, redox potential and salt concentrations are all data monitored by a computerised AB Aquatronic system, installed by Andrew Stagg of New Technology. Should oxygen concentrations fall, a redox control in the protein skimmer automatically triggers the ozone unit.

A computer also regulates the lighting levels so that moonlight, dawn, daylight and dusk may be simulated by a combination of metal halide blue fluorescent and UV lamps, all time-controlled to come on and go off in the correct sequence.

Above: Dr Gordon Reid is responsible for fish husbandry behind the scenes of the exhibition.

Left: A Whiptail Cat in the World's river exhibition.

away with the need for unsightly strengthening braces, the tanks were computer-designed and built of triple laminate glass.

It was calculated that they would theoretically hold 14 times their actual volume of water before they gave way, a reassuringly-large safety margin in any public aquarium .

Nevertheless, keeping the weight of internal decor down to a minimum is always sensible:

A Grey Mullet in one of the British marine tanks.

Equipment

The display tanks were made by a German company, Laging Aquarien, and installed by Chris Rawlings' team from Aquamagic, who first had to construct the supporting bases to highly accurate tolerances. To do in the coral reef display, New Technology's Andrew Stagg had the opportunity to try out an entirely new concept in aquascaping which will shortly be generally available. It consists of a spray-on foam which, when misted with water, takes on bulbous contours and cures hard. Already, this artificial but highly realistic 'rock' is being colonised by algae and soft corals .

Conservation centre

Attractive as the World's River and corridor displays are, the actual shirtsleeve work is conducted in the Conservation Centre at the foot of the stairs, where Dr Reid is assisted by Dave Gawith and Chris Harding. Here, endangered Lake Victoria cichlids are bred and maintained; here new stock is quarantined, and here British marine invertebrates multiply, thanks to lighting innovations and irreproachable water quality. Several species of reptiles and amphibians are under study, too, including South American poison dart frogs and a breeding colony of water dragons.

A day out?

Although reaching the Horniman by public transport from points north is not easy, the museum has gone out of its way to make things easy for visitors, once they have arrived. The stairlift for the disabled is supplemented by wheelchair ramps, and the high-intensity lighting on the tank displays is intended to help the visually impaired. You can pick up an audioguide to all the aquarium exhibits, and each handset has a booster for the hard of hearing.

The Living Waters display is not extensive enough to justify a full day at the Horniman, but don't forget that the museum is also a treasure house for those interested in ethnography (the peoples of the world, their arts and customs); musical instruments (one of the most comprehensive collections anywhere); and natural history, of which the aquarium is only part of the display.

Outside, there are 14 acres of mature gardens, including ponds, a conservatory recently restored, a small collection of animals and a nature trail. ■

The Horniman offers free admission, and is open from 10.30 am to 5.50pm Mondays to Saturdays, 2 pm to 5.50pm Sundays. The gardens open daily at 8am and close at dusk.

Marine Forum

Dave Keeley is your expert on the saltwater scene

Hard luck

Q My local shop sells dead coral for decorating marine tanks. I thought this was illegal now. The owner says there is no alternative. As a conservationist, I think it is immoral. Should I report him to the police? – R. Green, Braintree.

A **It is not necessarily illegal to sell coral, dead or alive. But most species of hard coral are on CITES Appendix II (CITES = Convention on International Trade in Endangered Species). The UK respects CITES regulations. It is therefore illegal to trade in any species listed on appendix II, without an appropriate import licence and an accompanying export licence from the source country. At the time of writing, I believe that no import licences have been issued, but this does not mean to say that they will not be in the near future. Though the regulations have been technically in force for well over a year now, it is only in the last few months that the authorities have enforced them.**

It is not illegal to sell corals legitimately imported, nor is it illegal to sell corals imported prior to their inclusion in the Appendix.

Many conscientious dealers have refused to deal in dead corals for many years now, believing that the destruction of habitat is both immoral, and self defeating to our hobby. I fully endorse that view.

Your dealer is very wrong on one point – there is now a viable alternative. Reeforms are a range of 50 artificial corals, available in natural colours or bleached white, very true to life, and virtually indistinguishable from the real thing. They cost about the same price as the real thing, but their use will not contribute to the destruction of the reefs.

Cold comfort

Q Last week my combined heater-thermostat failed, nearly resulting in the complete wipe out of my three month old marine tank. If I had not noticed it in time, I would have lost everything over night. Even though my dealer has exchanged the heater under the guarantee, he has confirmed that he would not have replaced my dead fish and invertebrates. When I went into the shop, he advised me to buy a Visitherm, because he has found them to be the most reliable make he sells. What do you advise? – A. Frost, Warminster.

A **First some general points. Your shopkeeper is only half right – you should be buying TWO Visitherm heaters. You do not mention the size of your tank, but irrespective, an average marine tank can easily cost £300-£400, and can soon contain an equal value in livestock. If you buy, for instance, two 100w units instead of one 200w unit, if one fails then the second one will maintain the water temperature except under the most extreme of conditions; and conversely, if one sticks in the on position, it would take far longer to over heat the tank.**

Visitherm heater-stats have been on sale for around four years now, and well over 1,000,000 pieces have been sold. The world wide return rate is under 2%. I do not know of any other heater-thermostat which has anything like this track record, and so it must be your best buy. Or rather, THEY must be.

Fighting Copper

Q I want to put inverts. into my previously fish-only tank. I have used SeaCure a few months ago. This solved my disease problems, but now is a nuisance. I have done a couple of extra water changes, but am still worried that the copper will be present. Do I need to strip down the tank? – C. Cure, Illminster.

A **Once you have introduced copper into any tank containing absorbent materials such as sand or rocks, you can never be sure that the copper will not leach out again sometime in the future: a drop in pH, in particular, however temporary, will usually precipitate this. Unless you are prepared to replace all your natural decor materials, sands and gravels from the aquarium, your only other alternative is to install Poly Filters. This is a marvellous product for removing copper from an aquarium – simply install a Poly Filter in any filter, and it will remove copper as it is released into the water, before it can adversely affect invertebrates.**

Poly Filter has many other unique and far-ranging properties in both fresh and salt water, but that is not relevant here.

Ioning out differences

Q For many years I have used SeaTest Kits, and until now have been more than satisfied. I used a Nitrite Kit when I first started four years ago, and continue to use Nitrate and pH Kits every week. These show that I have nitrates of 15 ppm, and a pH of 8.2. Recently my local shop advertised a free water check service for his regular customers, and I took advantage of this. He was using EasiTest Kits, and though the pH readings nearly agreed, the nitrate kit showed a reading of 70 ppm. On my protests, he took another make from his shelf, which showed a reading of over 90! Your kit is out-gunned 2-1 – admit it, it is not nearly so accurate as you promise. – **S. Cale, Teston, Kent.**

A **If you measured your water temperature at 75°, yet your dealer said it was 24°, you would soon work out that you were both using different scales, in this case fahrenheit and centigrade. Neither of you would be wrong, just different. As long as you were both aware which scales you were using, you would agree to differ.**

It is just the same with nitrate. There are two different ways of measuring it – you can either measure Nitrate-Nitrogen (NO3-N), or Nitrate Ions, (NO3). Nearly all scientific text books, and nearly all respected marine authors, such as Martin Moe and Stephen Spotte, use Nitrate-Nitrogen. So does SeaTest. So, traditionally, it has always been accepted that a reading of around 20 ppm nitrate is acceptable for an average marine tank.

Recently there have appeared two or three brands of test kit which measure Nitrate Ion. So previously contented aquarists have suddenly found that they have readings of between 50 and 100, and started to panic. If they had realised that they should have divided by 4.4 to get a 'traditional' reading, there would have been no problems.

I stress that either reading is correct. The important thing is to find out what your test kit actually measures, and read it accordingly.

Perhaps you can let me know the name of your dealer, and we can help him out of his confusion as well. And I trust that your well founded faith in SeaTest is restored.

PRODUCT INFORMATION

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JAN FOLDER PFK

The Cardinal Tetra - red from chin to tail ...and below right, the Neon Tetra with red from tail to anal fin.

Tempting Tetras

We make our selection of easily kept - and often easily bred Tetras

A pair of Congo Tetras, the male at the top. These are young fish that have not yet developed the full potential of their flowing fins

Tetras are part of the family of Characins which expand across two continents, being found in Africa and South and Central America. They are typically shoaling fish, and most of the examples that reach our tanks are small species that rarely exceed four inches. In this gallery of some of the easiest and most attractive Tetras (pictures by MAX GIBBS of the Goldfish Bowl, Oxford; and PETE TREVETT) we cover one Tetra from Africa and several from South America.

Africa

The Congo Tetra, *Micralestes interruptus* comes from the Zaire region of Central Africa and is one of the larger Tetras. Males may reach 3½". It prefers slightly acid water at around 25°C. The fish will survive under less than perfect conditions but the superb flowing finnage will not be seen at its best. One of the more expensive Tetras, it can be bred in captivity comparatively easily, and is well-worth the effort.

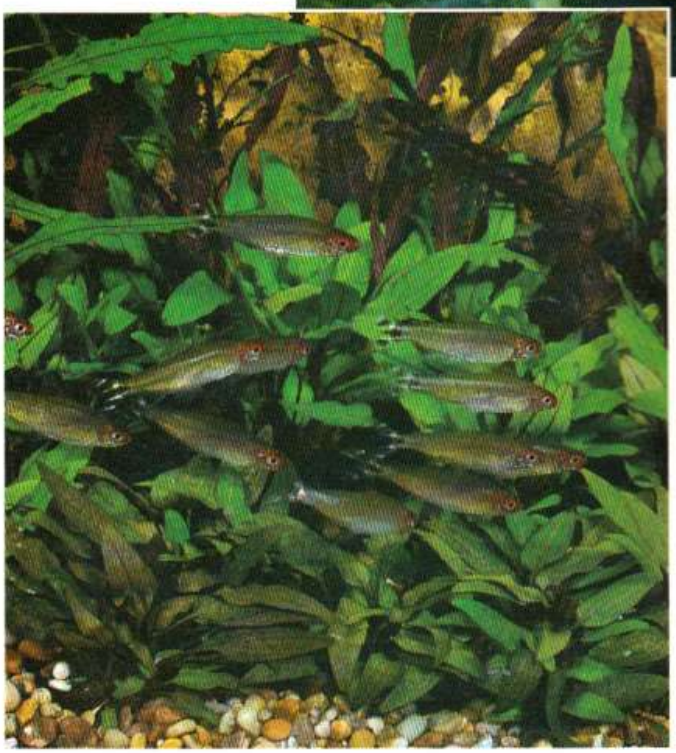
South America

The Cardinal and Neon Tetras *Paracheirodon axelrodi* is easily confused with the Neon Tetra *Paracheirodon innesi*. The Cardinal has the full belly of red which on the neon only extends halfway down. Both are among the most popular fish for the community aquarium, and could be kept together in soft water at around 24°C, pH6.5. Black substrates and controlled lighting help to show off the colours produced in these circumstances. The Cardinal is found in the Orinoco, Rio Negro and in Columbia; the Neon comes from the Upper Amazon.

◀ **The Bleeding Heart Tetra,** *Hyphessobrycon erythrostigma* or *rubrostigma* is well-known for its distinctive red heart marking. From the Upper Amazon, it reaches 3" long and prefers soft slightly acid water at 25 C. It's quite important to keep this species both in shoals and in a mixed community - perhaps of other tetras.

X-Ray Tetras are not as transluscent as their name suggests.

The X-Ray Tetra or Water Goldfinch, *Pristella maxillaris* likes plenty of swimming space. It will thrive in neutral water at 24°C and in good conditions it will reach 2" and show the bright red tail of the wild-caught fish. Comes from the Lower Amazon and tributaries.



Left: The Rummy Nose Tetra should perhaps be called the Rummy Faced, as the colour extends to the gills.

The Red or Rummy Nose Tetra, *Hemigrammus rhodostomus* comes from the black waters of the Rio Negro. Water should once again be at 25°C and pH 6.5 - blackwater extract can be useful in creating good spawning conditions. They reach 2" long.

Left: The unmistakable Bleeding Heart Tetras.

Below: Lemon Tetras - delicately yellow.

Breeding Tetras –Some General Rules

All of these fish scatter eggs, either onto the substrate or among fine-leaved plants. In most cases, to induce spawning you should separate a small shoal of tetras to their own prepared tank (where sex differences are obvious, a ratio of two males to four females is of the right order).

Feed the fish up on small frozen irradiated foods like tubifex, or on brine shrimp, to condition them.

The water in the tank should be at the ideal pH for the species, and in most cases will benefit from the additon of a blackwater extract. Pay attention to the hardness of the water as well as the pH. The tank should contain plants such as *Myriophyllum, Cabomba* or Java Moss or a spawning mop made from boiled green nylon wool for those tetras that scatter among weeds. For substrate spawners a mesh can usefully be placed a few inches from the substrate for the eggs to fall through. In either case the parental shoal should be removed after spawning.

The eggs take varying periods to hatch; 24 hours for Cardinals or Neons, Black Widows and most of the smaller tetras; up to six days for the Congo Tetra. Virtually all the fry of the smaller fish will require infusorians (see PFK October 1991) as a first food, after three or so days as they become free-swimming. Newly-hatched brine shrimp are also a useful first food.

The Serpae Tetra
Hyphessobrycon serpae comes from the Amazon and is very dificult to distinguish from the Blood Characin or Callistus Tetra *(Hyphessobrycon callistus)*. Both have a reputation for nibbling and nipping at other fish. They may damage smaller fish in their tank. Like most of our other tetras they like to be kept at 24°C in slightly acid water.

Left: The Serpae Tetra closely resembles the Callistus Tetra.

Right: A young Black Phantom Tetra.

The Black Phantom Tetra.
Megalamphodus megalopterus could, at a casual glance be mistaken for a Black Widow Tetra, especially as some of the Widows have similar flowing high dorsals and overlarge anal fins. But the Phantom comes from the Rio Guapore between Brazil and Bolivia, and prefers soft acid water at 24°C. It can be susceptible to fish tuberculosis - reject any fish that seem in any way bent or deformed.

The Lemon Tetra
Hyphessobrycon pulchripinnis is not listed in every book, though it has been around in the hobby for nearly 60 years. A stunning yellow-coloured fish, it only reaches 1½" and prefers acid water at 24°C. It has the reputation of being more difficult to breed than some of the other Tetras. ▶

The Black Neon Tetra, *Hyphessobrycon herbertaxelrodi*, also has the striking longitudinal stripe of the Neon, this time in golden yellow, and in common with most of the Tetras prefers the security of a shoal of at least six fish. It comes from the Rio Taquary in the Mato Grosso of Brazil, and prefers slightly acid water and temperatures around 25°C. They bear more than a passing resemblance to *H. heterohabdus* from the Rio Tocantins in the lower Amazon.

Max Gibbs found subdued light brought out all the scintillating colours of these Glowlights.

The Glowlight Tetra, *Hemigrammus erythrozonus* has a similar body shape to the Cardinal and Neon, but is far more subtly-coloured, and the irridescent central band appears to exude light. Widely distributed in north eastern areas of South America this peaceful Tetra likes temperatures around 25°C and slightly acid water. Again subdued lighting brings out the best in these fish.

The Black Widow Tetra, *Gymnocorymbus ternetzi* is found in the Mato Grosso. The Black Widow can be 2½" long, and is often quoted as a hardy alternative to the Black Molly (which may need salt in the tank water). In fact the mature fish is a silver grey colour with quite distinct black bands (as our picture shows). The Black Widow prefers cooler water than some tropical fish - down to 20°C. Presented with the temptation of male guppies, the Black Widow can be something of a fin-nipper. ■

Right: Black Neon Tetras with the distinctive lateral stripe.

Below: The Black Widow Tetra is easy to breed and long-finned variations have been developed

What's Blackwater Extract?

Many of the Tetras (and many other South American fish) come from blackwater areas. Here the water is dystrophic - that is characterised by a dark brown colour caused by a rich content of humic matter. The bottoms of such water are covered with partially decomposed peaty substances, and this produces high concentrations of Humic Acid. Such waters will always have a pH below 6. Truly dystrophic waters will not support much life - even filter bacteria would find the going tough at a pH as low as 4.5.

Waters such as the Rio Negro are in the higher pH area.

Although such waters have limited nutrient content, some indigenous species do thrive in the higher pH areas (such as Uaru, Discus, and Tetras), and to recreate blackwater conditions may be important. One manufacturer describes his Blackwater extract as *"a unique blend of peat extract, naturally occuring vitamins and plant hormones"* which *"effectively recreate natural water conditions especially beneficial to such fish as tetras... Regular use... encourages fish to develop their full colouration, improves resistance to disease, and induces spawning"*.

It will also aid plant growth and inhibit some fungis. What blackwater extract won't do is to impart a lasting lowering of pH or hardness. For that, more permanent water softening methods are essential.

Fortunately most tetras are now bred in the hobby, and will thrive in neutral water. Equally, as most of them are small fish, you will only need a limited quantity of soft water for perfect conditions in a small breeding tank.

PRACTICAL
Fishkeeping
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This month's competition begins on **December 28** and to enter all you have to do is study the three questions below. All the answers can be found in this month's Top-Up advertisment.

When you think you have the correct answers, dial our competition hotline on **0898 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.

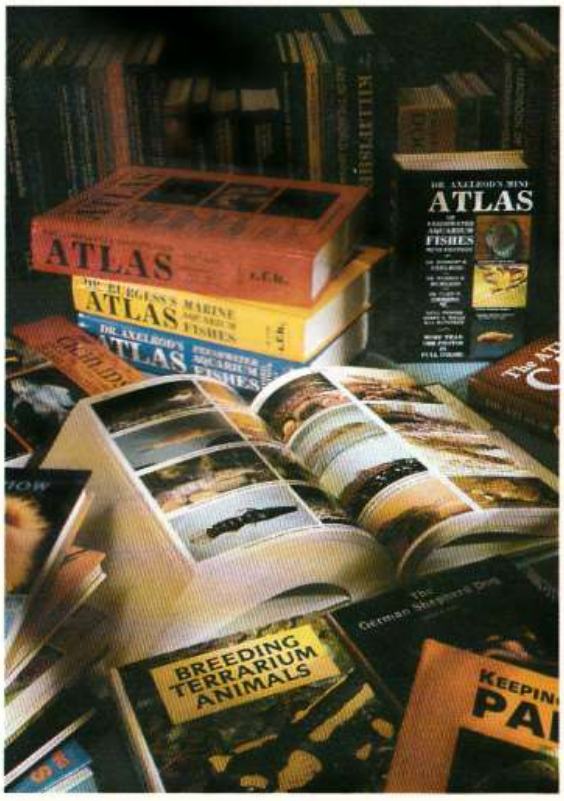
If you answer all three questions correctly, you will be asked to leave your name and address. Please state whether you would be willing to receive details of any further promotions. Keep the competition handy when you phone. Calls cost 36p per minute cheap rate and 48p per minute at all other times.

The names and addresses of all the correct entrants will go into a draw after the closing date, which is **January 28.** The first name drawn will win £250 worth of TFH books of their choice. The next ten names drawn will be able to choose TFH books to the value of £25.

1. What is the price of an Aquaclear 201 Powerhead from Top-Up this month?
a. £20.99
b. £10.99
c. £10.50

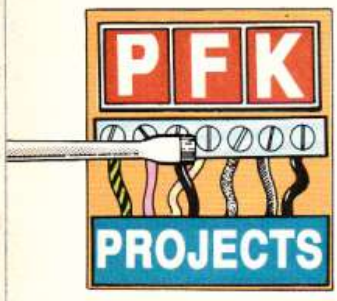
2. How many hours do Top-Up open each week?
a. 43
b. 53
c. 63

3. How many plants are there in the Top-Up multi tank plant selection?
a. 132
b. 122
c. 112



Just a selection of the books this month's winners will be able to choose from.

• DIAL 0898 600 067 •



Beating hairy m

PETE TREVETT set up a planted tank for our projects pages this summer. But he ended that piece by commenting on the problems he was beginning to see with algae. Here's how he tackled the problem.

A Gold Saifin Molly. Livebearer fry survived well due to the dense foliage.

The June issue of Practical Fishkeeping contained an article I had written relating to the setting up of an Aquarium with a view to obtaining good plant growth. Now that a few months have passed I thought it might be a good idea to give an update on this project highlighting the problems I encountered and the way these were overcome.

Beating the algae

You may recollect that in the first article I stated that I had an algae problem - both normal green algae coating the leaves of the plants - and hair algae growing on the plants, rocks and aquarium glass.

The green algae was quickly eradicated by adding a small Plecostomus to the tank. The hair algae was more persistent and the growth of this escalated rather badly. It reached the stage where I was considering removing all of the plants and starting again.

This would have been a rather drastic and costly solution so I sat down, put the few brain cells I have into motion, and reviewed the situation. The first conclusion I came to was that this would be a "battle" and I was not going to let the algae gain the upper hand and defeat me.

I decided that the main cause of this algal growth was the fact that the plants were not yet established and therefore there were lots of nutrients available and also a lot of light which encouraged the growth of the algae.

The solution to this problem seemed to be to try and slow down or completely stop the growth of the algae to enable the plants to become established. They would then eventually decrease the level of light reaching the algae and lower the available nutrients thereby halting its growth and starving it out.

Reducing the amount of light in the tank, along with the addition of a blanket weed killer, did nothing to cure the algae problem.

Chemical warfare

I purchased some blanket weed killer in liquid form (marketed by **Interpet**) which I had decided to use to try and kill the hair algae or at least stunt its growth. I removed the worst affected leaves and shoots from the plants in the tank, and then added a 5ml dose of the chemical and kept my fingers crossed - hoping that this would not harm the plants.

I also reduced the amount of light in the aquarium by switching off one of the Powerglo tubes - this left a Triton and Powerglo switched on for ten hours a day. I monitored the effects of this over the next two weeks, but could not discern any change in the quantity of algae in the tank - it certainly wasn't disappearing!

The only thing I did during this period was to remove more leaves and shoots with hair algae on them. However, I did note that the plants did not seem to have been affected by the blanketweed killer and, in fact, the vast majority of them were growing.

the menace

The *Alteranthera lilacina* and *Alteranthera sessilis* (both red leaved plants) were the only types which were not doing well - I put this down to the fact that the light level had been lowered and these types of plant do require a lot of light. I therefore removed them before they started to disintegrate.

Active encouragement

Having discerned that the plants were growing I purchased a bottle of Everplant D liquid fertiliser and proceeded to add 9 drops per day to the aquarium (1 drop per 5 gallons) and, in fact, I have been adding this ever since.

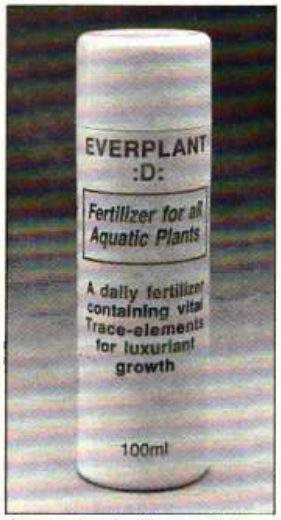
However, I did not increase the light level at this time.

Three to four weeks after this the aquarium was choked with plant growth - so much in fact that the fish had no open spaces in which to swim. The livebearers in the tank had a field day with plenty of fry surviving because they could hide among the plants.

I drastically pruned the plants at this point, discarding shoots and leaves with hair algae on them and replanting cuttings which were free of algae.

A friend gave me some *Riccia flutans*, a very good floating plant which seems to be practically impossible to obtain in my part of the country (Berkshire). This plant is especially useful as cover to decrease the light penetrating the aquarium and for fry to hide in. This was placed in the tank after the other plants had been thinned out. By this time the hair algae was slowly disappearing. To help it on its way I removed any leaves with algae on them at twice weekly intervals. Since then I have had to thin out the plants a second time and again replant the cuttings.

At the time of writing, the hair algae seems to have been almost totally eradicated. I believe that the Blanketweed killer assisted in checking the growth of the algae for a period sufficient to give the plants time to get established.



An aquarium fertiliser can help win the algae battle by promoting the growth of other

Filtration

Filtration is still done by a Fluval 303 external filter with the normal flow rate reduced to about one third. I noticed a helpful letter on the talkback pages recently suggesting that I change this, but I feel that this is not necessary as it seems to be working well. I may add a trickle filter to the existing filtration at a later date as an experiment to see what effect this may have on the growth of the plants.

Currently the plants are happy, healthy and growing well, so well in fact, that I am now looking to add a few different species to enhance the display.

Lighting

Over the last two months I have adopted the practice with the lighting of having two tubes on for ten hours a day. The third tube is switched on each evening for about four hours.

Because of the excellent growth rate I see no need to increase the light levels above this at the present time. Throughout this period partial water changes (25%) have been carried out once every four weeks. The replacement water is taken straight from the tap ensuring, of course, that it is the same as the temperature in the aquarium. Aquasafe is added to this water to remove Chlorine etc.

The solution?

In summary, I believe that the demise of the hair algae was achieved by utilising the following procedures:

- Using a chemical which seemed to stunt the growth of the algae.
- Reducing the level of light in the aquarium.
- Promoting the growth of other plants using an aquarium fertilizer.

Summary

As with many things encountered in this wonderful hobby of ours, it is often a case of trying different things in order to solve a particular problem. This time it worked for me and I won the "battle" and have an aquarium to be proud of. The next time I may not be so lucky! Now about that Blanketweed I have in my Koi pool. ■

List of Plants currently in the Tank

Aponogeton crispus - Crinkled Aponogeton
Bacopa caroliniana - Giant Bacopa
Cryptocoryne affinis
Cryptocoryne pontederifolia
Cryptocoryne wendtii de wit
Echinodorus paniculatus - Broad Leaved Amazon Sword
Hygrophila polysperma - Dwarf hygrophila
Ludwigia natans - Creeping Ludwigia
Microsorium pteropus - Java Fern
Riccia flutans
Vallisneria gigantea - Giant Vallis

The planted aquarium after five weeks. Early algal growth was eradicated by adding a Plecostomus.

PFK PROJECTS

MARY BAILEY carefully moves her mouthbrooding mothers, and looks at the problems of raising the fry.

A Mbuna community. Don't let fry be born in this setting.

GET THE BEST from your broods

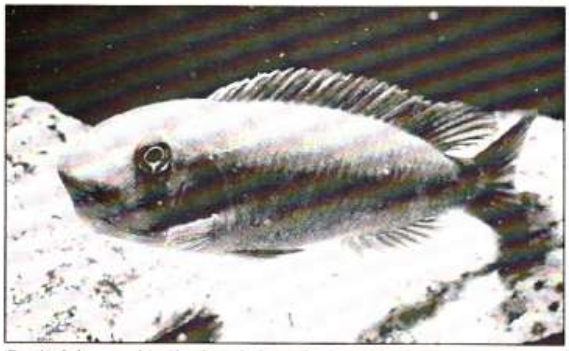
Last month I showed you how to set up a 'maternity' tank for Mbuna mouthbrooders. Now let's tackle the interesting problem of how and when to move the brooding mother.

When

Over the years there has been considerable debate over the best time to move a brooding female. Some fishkeepers say as soon as possible - others advocate as long as possible - after the spawning.

If the female is moved for her own safety, then obviously she should be moved at once, and if she eats the eggs, then at least she is alive and safe.

In fact I have almost always moved Mbuna within an hour or so of the completion of spawning, and never had a problem with egg-eating.



Don't delay moving the female into the brooding tank for too long. She may be tempted to delay the release of the fry until she becomes familiar with her new surroundings. This will weaken her further and is bad for the fry.

If the female is not in danger, but is nevertheless to be moved, there is something to be said for waiting for day four, by which time the eggs should have hatched if they're going to.

This avoids moving the female pointlessly where a clutch is infertile. That said, if the female has previously produced a fertile brood, it's highly unlikely that she will subsequently produce an infertile one (as long as she has a male present) so this argument no longer applies.

With Mbuna, I can see little point in leaving removal to the end of the brooding period when the female will be forced to go through a settling-in period just as she is relaxed and ready to release the brood into a familiar environment.

The likely result will be a prolongation of the brooding period as she settles down and regains confidence. This will further extend her fast and further weaken and stress her which is bad for the fry. In addition, they would be better off out and feeding now that their yolk sacs are fully absorbed.

There is also the danger that early release before the 20th or 21st day can result in fry all over the community tank, with all the problems that can pose.

Some species are better suited to late transfer. If the female, despite careful handling, is prone to spitting out her brood when netted, then it's a lot easier to "finish off" a brood of almost free-swimming fry than a bunch of eggs. I am currently breeding *Ptyochromis sauvagei*, a Lake Victoria haplochromine. All three females, however carefully handled, spit out their brood as soon as they're netted.

Netting

When netting a brooding female you should never chase her around the tank with one or more nets. Watch to see where she sits, or where she goes if a male chases her. Position a large net at about 60° to the front glass, so as

to create a funnel facing her direction of swim (or flight path!).

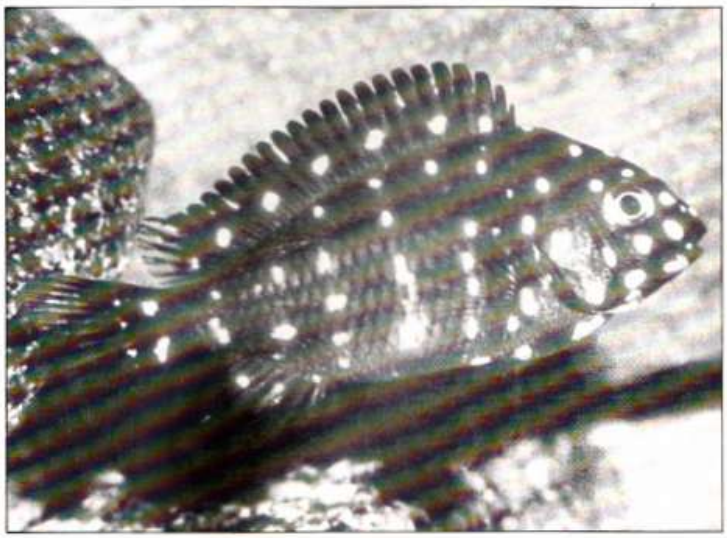
Use your hand to guide her gently into the net. Some "old hands" get quite blasé about the whole thing and will swim straight into the net as soon as you put it in for them (presumably welcoming the three week holiday in store for them).

Raise the net so that the frame is just above the surface, then carefully scoop the mother out in a plastic basin. Float this in the brooding tank for about half a minute to ensure equalisation of temperatures (which should, of course, be as close as possible in both tanks). Gently tilt the bowl so that she can swim out.

Don't switch the light out, even if she is a little agitated at first. She needs to be able to see to explore and assure herself that she is safe and secure.

Again, "old timers", veterans of several broods, will probably settle more quickly - novices may take hours. It's best to leave them to it, rather than add to the distractions by prowling around near the tank.

Some females take no food during the brooding period. Others will take a little flake or small particles of other food. It's probably best not to experiment when the female is isolated, as the psychological effects of invasion by a large siphon tube removing uneaten foods may be dire. If you don't feed, you will manage without water changes during brooding, and the need for topping-up can be avoided by using a tight lid or cover.



Tropheus *species from Lake Tanganyika have a longer mouthbrooding period than some Mbuna. Picture shows a juvenile* **T. duboisi.**

When the fry appear

At a fairly constant temperature of around 80°F Mbuna fry become free-swimming in about 15 days after spawning, but are rarely released before the 18th day. In fact the 20th or 21st days are the most likely for release, though there is no great need for concern if it takes a little longer, especially if the female has been nervous and unsettled during brooding.

If she's still brooding after the 25th day, it is advisable to put some live food in the tank to tempt her, and to leave the tank quite undisturbed, for a day resisting the temptation to peek. This will usually do the trick, giving her that extra touch of confidence that all is safe for her fry.

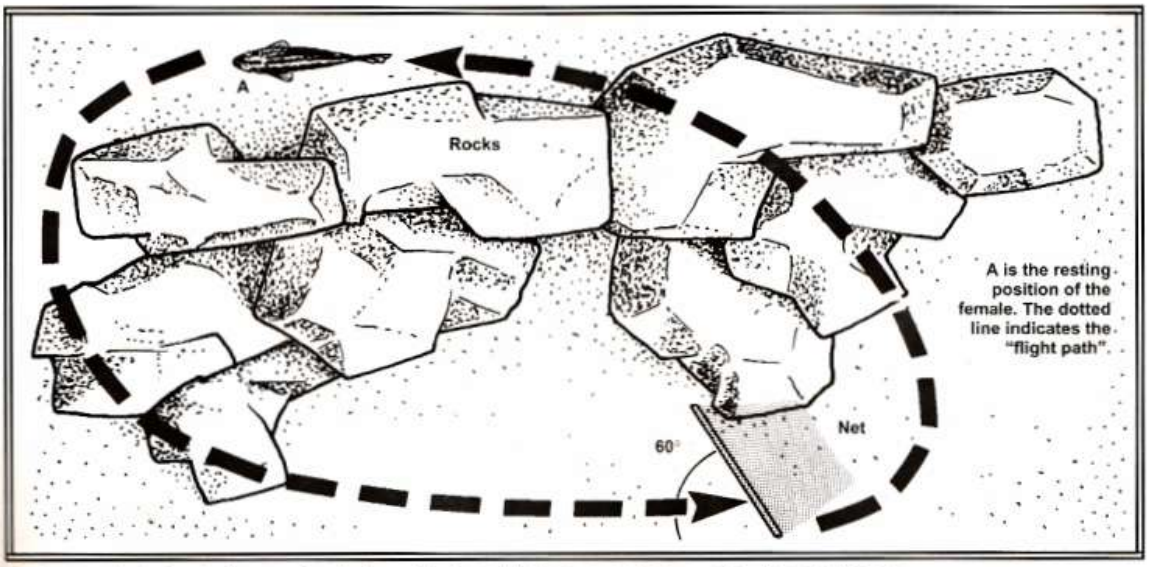
Some species, most notably *Tropheus*, have much longer brooding periods, but the same general principles apply.

Fry release

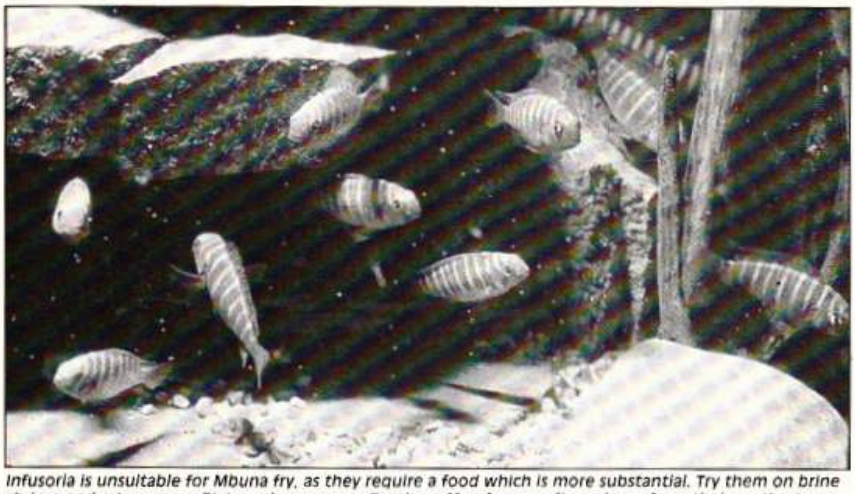
In nature (and in the community aquarium), Mbuna normally release their fry a few at a time into nooks and crannies. From then on they have to fend for themselves.

Open water mouthbrooders, by contrast, are more likely to practise "aftercare", taking their fry back into their mouths at intervals for several days after initial rerelease. They of course have no other form of protection and limited hiding places.

In fact, Mbuna females will sometimes also practise after ▶



The best method of capturing your female is monitor her path of escape and intercept it with an angled net.



Infusoria is unsuitable for Mbuna fry, as they require a food which is more substantial. Try them on brine shrimp and microworm. Picture shows young **Tropheus Moori**, *soon after release from their mother's mouth.*

◀ care in the brood tank; then again they may ignore the fry; and in the worst case they may start to hunt them down.

Despite the fact that Mbuna don't often practise aftercare, I feel it is best to leave the mother with the brood until she has clearly lost interest in them.

Young **Tropheus duboisi.**

She can then be moved to another tank to be thoroughly conditioned before return to the community.

Conditioning the mother

This is best done in a tank containing other resting females or some larger fry, as a female kept by herself will be picky with food. By contrast, the herd instinct will usually get her feeding well. I have never had any problem with a female trying to eat fry in this situation.

Re-introduction

Take the same precautions when you introduce the mother to the community as you'd take with any new fish. Usually the fish will have lost her place in the community, and be treated as an intruding stranger. It makes sense to save up fish waiting for re-introduction, and put several in at the same time, spreading the burden and fragmenting the inevitable hostilities.

Raising the fry

Once the female has been removed, the cubicle should be modified slightly for the initial stages of fry-rearing. It is important to remove the caves, as otherwise a percentage of the fry will hide, miss out on the food and starve to death.

This does not happen if there's nowhere to hide, and one can expect to rear the entire brood, barring accidents. It is unkind to remove all the shelter, and if there are no floating plants already present, a good idea is to add a few or stick some plants, plastic or real - in the substrate. This will give a little shelter, but not so much that the fry will fail to notice the arrival of food.

Food for the job

Time and time again I get anguished letters from fishkeepers who've tried to raise mouthbrooders on infusorians (or infusorian substitutes), and lost the brood to starvation, not realising that much larger foods are needed. Brine shrimp, microworm or small natural pond foods - (*Cyclops, Bosmina,* and sifted *Daphnia*) are more appropriate, but because of the amounts required this can become an expensive and time-consuming hobby.

I think it's best to wean the fry on to other foods as soon as possible. Luckily they are quick to learn that food arrives when their owner opens the lid, and once they react to your presence by rushing to the top (normally after only a few days) you can try them on other foods such as cod roe, finely scraped heart, the soft orange part of mussels ground up, crumbled flake, and other similar-sized foods.

If they refuse such foods, but their little bellies are nicely rounded by the previous live food meals, then it's best to be hard-hearted and siphon off the food before leaving them hungry for a day - when hunger will add an edge to their appetites. Then they should be fed as much as they can eat, at least twice a day, ideally more often.

Larger quarters?

Broods from adjoining quarters can be reared together, providing the fry are about the same size and age. If a small tank is in use, they can be reared up to about 1/2 to 2/3 of an inch, but will then need to be moved to larger quarters. Moving fry before this time can inflict a severe check on their growth, and may result in some losses. Some fishkeepers recommend taking fry from mother, not vice versa, but this is best avoided.

Water quality

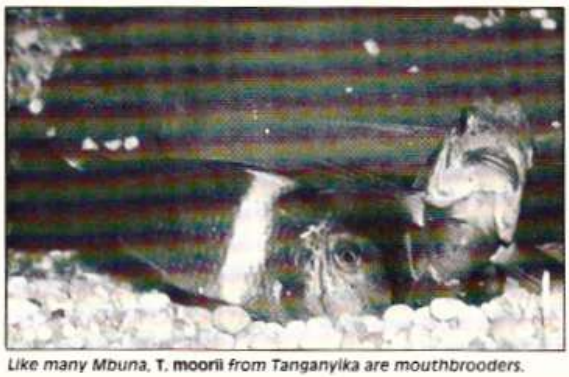
It is vital to make a weekly 20% water change, and as the fish grow, increase this to twice weekly. Keep a nitrite test kit handy, and use it at the least sign of clamped fins or shimmying. There really shouldn't be any problems if adequate biological filtration and water changes are the order of the day. Remember that it's vital with rifts to keep the pH above neutral.

Growing success

Following this regime, Mbuna fry should attain a size of 1 to 1¼" in 10 to 12 weeks.

Although the use of brooding tanks necessarily introduces an element of artificiality into the breeding of mouthbrooders, it does allow the fishkeeper to participate in the breeding process without adversely affecting the next generation - artificially hatched substrate spawner fry don't make good parents because they need to learn from being "parented".

All in all, the methods described are extremely rewarding. I hope you enjoy breeding your mouthbrooders as much as I have. ■



Like many Mbuna, **T. moorii** *from Tanganyika are mouthbrooders.*

Above: Syd's pond contains mainly Koi, along with Comets, Fantails and Grass Carp. You're made to feel quite welcome as they swim to the glass to greet you.
Left: As the house is open-plan, the fish can be viewed from any of the downstairs rooms.

Staff Writer KAREN YOUNGS visits SYD CARROLL in Rochester, Kent - and gets a most unusual view of his pond

Window on your pond?

Many fishkeepers are content with a couple of tanks and perhaps a pond in their garden, but Syd Carroll has gone one step further - he's brought his pond into his home.

Window on the pond

It all started when the Carrolls had their house modernised. An extension to the kitchen was impossible without cutting into a steep bank at the back of the house, which formed part of a rising garden.

For months the porch window looked out onto what was not a particularly awe-inspiring view of muck and weed-infested soil.

The original project was to use the porch window as the front of an outdoor tank, by digging down into the soil, bricking it up and adding a few more sheets of glass. Syd's intention was to have a couple of fish swimming around to make the view a little more interesting. But then he was introduced to Koi and his ideas changed...

What finally emerged was a 25' long pond which was 8' deep. The water volume grew from the originally estimated fifty gallons, to a staggering six thousand gallons. The project took three years to complete.

But what stands Syd's pond apart from most others is the porch window. Instead of it looking out over the pond, as is the norm, Syd's window looks out into his pond.

Great excavations

It wasn't easy. After digging the first foot of topsoil, Syd hit solid chalk, which really required a pneumatic drill - but he made do with a pick-axe.

Luckily he'd managed to obtain a trailer which carried about 1.5 tons each trip, but the process was still a tedious one. The mode of operation was to dig

Syd gets so much enjoyment from his fish that he finds the winter months quite depressing. In order to overcome this, he's set-up a tank indoors to grow on some pondfish for the summer.

with the pickaxe, shovel it into a bucket, walk up nine steps, tip the chalk into a wheel barrow, walk about fifty feet, up a steel ramp and into the trailer. When this was full it was hitched to the car and driven to the local dump where it was all shovelled out again.

When the excavation was completed, Syd turned his attention to the glass required for the porch window. Obviously it needed to be strong to withstand the pressure from the water. Eventually he settled on 19mm plate glass, 4' x 3', as it was the most economical size to do the job. He was advised that at least 2" had to be supported by a steel framework around the edge.

Syd managed to retrieve two perfect 5" girders along with half a dozen .25" thick 4' x 4' steel plates for just a few pounds from a local factory which was being demolished.

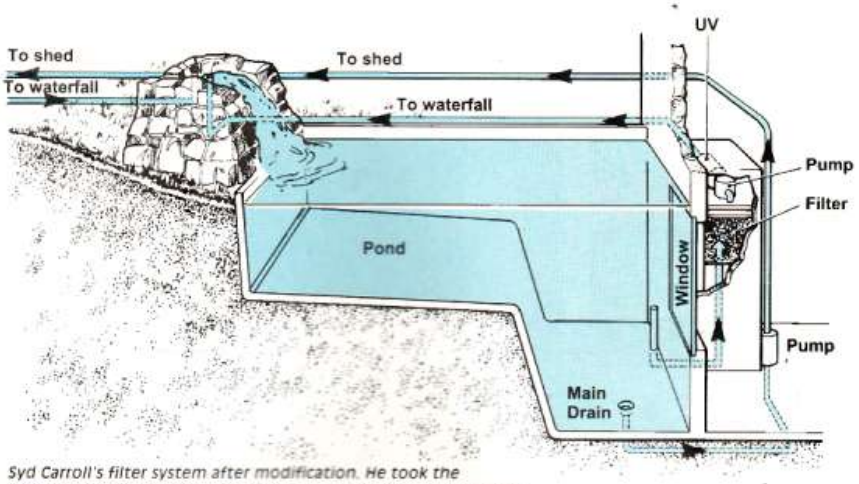
The two girders were placed, end on end, in 3' deep holes.

This wasn't as easy as it sounds. One of the girders was lowered into a hole, concreted in and allowed to set.

The fun started when Syd and his crew tried to get the other one parallel. The only tools they had available were a shovel, a hammer, some straight wood and a spirit level. This job alone took the whole day.

When the glass was fitted, the frame was only ¼" out. The tops of the uprights were cut off and welded between to form the window. The steel plates were welded under the window, and at an angle from each upright, to the steps on one side and into solid chalk on the other.

Syd soon found that there's more to building a waterfall than meets the eye. In order to prevent water loss from splashes, the wings ended up two feet bigger than he first anticipated, but the end result was worth the effort.



Syd Carroll's filter system after modification. He took the opportunity to raise the water level, so an overflow was needed

Lining the walls

After laying the pipework, Syd turned his attention to lining the walls. He built them up with old bricks, on their side, filling up behind with a sloppy concrete mix.

The deep end of the pond was angled towards the drain with concrete. Once more, the old factory came in useful for supplying some old concrete fence posts which Syd used for the bottom of the slipways, the bent tops angled towards what was to be a waterfall.

The pond was rendered and painted with three coats of Pondseal G4, with a further three coats of G4 top coat in black.

Syd used a steel plate he had left over to build his waterfall on - which he soon found isn't as easy at it looks.

As he built, he realised he needed to visualise exactly how the water would react as it hit each stone - at every conceivable angle. The wings actually ended up two feet bigger than he expected them to.

Modifications to the filter system meant that the fish needed to be moved to temporary accomodation. This gave Syd the opportunity to build a holding tank in his shed (which is perfect for future breeding projects).

The tank had its own filter and was plumbed so that the bottom drain of the pond could be connected to it.

As he was modifying the filter system anyway, Syd decided to render the pond walls up to the top and raise the water level to the top of the brickwork.

Filtering the pond

Syd's improved filter system is designed so that the pondwater travels under gravity into the filter box, through gravel and matting, pumped via a UV lamp and into the bottom of a 50 gallon plastic container in the waterfall. (This can be used as a further filter if required).

Syd found a Grundfoss central heating pump ideal for this purpose. This is mounted above the surface and therefore had to be primed using a hosepipe, which Syd pushed into the pump and turned on to force any air out.

Raising the level of the pond meant that the filter was below the water-line and an overflow pipe was essential. The bottom drain in the pond was connected to the filter in the shed and incorporated a pre-filter centrifuge.

Syd can drain this if required.

The water which travels through the filter in the shed enters a large 45 gallon drum via a pipe which swirls the water round while the fish waste settles in the bottom. The water travels up through hair rollers and filter cloth after which it can either enter the holding tank in the shed or run along a pipe and into the waterfall - whichever is required at the time.

Fish

Syd's pond contains a nice selection of fish - mainly Koi, with the odd Comet, Fantail and Grass Carp - which swim to the window to greet you as you walk into the room. It's an excellent way of keeping a check on their health. The open plan design of the house means that the fish can be seen wherever you are downstairs.

The filter is housed behind the wall on the right of the window, with easy access from the front and top.

The overall effect is certainly attractive and the clarity of the water is excellent - the waterfall is 25' from the window, but it's still possible to see the water movement.

First thing in the morning is Syd's favourite time, as the sun shines into the pond, forming a spotlight for the fish.

The only drawback of Syd's room with a view is that in the winter, when the fish's metabolism slows down, he finds it rather depressing to see them lying motionless on the bottom of the pond for days on end.

But he's got round this minor problem - he's set up a tank in his living room, so he can grow on young Koi for the following season. ■

It pays to shop around

RECENTLY I had a disaster with a 66" tank which I decided to replace with a new one, measuring 48" x 18" x 15" wide.

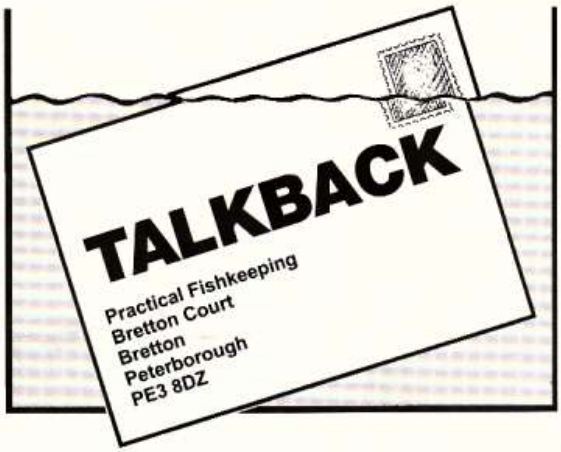
I received quotations which varied between £36 and £200+ with the average price falling in the £70-£100 range.

I appreciate that some manufacturers produce extremely complicated aquaria and I equally appreciate that the size and output of the manufacturer will affect the price, but I was asking for a simple, no-frills aquarium and I cannot account for the vast difference in prices for what is, essentially, the same product.

As a very good example of what I say, the differences in prices quoted between one manufacturer and a retail outlet was 100%, despite the fact that the same manufacturer supplies the tanks to that particular shop. Do other retail trades operate on such a profit margin?

I might add that I bought a tank and cabinet from Barry James of Everglade Nurseries, Baunton, for about the same price as I was being quoted elsewhere for just the tank - in a lot of cases less than the cost of the tank.

• **Stephen Broadbent, Gloucs.**



Swap shops

I FEEL I must express my concern at the policies adopted by some retail outlets in the buying and selling of large fish.

I have been in the hobby for ten years or more and over the past three or four years the amount of large species which are readily available seems to have doubled.

I have noticed some retail outlets offering to swap fish which become too large for their tanks with smaller specimens.

I think this policy is open to abuse. First of all, it allows fishkeepers to buy fish - Red Tails, Snakeheads, Lungfish - which they are all too aware will outgrow their three or four foot tank, in the knowledge that when this happens, they can just return it to the shop and buy something else.

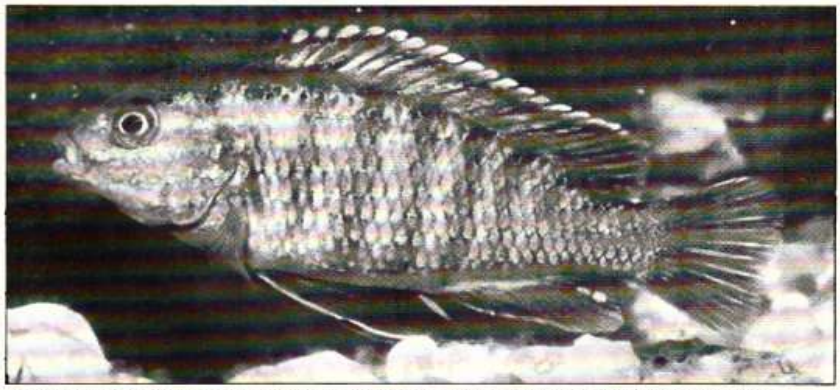
It also allows those who become bored with their fish to swap around whenever they feel like it. I am sure (at least I hope) that this type of fishkeeper is in the minority and that most of us would never buy a fish unless we were sure we could house it properly.

But if dog kennels were set up for people to take back a dog every time they wanted to and exchange it for a puppy, there would be uproar. So why should fish be treated differently?

• **K. Simmonds, Tyne and Wear**

STAR LETTER

■ Can Malawi Cichlids compare with marines? John Lambe of Co. Armagh, Northern Ireland, reckons they can. He wins a years' subscription to PFK for this month's Star Letter.



Labidochromis strigatus. *All members of the* **Labidochromis** *genus are suitable for newcomers to Malawis - but can these fish really compare with marines?*

I MUST stress that the following is purely a personal view, based on my experiences with both Malawi Cichlids and various marine fish.

I will attempt to outline why I feel that for those of you, who, like myself have become bored with community fish and would like to try marines, should first consider Malawi Cichlids.

To me the main attraction of marines is in their colour and the fact that you have a Small Barrier Reef in your own living room.

The real truth is that creating reef-like conditions is beyond the reach of most of us. To create the desired environment requires a lot of equipment, needing a lot of money. Fish are also expensive and you can keep far fewer in a tank.

How many of you dread your water changes, or, like me, have to time them for when your spouse is not at home?

Keeping marines means all the replacement water has to be properly mixed with marine salts and tested with a hydrometer to ensure the correct specific gravity.

Heard enough? Well, here is why I feel you should first consider Malawi Cichlids.

To start with, if your tank is three feet or more in length, then you probably need spend no further money on equipment.

Personally I feel that by choosing the correct Cichlids you can create a show of fish to compete with any marine tank.

The decor, if given time and planned properly can be constructed in a way that can only enhance the beauty of your fish. My four foot tank has tufa rock from top to bottom and along both sides, creating a mass of caves of varying shapes and sizes.

If the conditions are right, Malawi Cichlids will reward you by breeding and in most cases the young are protected by the mouthbrooding female. Breeding my fish is one of the greatest rewards for me.

In summary, I have found that Malawi Cichlids can match marines for colour. You can not only keep larger numbers of fish, but are encouraged to do so. They're a lot cheaper to buy, as is the equipment needed to keep them. And they'll reward you by breeding.

There have been some excellent articles in PFK on Malawis - in particularly that by Mary Bailey in March 1991 which not only includes information on setting up, but also has a list of recommended fish for beginners.

No hard and fast rules

I AM writing in response to a letter in Tropical Answers in the December issue of PFK, entitled "How can I breed my Neons?".

I feel some of the advice given, although correct, was not essential.

I have a two foot tank containing five male Guppies, six Neon Tetras and some Platies. Recently I have had about ten baby Neons which I've transferred to a separate tank. The conditions in this tank and in the main tank are nothing like those in the answer to the reader's letter.

Water hardness is 250ppm, pH is 7.6 and I have 13W of Grolux lighting on for 13 hours a day in the main tank and none in the small tank. The babies are fed on Liquifry - the parents on ordinary flake food. In the fry tank I swap about one quarter of the water with water from my main tank once a week. My Neon fry are now about three weeks old.

• **Mark Gribble, Berks.**

Not so efficient...

I WAS interested in the reply Dr. David Ford gave in November 's PFK about the costs of running an aquarium.

I think readers should be aware that fluorescent lighting for aquariums is not as economic as one might think. For example, a four foot 40W fluorescent light will actually consume about 100W. This is because of the choke or ballast that all fluorescent lights have.

As it is advised that one should use two or even three tubes per tank, then this would turn out to be quite expensive to run.

Domestic fluorescent light fittings have what is known as power factor correction incorporated. This is simply a capacitor, usually about 3.5 microfarads, which is wired in parallel with the incoming mains and has the magical effect of reducing the current taken by the choke. Typically a 40W unit will end up taking only about 55W, thus saving 45W.

Most, perhaps all, aquarium light units do not incorporate power factor correction (why not?) and are therefore not as efficient as they could be.

• **Brian King, Dorset**

Goniopora are filter feeders which require high intensity lighting and optimum water conditions in order to do well in captivity.

Tips for reef keepers

AS A result of a recent survey undertaken by this company, which was mentioned in your December issue, we have found some marine fishkeepers are experiencing problems with their reef aquariums. I hope the following points may be of use.

I find no additives in any form are required except pH buffering compounds. Vitamins and trace elements do not have any bearing on the health of our livestock here. Our trials have proved this beyond doubt, having offered additives for one year and withheld them for three years.

Night time feeding is required for hard corals which expand their feeding polyps during darkness. As a guide a 16-18cm long bubble coral will take a 4mm piece of frozen fine mussel every other day. An average size brain coral should be given a 3mm piece of frozen fine mussel only when their polyps are fully expanded. Hard corals can be maintained indefinitely and in peak condition following this regime, but high intensity lighting is essential for their symbiotic algae to flourish. Goniopora, Lobata and soft corals are minute filter feeders and those we have here species have not received any liquid or other foods for three years.

Our stocking levels are approximately 1" to seven gallons. We have a Common Clown, a Dwarf Angel, a Yellow Tang and a Royal Gramma. Our feeding regime for this 12-14" of fish, is as follows: on even days a 5mm piece of fine mussel and on odd days a 1cm piece of Brine Shrimp, plus a 3mm piece of frozen plankton once a week. Particles from this feeding regime are sufficient for both soft and hard corals and various other invertebrates.

Fish should be fed a little at a time and tweezers are ideal for this purpose. Bristle worms have been totally eliminated by this method. Crustaceans will require feeding individually rather than searching for quantities of food left over from heavy handed feeding.

For long term success in maintaining a trouble-free reef aquaria, correct feeding is essential, together with high intensity lighting, trickle filtration, living rock and protein skimming. Undergravel systems will generally lose their efficiency after two years and are now recognised to be twenty times less efficient than modern trickle filters, which are virtually the only filters sold in the USA today.

• **Leon Taylor, Aquarium Systems Ltd.**

Any help?

I WAS a member of the Bexleyheath Aquarists' Society some time ago but unfortunately the club disbanded. I am now wishing to rejoin another society but do not know of any nearby. Could anyone please help me with any information? I recall there was a club called S.E.L.A.S. of Greenwich but I don't know where they meet or if indeed they still exist.

• **P. Barnett, Kent**

Higher levels

I HAVE recently done some research on Nitrate levels, the results of which are somewhat disturbing.

I tested the tapwater in our area. It was 10ppm. I then tested some water at some of the main retailers - a few with centralised systems. Most were above 100ppm. I was told this didn't matter because the fish were only kept short term.

I then tested water from a direct Singapore shipment, which read 75ppm.

My conclusion is that marine fishkeepers - especially those with invetrts - are fighting a losing battle from the time the specimens are caught. After all - who sets recommended nitrate levels, but people in the aquatic business?

• **J. Glavey, Herts.**

In the bag...

OFTEN nets are too small and get ripped and destroyed by the pelvic and dorsal spines of some fish - not to mention the damage caused to the fish when its spines become entangled in the net.

I would like to point out this idea for moving large catfish and cichlids.

You can solve the problem using a large waterproof bag - usually available from your local Koi retailer.

Snip off the corners at the bottom of the bag and coax the fish into it. When you lift it clear of the water, it should run out of the holes, while the fish, (providing you have not made the holes too large) should remain in the bag.

• **D. Butterton, W. Midlands**

How can I breed ... The Rain

DEREK LAMBERT continues our occasional series with a look at Rainbows which he believes are among the easiest fish to breed. Here's how he does it....

A partial water change often induces egg scatterers to spawn. Picture shows **Bedotia geayi.**

The Rainbows are a group of fish that are becoming increasingly popular in the aquarium hobby. They are small to medium sized (2 - 5 inch) fish with two dorsal fins and a streamlined appearance.

Generally they are peaceful and make perfect inmates for the average community tank. They also make an ideal group of fish for the beginner to try breeding, as many species will breed in normal tap water and the fry are relatively large and easy to rear.

The breeding tank

If you do decide to try breeding Rainbows then you will need a bare 2' tank with a small box or sponge filter placed in one corner. The bottom should be left bare so that any waste matter can be easily removed. The water should be 72 - 78°F and hard, alkaline. If you are in a soft water area a little salt can be added to raise the pH but otherwise salt is not needed.

The only other addition to the tank besides the fish is the spawning medium. Personally, I prefer to use artificial spawning mops which can be sterilized between spawnings. These can be made very easily from white nylon wool. This should be wound round the fingers of one hand about 15 - 20 times and then tied in the middle with a separate piece of wool. The loops are then cut and the mop boiled in water for ten minutes and then rinsed under the tap to remove any loose fibres. Natural plants can be used but you must be careful not to introduce any pests with them which might attack the developing eggs or eat the new born fry.

Positioning the spawning medium will depend on which species you are trying to breed. In general species of the following genera: *Chilatherina, Glossolepis* and *Melanotaenia* scatter semi-adhesive eggs over the spawning medium, so the mops should be thickly placed over the bottom of the aquarium. Members of genera *Iriatherina, Telmatherina* and *Pseudomugil* (this includes the "Popondettas") usually hang their eggs in plant fronds so the mops should be suspended from the top of the aquarium.

Pseudomugil furcatus *is among the more-difficult species to breed. Regular collection of the eggs is necessary for success.*

Sexing rainbows

Sexing Rainbows is relatively easy as the males have more colour and generally larger finnage. In some species such as *Melanotaenia boesemani* the difference is so striking you might be fooled into believing they are two different species altogether. Once you have a pair settled into your set-up you will

...bows?

Breeding the more difficult rainbows

The Rainbow species which hang their eggs in mops are, in general, smaller species which are much more difficult to breed. Of these my personal favourite is *Pseudomugil furcatus*. This species only attains a size of 2" and has lovely yellow flashes on all the males fins. It prefers being in a small shoal of about 2 - 5 pairs.

The eggs are laid just about continuously, but normally only one per female per day at most. Sometimes they will go through a resting period for a week or two when nothing is produced.

The easiest method I have found with this species, is to carefully search through the mops at lunch-time and remove the eggs to a small margarine tub for their incubation period.

Once the fry are free-swimming I place them in a small tank to grow-on. The fry grow relatively quickly reaching half size in about five months when they will start to breed. Unfortunately they are a short-lived species with an average life span of only one year.

need to condition them with plenty of live food in preparation for spawning.

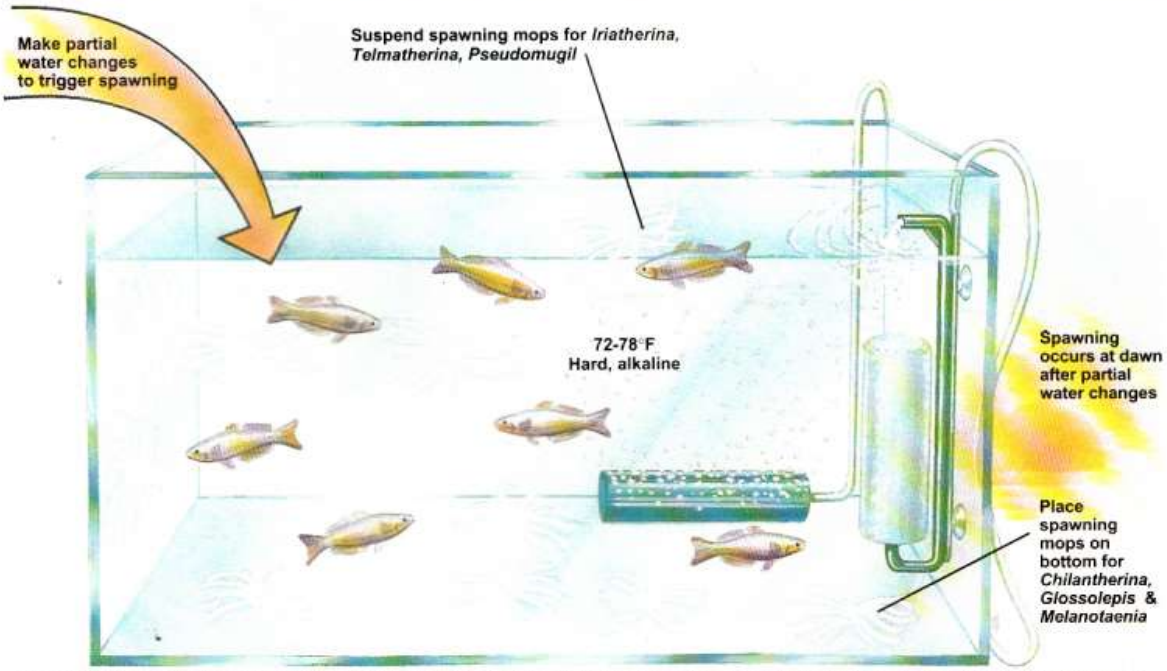
Spawning

A partial water change often kicks off spawning in the egg scatterers. This usually occurs at first light the morning after the water change was carried out. The pair charge about the tank occasionally stopping to tremble side by side and produce about 5-10 eggs.

This continues for a couple of hours, by which time several hundred eggs may have been laid. Some species will continue to spawn, off and on, over a couple of days. Once spawning is complete the adults should be removed and about 10 drops of liquifry added to the tank to help a culture of infusoria develop.

Care of the fry

The filter should also be removed to prevent the new-born ▶



To breed Rainbows you will require a two foot tank with a small sponge filter in one corner along with a spawning medium, such as mops made from nylon wool.

◀ babies being sucked into it. The eggs take about a week to hatch and the fry hang on for a further two days before becoming free-swimming and starting to feed. Once the fry are free-swimming the spawning medium can be removed.

This is the real danger period when small fry can so easily be starved to death or the tank polluted to the point where many of the babies die.

Feeding little and often is the key to success at this time. A few drops of Liquifry in the morning, followed by several more feeds throughout the day, should get them off to a good start.

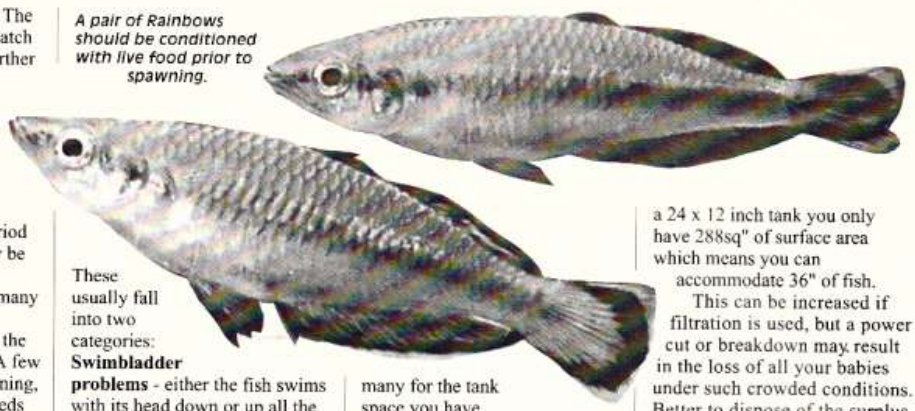
After the first few days small amounts of newly-hatched brine shrimp can be fed and the Liquifry phased out.

After the first 21 days it is safe to return the filter to the tank which cuts down on the risk of pollution. About 10% of the water can now be changed with fresh water of the correct temperature. This should be done on a weekly basis to start with and after a month it can be stepped up to about 50% weekly.

Culling

Once the fry have grown to a size such that you can clearly see the body shape, you will need to cull any deformities that can be spotted.

A pair of Rainbows should be conditioned with live food prior to spawning.



These usually fall into two categories:

Swimbladder problems - either the fish swims with its head down or up all the time with a jerky motion.

Bent spines - either vertical, which is easily seen from the side - or horizontal, which can only be seen from above.

Later any fish with deformed fins can be culled. One of the commonest deformities I have seen is fish with only one dorsal fin.

All of these must be removed and either humanely destroyed or fed to other larger fish. Never flush dead, dying or deformed fish down the toilet. If the fish are still alive this is incredibly cruel and if they are dead it would be all too easy to introduce diseases into our native fish stocks.

Tankspace

The next problem you are likely to encounter with the fry is too many for the tank space you have. Remember you should not have more than 1" of fish to 8sq" of surface area. If you have used a 24 x 12 inch tank you only have 288sq" of surface area which means you can accommodate 36" of fish.

This can be increased if filtration is used, but a power cut or breakdown may result in the loss of all your babies under such crowded conditions. Better to dispose of the surplus stock as soon as possible to give the rest the room they need to grow. ■

New Society will help you get those rainbows

At present there are over 40 species of Rainbows in the hobby most of which are very difficult to obtain. It was with this in mind that a group of fishkeepers and scientists met recently to form the British Rainbowfish And Goby Society.

The main aim of the society is to promote the keeping and breeding of Rainbowfish and Gobies, and to make them more readily-available to the general fishkeeper.

To start with, the society intends to produce an egg and fish list four times each year (February, May, August & November). On this list members can advertise for the eggs and fish that they are looking for, or that they have surplus of.

Later it is hoped to produce a newsletter and hold regular auctions and a yearly convention. For details about this new Society send an S.A.E. to **Ms. P. De Lima, "Little Xanadu", 104 Dale View, Hangleton, Hove, East Sussex, BN3 8LF.**

Rainbows, like this **Bedotia geayi**, *are peaceful community fish with a streamlined appearance.*

Integrated 'Aquarian'

Editor STEVE WINDSOR looks at the exciting new 'Aquarian' range.

It's not often that a completely new range of aquarium hardware reaches the market, far less one comprising a fully integrated range including airpump, internal power filter, undergravel filtration system, powerhead, spraybar system and heater thermostat, all both styled to match and integrated.

'Aquarian' have launched the system for the new year, and what's so nice about it is both the care taken in the design and the excellent features, made better by the fact that units fit together so tidily. But we had our criticisms too...

Air pumps

The pumps come with airstone, airline and anti-syphon valve. The case is designed to absorb sound, while a laminar airflow system has the same aim. The rubber diaphragms are specially made in the UK, while independent rubber feet prevent walk and vibration.

The verdict

The old 'Aquarian' air pumps were among the quietest around (sold under the Atlantis name) and one is "soundless" at my elbow as I write. Initial tests on the new pump suggest it too is virtually noise-free.

They also had daft rubber feet that fell off if you looked at them and needed supergluing in position. These are greatly improved on the new model, and cannot be pulled off.

It's a nice idea to include a range of accessories with the pump. You get a sensible length, more than six feet, of airline, a decent-sized black airstone and a "gentle" anti-syphon valve, plus one spare diaphragm. Comes with an excellent instruction leaflet.

The underview of the new air pump - very like the old Atlantis series - but you won't lose the rubber feet now...

Price

The R.R.P. is £10.49 for the model 60 (24" tank); £14.49, model 90 (36" tank); and £19.99 for the 120 (48" tank) - the largest size having a double outlet; there is a one year guarantee.

Star rating	
Quality	★★★★★
Practicality	★★★★★
Price	★★★★

Heater thermostat

We disliked and distrusted the old Atlantis heaterstat after we had a nasty boiling incident. The new 'Aquarian' unit has a very sensitive heat control mechanism, accurate to 0.2°C.. It also conforms to the new European safety standard.

The design incorporates an external adjustment control which leaves the actual heater as a small neat grey unit. By aligning two dots you pre-set the thermostat at 25°C - plus or minus 1°C. The heat is governed by microchip, not bimetallic strip.

The verdict

Perhaps the flex could have been longer, from switch to plug, and unit to switch. In such an advanced unit it would have been nice to see a reliable thermometer included or supplied. It's a bit of a shock to realise that under the plastic of the heater unit lurks glass, albeit "especially thick". Apparently, to comply with EEC regulations, glass is the only material available.

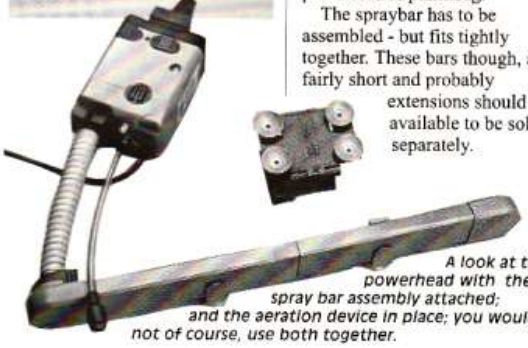
On the other hand it's great to say farewell to the bimetallic strip and to have a temperature pre-set function.

We tested the unit and immediately encountered a cosmetic problem we'd been warned of, the plastic around the heater tube bubbling up. Somehow it's not reassuring not to see a light glowing from the actual unit, but we'll get used to that. There really does need to be a foot more flex between the heater and the adjustment unit. As usual, there's a detailed instruction leaflet included in the pack.

Price

There are three models, 100 to 300 watts at RRP £17.49; £17.99 and £18.49 with a two year guarantee.

Star rating	
Quality	★★★★
Practicality	★★★
Price	★★★



A look at the powerhead with the spray bar assembly attached; and the aeration device in place; you would not of course, use both together.

Powerheads

The new powerheads are mainly aimed at driving the new 'Aquarian' undergravel system, but are identical to the drive units on the internal filters. Loads of features on these too. The larger two models come with spray bars; all come with a clever hinged extendable bracket so that they can easily be positioned in any shape or size of tank; and a venturi aeration feature. Both flow power and direction are variable.

While the system is aimed at the new 'Aquarian' undergravel, it has the usual "cone" type fitting to adapt to other forms of uplift.

A red indicator indicates that the undergravel filter is running at less than top efficiency, the more red the closer it, or the powerhead, is to being blocked.

The verdict

A neat tidy unit, low on bulk. Arguably there are two unnecesarily fiddly bits - the tiny bit of plastic that closes the venturi feature when it's unwanted, and the awkwardly stiff impeller cover which has to be moved to make the spraybar work. The clever hinged bracket is an excellent feature if your fish are not too rowdy. Oscars will probably use a moveable powerhead as punchbag.

The spraybar has to be assembled - but fits tightly together. These bars though, are fairly short and probably extensions should be available to be sold separately.

See also our comments on the internal filter below. Again good instructions are included.

Price

There are three models, shifting up to 200 l/hour; 400 l/hour; and 540 l/hour at RRP £20.49 ; £24.49 and £26.99 with a one year guarantee.

Star rating	
Quality	★★★★★
Practicality	★★★
Price	★★★★

With filter unshipped, the media is exposed. Is there enough charcoal impregnated foam for efficient filtration?

Internal filters

There are three models of filter, based around the powerhead, above, and including the same features. Water turnover rates are the same too. However, the internal filter will act as pre-filter to the powerhead, and as a consequence, this unit can be used "upside-down" as a reverse-flow system (but only with the 'Aquarian' plates).

The modular foam inserts - small charcoal -impregnated blocks of media, can be rotated to preserve the best head of bacteria; the suggestion is to change one a week and retain the other "seeded" blocks. This should avoid any problems with the carbon releasing adsorbed nasties into the tank.

The verdict

Criticisms are as above; and is there really enough media in the filter to match the size of tank they're suggested for? As a reverse flow system they sound ideal, however. So we set one up using the integrated 'Aquarian' plates, and found the neat and tidy look, and the cleverly integrated system very good.

However, we were disappointed when our brand new filter needed a gentle tap to "kick start" it, (something powerheads are prone to, but not when brand new).

Good instructions included.

The price

The three models, 200l, 400l, and 540 l have an RRP of £25.49; £30.49; £34.99 - replacement cartridges come in packs of three at £2.49.

Star rating

Quality	★★★
Practicality	★★★★(★)
	Is there enough media?
Price	★★★★

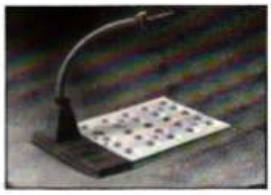
The hinged clip for filters and powerheads can be locked in place or hinged out as required.

Undergravel system

This system relies on a separate uplift base cone and side piece, which "clips" over the new undergravel plates. To do this you snap off a flange. The whole system is of course tightly compatible with the powerhead - and, with the option of reverse flow, the internal filter.

The actual plates have sunken slotted "dishes" to ensure water flow through the gravel, and any number can be fitted together to accomodate most tank sizes in common use.

The side-fitting uplift cone minimises the chance of gravel entering the uplift.



The undergravel assembly. When the undergravel is air-powered, a fiddly little rubber sucker holds the top of the tube in place. With a flange on three sides, you can only join two undergravel plates by using an uplift unit, or run them as separate units.

The verdict

It is very rare for gravel, or even grit, to get stuck in a powerhead, via a properly-fitted undergravel plate. Even with the cone system, gravel can get under a badly-fitted plate - and the cone is bulky and ugly, especially in a small tank. Perhaps it could be made a tank feature by siliconing gravel to it?

What it does allow you to do is to remove and clean the uplift without gravel getting into the hole left behind - which really should be a boon.

The "snap-off" flange on our sample required the attention of a sharp knife - no real problem, of course - and the slots in the undergravel plate were very poorly cut - mostly closed on our sample - though I'm sure powerhead motivated water would pass through. When I questioned 'Aquarian' about this, they said that the increased pressure ensures an even distribution of water through the length and breadth of the plate. On a tank of over 60cm you will have to do one of two things; you will either need two uplifts, one at each end (90 or 120 cm); or to centrally-position the uplift (80cm). It starts to make this system expensive when two uplifts and conceivably two power filters are required.

That said, with its easy linkage to the compatible powerhead, and its clever reverse-flow possibility (which after all, pre-filters the water through carbon and begins the biological filtration process), this sytem is as close to a revolutionary breakthrough in undergravels as we're likely to see.

The price

Uplift system, RRP £4.49; undergravel plates £2.49 or £2.99

Star rating

Quality	★★★★
Practicality	★★★★★
Price	★★★

Flaked food

The 'Aquarian' flake range has been revised and now consists of Goldfish, Tropical, Marine, Carnivore, Herbivore, Fry and Growth, plus a tablet food, and Floating Pond Food.

The size range is from 13g to 500g at recommended prices from £1.05 for the smallest Goldfish food, to £26.50 for the 500g tropical food.

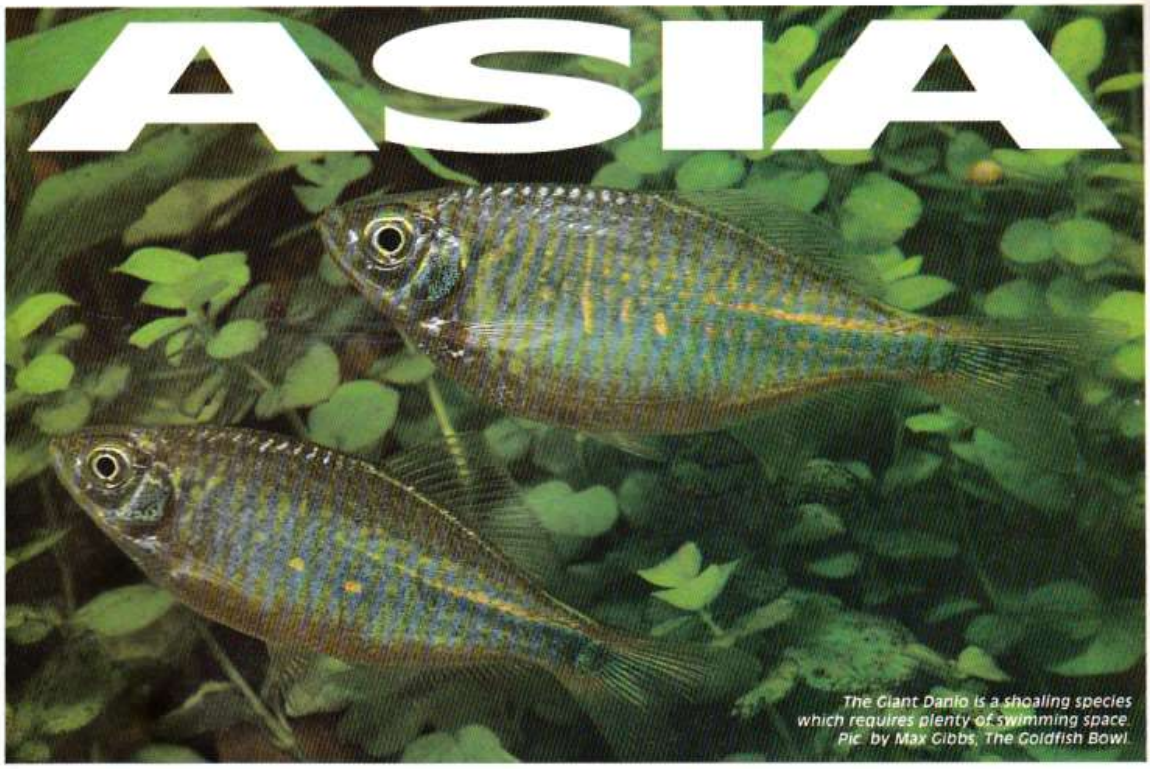
Test kits and treatments

The 'Aquarian' range now includes 12 different items. Tanksafe and Watersafe are for preparing water and starting up your filter (RRP £3.02); Water test is a dip and test kit for hardness, pH, and alkalinity £7.13; Algae control and plant food £3.02; nitrite £6.12; and remedies for fungus, whitespot and finrot at £3.02. Three new products to stabilise, lower or lift pH also have an RRP of £3.02. ■

Star rating

Don't bother	★
Barely acceptable	★★
Average/ adequate	★★★
Good	★★★★
Very good	★★★★★

ASIA



The Giant Danio is a shoaling species which requires plenty of swimming space. Pic by Max Gibbs, The Goldfish Bowl.

on stream

Dr DAVID POOL of the Tetra Information Service suggests some stocking schemes to bring a South East Asian river into your lounge.

Creating an aquarium which contains fish and plants from one particular part of the world or even one environment can provide added interest to anyone wanting a change from a mixed community. In my previous article an Amazon community was discussed. This month we will look at a more specific aquarium and describe how to set up an Asian Stream Aquarium.

There are a wide range of fish and plants available in your local aquatic shop which originate from Thailand, Sumatra, Borneo and other South East Asian countries. Included in this list are many fish that will be familiar to any tropical fishkeeper such as Zebra Danios, Tiger Barbs, Siamese Fighting Fish and Dwarf Gouramis.

Natural Conditions

Conditions, fish and plants vary considerably throughout SE Asia, depending largely on the geology of the area and the size of the stream. Most of the fish are tolerant of a range of water conditions providing the pollutant levels are low. As a guide, an Asian stream aquarium should have the following water conditions.

Temperature	24-28°C (75-82°F)
pH	6.0-7.5
GH	5-12°dH
KH	2-6°dH

This variation is quite large and encompasses the tapwater conditions found in most areas of the UK. With very little change, it should therefore be possible for anyone to keep an Asian stream community.

If tapwater conditions in your area are higher than those recommended, the water can be made softer and more acidic in the following ways:

1. Dilute the tapwater with clean rainwater or distilled water.
2. Use water softening resins suitable for aquarium use.
3. Allow the water to stand in contact with or filter through aquarium peat (2 handfuls per 10-15 litres).
4. Use commercially available pH adjusters.

As with any change in water quality, the hardness and pH changes should always be undertaken slowly if fish and plants are present. The changes should be made outside the aquarium and then the adjusted water added at each water change. Try to avoid changes of greater than 0.5 pH units and 2°dH every 3 days.

Setting up your Asian Stream

The equipment required for your aquarium is the same as for your community or Amazonian aquarium and has been covered in previous articles. Some water movement is required, therefore a suitably-sized filter should be installed.

An undergravel filter powered by a powerhead, an internal or an

external power filter are ideal and should be positioned so that the filter outflow creates a current along the length of the tank. Spray bars are ideal for this purpose and should be positioned just under the water surface to create water movement without too many bubbles. The bubbles tend to remove carbon dioxide from the water which can affect plant growth.

Decor for the aquarium is a matter of personal taste and can include bogwood, inert stones, gravel, sand, live or artificial plants. Bogwood is ideal and gives the impression of an overgrown stream. When designing the tank, areas of open water are important if you are keeping fast swimming species of fish such as Danios and Silver Sharks.

Plants for your Aquarium

South East Asia is the area of origin of many of the aquatic plants which are sold for the aquarium hobby. These plants are now being farmed in large numbers resulting in the wild stocks not being depleted and their being available at a low cost.

Table 1 shows a range of plants that could be included in your aquarium, together with their lighting requirements. In a stream aquarium, the Cryptocoryne plant species should form the basis of your planting scheme. The taller plant species such as *Cryptocoryne affinis, C. blansae* and the onion plant *Crinum thaianum* should be positioned in the main water flow, where the current causing constant leaf movement will add considerably to the stream effect we are trying to create. In slower areas, around pieces of bogwood for example, *Hygrophila* and *Ceratopteris* can be planted. These species grow very rapidly and may need regularly pruning to keep them under control.

If the aquarium is to centre around gouramis and other labyrinth fish, *Hygrophila* species, (Indian Fern) and floating plants are ideal. The surface cover will also encourage the bubblenest builders to breed.

To encourage healthy plant growth it is advisable to use a substrate fertiliser when setting up the aquarium. In addition a good quality plant fertiliser such as Tetra FloraPride should be added with each water change.

Fish for the Asian Stream Aquarium

The choice of fish which could be added to your Asian aquarium is very large, but it is better to select a limited variety of species and introduce greater numbers of each.

Table 2 provides a list of fish that could be added to your aquarium. In general these species can be picked and mixed to suit your individual choice. The gourami species are perhaps the exception to this and should be kept in an aquarium with little flow and densely-planted areas.

If there are areas of flowing water within your aquarium the danio species are ideal. These fish should be kept in groups of six or more. If kept in shoals, the danios will be constantly active displaying to each other and searching for small particles of food. The danios are largely surface-living species and will spend the majority of their time in the top 10 cm of the water. The different danio species (Zebra, Leopard, Pearl, etc) can be kept together and will all interact and shoal with each other.

When kept in small shoals within an established aquarium, it is not unusual for the danio species to breed. This is usually preceded by the males chasing the much fatter females until the eggs are released. In your community the eggs will quickly be eaten, therefore the adults should be placed in a separate breeding tank if you wish to raise the offspring.

The barb species are also good inhabitants of our Asian Stream. They tend to stay in mid-water and so complement the danios perfectly. There are a wide range of suitable species, including Rosy, Tiger, Cherry, Striped and Chequered Barbs.

Again they should be kept in small groups. Pairs of each species will survive happily in the aquarium, but it is better to keep them in groups of four or more. With Tiger Barbs this is essential. If kept in ones or twos they will be quite aggressive and will live up to their reputation as 'fin nippers'. However if your keep four or more they will be too involved with other Tiger Barbs in the shoal to bother with other fish.

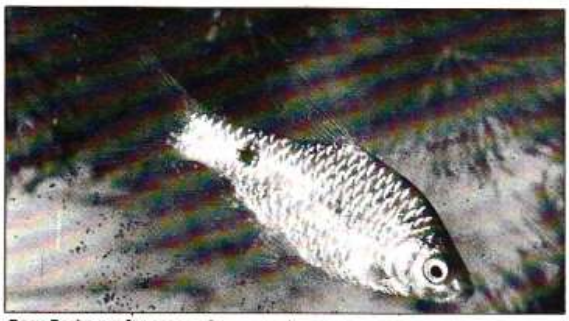
Take care when buying barbs that you do not choose the larger species - unless your aquarium is designed for them. Tinfoil Barbs and Spanner Barbs are good examples. They both look very appealing when 2-3 cm in length, but will quickly grow to 35 cm and 18 cm respectively making them too big for most tanks.

On the bottom of our stream aquarium we should have one or more of the loach species. The most suitable is probably the Clown Loach which is a peaceful ▶

PLANTS FOR AN ASIAN STREAM AQUARIUM

Species	Size	Lighting
Alternanthera rosaefolia (Red Hygrophila)	30-40 cm	Very bright
Aponogeton crispus	30-40 cm	Moderate
Blyxa japonica (Bamboo plant)	15 cm	Moderate
Ceratopteris thalictroides (Indian Fern)	10-30 cm (floating or planted)	Bright
Crinum thaiamum (Onion plant)	100 cm	Moderate
Cryptocoryne affinis	15 cm	Moderate
C. balansae	30-50 cm	Moderate
C. nevillii (Dwarf Cryptocoryne)	6-10 cm	Bright
C. wendtii	10-15 cm	Moderate
Hygrophila polysperma (Dwarf hygrophila)	30 cm	Moderate
Microsorium pteropus (Java fern)	20-25 cm	Dull/Moderate
Rotala macranda (Red Rotala)	45 cm	Bright
Synnema triflorum (Water Wisteria)	45 cm	Bright
Vescularia dubyana (Java Moss)	Creeping species	Dull

The Siamese Fighting fish dislikes a fast water flow. Keep only one male per tank. Pic. by Pete Trevett.



Rosy Barbs prefer areas of open water.

and very interesting addition to the aquarium. In the wild the Clown Loach can grow up to 30 cm in length but seldom grows to more than 16 cm in the aquarium. They are best kept in groups of four or more, when they will demonstrate their best behaviour.

If kept individually Clown Loach tend to be very shy and retiring. In pairs they will often be quite aggressive towards each other. However when there are four or more they form a close school and will feed, rest and swim together. When feeding the clown loach make a loud clicking noise, particularly when given a tablet form of food.

They also lie on their sides when resting. This unusual behaviour can cause concern to the fishkeeper who may well fear the worst when it is first seen. The Loach themselves usually lie under any cover in the aquarium and will often all lie next to each other.

The other loach species tend to be more aggressive than the Clown Loach, or are nocturnal, and so are not suitable for our 'peaceful' community.

A single Red-tailed or Red-finned Shark will provide a striking addition to the aquarium. These fish are territorial and should only be kept individually. If not they will constantly terrorise each other with the weaker one often being more susceptible to disease.

Fish for a Slow Flowing Stream

The gouramis are not ideal inhabitants for an aquarium in which there is good water movement. If you wish to keep them it is better to minimise water circulation and increase the numbers of plants present including floating species.

In such conditions you could base your fish community around the gouramis. These fish are air breathers, gaining oxygen through their labyrinth organs each time they rise to the surface to take a gulp of air.

The commonly available gouramis are very hardy and will accept a range of dried foods. These species include the Pearl, Moonlight, Blue and Dwarf gouramis.

Keep them in groups of at least two (one male and one female). If the tank is not overcrowded and has surface plant cover the gouramis will often breed. This is indicated by the formation of a bubblenest in the surface vegetation which will be carefully guarded by the male.

There are also a group of more retiring and timid gouramis. These include the Chocolate, Honey and Croaking gouramis. Again they should be kept in pairs and provided with a densely-planted aquarium. In some cases it may be necessary to supplement their diet with live foods, particularly when first introduced into the aquarium.

The gouramis should not be mixed with aggressive or very active fish. If this is done by mistake they will tend to become very retiring and will seldom be seen.

The many rasbora species are ideal for this purpose and also make interesting inhabitants. As with the danios, only select a small number of species, but keep them in shoals of six or more.

The choice of fish, plants, and decor for an Asian Stream aquarium is very varied. Two general examples have been given in this article but you could also select other mixtures to suit your preferences. Fishkeepers who prefer larger fish could, for example, choose silver sharks, black sharks, tinfoil barbs and kissing gouramis. The choices are endless and make an interesting change to the normal community aquarium. ■

FISH FOR AN ASIAN COMMUNITY AQUARIUM

Species	Size	Comments
Brachydanio rerio (Zebra danio)	4 cm	Very hardy. Keep in groups of four plus.
Brachydanio albolineatus (Pearl danio)	5 cm	Hardy. Keen jumper so keep tank covered. Groups of four plus.
Brachydanio frankei (Leopard danio)	5 cm	Very hardy. Easy to breed. Keep in groups of four plus.
Danio aequipinnatus (Giant danio)	12 cm	Requires large free swimming areas. Hardy and peaceful. Keep in groups of four plus.
Rasbora heteromorpha (Harlequin Fish)	4 cm	Hardy. Keep in groups of four plus
Rasbora pouciperforata (Red-striped Rasbora)	5 cm	Hardy. Requires large free swimming areas. Keep in groups of four plus.
Crossochellius siamensis (Siamese Flying Fox)	10 cm	Hardy. Territorial so only keep one. Keen jumper.
Epalzeorhynchus bicolor (Red Tailed Black Shark)	10 cm	Hardy. Territorial so keep individually.
Botia macracantha (Clown loach)	upto 30 cm in wild	Very peaceful. Susceptible to whitespot - keep in group of four plus.
Botia Sidthimunki (Dwarf loach)	5 cm	Peaceful shoaling fish. Prefers shaded areas. Keep in groups of four plus.
Barbus conchonius (Rosy Barb)	6 cm	Very hardy, peaceful fish. Prefers areas of open water. Keep in groups of four plus.
Barbus oligolepis (Checker Barb)	4 cm	Very hardy. Keep in shoals of four plus.
Barbus tetrazona (Tiger Barb)	5 cm	Very hardy. Keep in groups of six plus or will nip fins.
Barbus titteya (Cherry Barb)	5 cm	Very peaceful shoaling fish. Best kept in groups of four plus.
Betta splendens (Fighting fish)	7 cm	Only keep one male per tank. Requires slow flowing pollutant free water.
Trichopsis pumilus (Sparkling Gourami)	4 cm	Timid, shy species. Keep in well planted still aquarium.
Helostoma temminckii (Kissing Gourami)	15 cm	Individuals can be aggressive to others of same species. Hardy.
Colisa lalia (Dwarf Gourami)	6 cm	Hardy, peaceful fish. Best kept with smaller placid fish.
Trichogaster leeri (Pearl Gourami)	10 cm	Hardy. Prefers well planted shady aquaria.
Colisa chuna (Honey Gourami)	5 cm	Peaceful. Keep with timid small fish in well planted tank.

Burning

PHILIP HUNT gets fired-up for his favourite marine goby

Gobies are fish which are often thought of more as interesting than beautiful; too many fishkeepers think they have more to do with rockpools than aquaria. We also tend to think of them as drab fish, evolved for camouflage rather than display.

Many gobies are patterned in pastel colours or shades of browns and greys and black, though they often have interesting fins and spines. There are exceptions, however; the Sleeper Goby *Valenciennea strigata,* with its bright gold head and electric blue cheek stripes, is one. Others include yellow rock gobies *(Gobiodon citrinus),* which are a vivid yellow, especially when young, the Neon Goby *(Gobiosoma oceanops),* striped in blue and black, and the scarlet and blue Catalina goby *(Lythrypnus dalli)* which unfortunately prefer temperatures lower than those of most tropical marine tanks.

Fiery fish

The most brilliantly coloured gobies, however, are the Fire Gobies or Firefish, of the genus *Nemateleotris.* Among aquarium species these fish are perhaps only surpassed for brilliance of colour by various Basslets, notably species of *Pseudochromis* and *Gramma loreto.* However, they have much more to recommend them to the fishkeeper than simply their beauty.

For the marine fishkeeper there are many criteria that make for a desirable species. An attractive or interesting appearance is the first requirement.

A fish must also feed well in captivity on easily-available foods, be tolerant of deteriorating water conditions, just in case problems arise, and must also be compatible with other species, including, for the reef tank enthusiast, invertebrates.

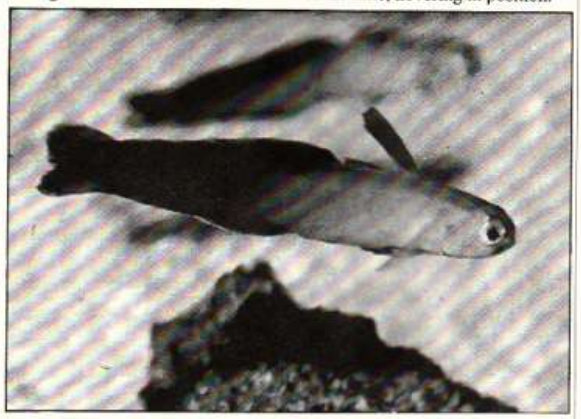
Also, for purposes of conservation, it would be good to have captive breeding somewhere on the horizon. Finally, its behaviour must be such that it adapts well to aquarium life, so that, for example, it is not nocturnal or excessively shy or aggressive, and does not require such a large territory that it is stressed by confines of a tank. The Firefish satisfy all these requirements.

Hovering Gobies

Firefish are unlike the majority of other gobies in that rather than staying on or close to the substrate, they hover in midwater in the wild, a few inches above the reef, waiting for food to be brought to them by the current.

They take up position a short distance over a crack, crevice or hole into which they can bolt at tremendous speed when disturbed.

Firefish also tend to live in deep water, up to thirty metres, which requires them to be decompressed slowly when being brought to the surface.



N. decora has a shorter and far less pointed dorsal ray than N. splendida.

Two species

Two species of *Nemateleotris* are encountered in the aquarium.

Most commonly seen, and least expensive is *N. splendida,* also known as *N. magnifica,* usually sold simply as a Firefish, or occasionally Fire-tailed Goby.

In the wild it is distributed throughout the Indopacific. It is a very beautiful fish; the head of the fish from the snout to behind the eyes is a golden yellow. Stretching along the top of the head are vivid purple and pink stripes, which reach to the extraordinary dorsal fin, whose first ray is elongated to a length which is nearly half that of the body. The body, long and slim, is white immediately behind the head, but then shades though orange and bright scarlet to a deep wine red on the tail fin and the ends of the dorsal and anal fins.

N. splendida is a small fish, reaching a maximum of eight centimetres when fully grown. Most imported specimens are about half that length. They are quite hardy, and once they have found a convenient lair stay on view most of the time, hovering in position.

When threatened by other fish, the Firefish will disappear with great speed into its bolt-hole.

It's easy to feed, taking flake, frozen mysis and live brine shrimp with relish, but with one proviso, namely that the food is presented in midwater as the Firefish will not feed from either surface or substrate. This is easily accomplished; surface feeders often pull dried foods underwater, and frozen shrimps or similar will usually sink slowly.

N. splendida prefers a quiet aquarium, with invertebrates and peaceful fish such as mandarins, Anthias and the smaller dwarf angels.

Among themselves, however, members of this species are highly territorial, and one specimen per tank is the rule unless a genuine mated pair can be obtained.

Purple Firefish

The other species imported regularly into Britain is the Purple Firefish, *Nemateleotris decora.* It is less often seen than *N. splendida,* and commands a higher price, usually about three times that of *N.splendida.* Like the former, the Purple Firefish is quite widely distributed in the Indopacific.

It grows to a slightly larger size, up to ten centimetres.

In the aquarium it has similar behaviour to *N. splendida,* but adapts slightly better to tank life, quickly learning to take food from the surface, though still preferring to feed in midwater.

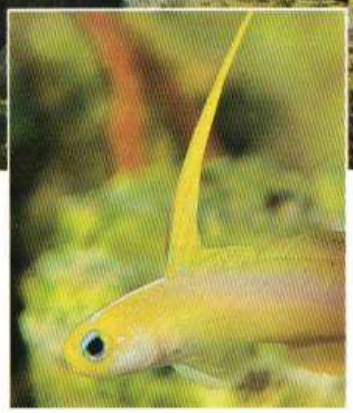
My own specimen shares a four foot mixed fish/invert tank with a Common Clown, Six-striped Wrasse and a Coral Beauty. Only the Dwarf Angel intimidates the Firefish, being a much bulkier fish.

It's amusing to watch the two fish scrambling for pieces of flake drifting around in the current; it's easy to see which of the two is adapted to snapping-up passing zooplankton and which to grazing algae and sponges at a leisurely pace. The firefish wins ninety per cent of their races!

Despite this slightly more aggressive attitude to other species, *N. decora* can be kept in small groups, being less territorial to its fellows than *M splendida.*

The Purple Firefish is another very attractive fish. The long body varies between white and pale yellow, flushed increasingly towards the rear with deep, rich purple.

beauties



The most commonly-found Fire Goby in the hobby is **Nemateleotris splendida (or magnifica)** *the Firefish or Fire-tailed Goby. Pics Max Gibbs, the Goldfish Bowl, Oxford.*

The dorsal, anal and caudal fins are patterned in orange, red, yellow and purple, and an almost fluorescent fuschsia stripe spreads from the mouth, which is downturned, giving a morose expression, over the top of the head to the first dorsal ray, which is elongated, but not as exaggerated as in *N. splendida*.

Breeding

The Purple Firefish has been spawned in captivity, though the fry have not yet been raised, to the best of my knowledge.

The male fish turned out to be the larger and heavier bodied of the pair, and apparently courted the female by a quivering dance. The male also drove other fish away from the spawning area. The pair dug a depression and spawned in it at night. No parental care was seen. Although the fry were not raised, the fact that the eggs were deposited on the substrate rather than left to drift in a pelagic fashion is encouraging, in that collecting the eggs and hatching them in a separate raising tank should be straightforward.

Stocking warning

The Firefish are an asset to any suitable aquarium, particularly a miniature reef tank. They are hardy enough to survive in newly-established aquaria, and peaceful enough to get on well with most other fish of a similar size. One small caveat is that when acclimatising the fish to the aquarium the floating plastic bag must be kept closed except when adding tank water.

When frightened, and without a hole to bolt into, the fish tend to head vertically upward. My own Purple Firefish took a flight onto the carpet when I was introducing it into the tank, so I speak from experience.

The fish seemed none the worse for the experience, but obviously this is a situation to avoid, so it's probably wise to keep the tank covered whenever possible. ■

The hard coral dilemma

I am sure that most of us feel committed in this way, but, looking a little deeper, the facts do not entirely confirm this. A particularly striking example of, perhaps, a lack of acceptance of these principals is the attempt to keep hard corals in the enclosed system of a home aquarium. Despite major advances in aquarium technology, keeping hard corals in captivity has met with relatively limited success.

Even using the most sophisticated marine life support systems does not guarantee hard corals will remain alive and healthy for long periods. At the level of sophistication available to the average home hobbyist, it is really inadvisable.

A diver encounters a shoal of Porkfish in the Maldives.

Left: This **Tridacna crocea** *clam is listed as 'delicate'.*

Such statements can of course be challenged and undoubtedly there is a handful of expert marine fishkeepers who are successfully pioneering methods which perhaps in the future will allow much greater success - and also be in line, realistically, with what the average hobbyist can afford.

The main point is that almost all of the hard corals imported currently are destined to die in a very short period, because in the main the person purchasing them does not have an adequate substitute for the natural conditions they demand.

It is therefore quite inconsiderate of us to take them from their natural environment in the first place - especially as many hard corals require a long time to establish their colonies in the wild, and suffer accordingly when they are disrupted.

Remember, also, that taking hard corals from a reef is far more damaging than taking other creatures of the reef ecosystem because it is the structure of the reef itself which is being depleted.

These corals form the bricks with which the reef ecosystem is built and the habitat of the other life forms. It is also quite unnecessary as there is a wide range of soft corals, anemones and other sessile invertebrates, which will prosper in captivity and provide an equally-attractive reef-like display in the home aquarium.

Alarm bells

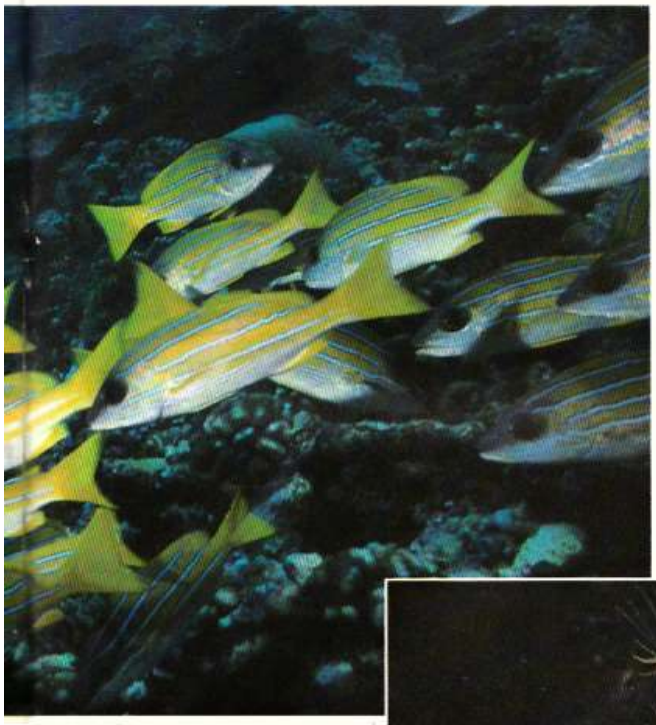
I am sure you will agree that a pretty strong case can be made for not keeping hard corals in the average home aquarium. Recently, however, support has been sought for not keeping a whole range of other species of reef animals, and here the justification is not so clear.

Such proposals not surprisingly cause alarm, especially as the experience of German hobbyists has shown that, what may start as recommendations for voluntary curbs can easily be extended by law and become a ban on the importation of such subjects. Recently this did occur when over 40 species of butterflyfish and 15 species of angelfish were involved in a ban from importation into Germany.

Many of us, naturally, feel threatened by the German restrictions, especially as there are moves to extend these to our country as E.E.C. law in 1992. Many expert British fishkeepers feel that such restrictions are unnecessarily severe as the bulk of the species are not listed, in any way, as endangered, but have been included in the ban principally because they are regarded as impossible to acclimatise to aquarium life, due to their specialised dietary or habitat requirements.

This introduces a much grayer area, as many of these 'impossible to keep' subjects are considered suitable for the

The Majestic Angel fish could disappear from the hobby due to the M.C.S. listing which terms it as 'Impossible'.



Soft corals are relatively easy to keep in the aquarium, so can be considered 'environmentally friendly'. Left: **Dendronepthya**. *Below left: Zooanthid anemones.*

aquarium in this country. On the other hand the expert fishkeepers who formed this opinion also agree that some of the species listed should be regarded in this light and not imported.

Unscrupulous or honest?

My own opinion is that although I am uncomfortable with a law-enforced ban, it does address the situation of the unscrupulous dealer who would not accept a voluntary ban and continue to trade 'impossible to keep' subjects to the less-experienced and unsuspecting members of our hobby. The difficulty with law-enforced bans is that they tend to be regarded as having been written on 'tablets of stone' and can be difficult to change if circumstances improve our methods and allow us to keep these subjects which are 'impossible' by today's standards.

I feel also, to be fair, that extensive as the German restrictions are the ban does relate to a real problem in relation to the butterflyfish species - which are specialised coral polyp feeders and do not acclimatise to substitute foods in captivity.

Such is the dilemma with which we are faced in wishing to avoid our hobby impacting unnecessarily on the coral reef ecosystem nor wanting the exciting challenge of keeping coral invertebrates and fish to end in suffering and the premature demise of the creatures we take into our charge.

Freedom to choose?

There is obviously a case for freedom to choose in those cases where it's purely a matter of opinion as to a species' suitability for import. There are also times when reliable unbiased expert advice would be valuable to most hobbyists, allowing them to exercise their choice in an environmentally-friendly manner.

Fortunately there is a project currently being developed by the U.K. based Marine Conservation Society which could help a great deal in this area - and has the support of leading conservation groups including the World Wide Fund for Nature; plus that of leading members of the trade in tropical marine fish and invertebrates.

In short; the Marine Conservation Society's project

Left: The removal of hard corals, like this **Euphylia**, *is more damaging to the reef than the collection of any other creatures.*

Below: A Queen Conch farm in Providencials raises Conches in an attempt to restore the natural reef.

aims to introduce a voluntary labelling scheme which will be operated in conjunction with retailers, and will indicate those coral invertebrates and fish which are inappropriate for the aquarium - plus the level of expertise required to keep those considered appropriate, but needing some experience.

This eco-labelling system is a negative listing, meaning that it draws attention to those species which are inappropriate or require some experience to succeed. It does not provide a list of recommended aquarium species.

As the primary objective is to draw attention to those species where there is definite concern, it is not surprising that this approach has been taken.

Such an emphasis is also of real value to the hobbyist who is informed of the critical cases where exercising choice will best promote the aims of reef life conservation.

How it works

Many of the butterfly and angelfish species banned by German restrictions, fall in this scheme into the 'delicate' and 'difficult to keep or acclimatise to the aquarium' category, requiring an expert fishkeeper to keep them successfully. Thus the scheme is more discriminating in this area.

The proposed eco-labelling is not, of course, confined to these two fish families but extends over a range of fish and invertebrate groups.

The scheme is primarily devised to draw attention to species which have a very low chance of survival in captivity - but also addresses localised conservation problems in supplying countries where there may be risks to the reef environment or the population of a species due to over-fishing or the use of collecting methods which are damaging.

This is accomplished by allowing species to be labelled 'inappropriate' from a location where, for example, fishing pressure is endangering that species while it could be acceptable to collect the same species from a less impacted area.

Educational. . .

A major feature of the scheme is that it is a powerful communication tool, providing advice about species which require specialist care, and drawing attention to those which should not be traded.

Perhaps more important to the hobbyists is that the listings are in the main compiled with the help of respected members of the trade; or those skilled in keeping delicate marine aquarium species such as Dr Gerald Allen, acknowledged expert in the care of butterflyfish and angelfish.

and informative

If this scheme is successful and is supported by the majority of importers and retailers, the hobbyist will become better informed as information regarding impossible and difficult species would be freely available at point of sale.

Traders, equally, would be kept well informed on the conservation status of the species in which they are dealing.

Retailers supporting eco-labelling would be readily recognisable by the labelling of their tanks and from information sheets, leaflets and posters prominently displayed.

I am not able to conceive of a simpler means of making our hobby more environmentally friendly, and there isn't likely to be a better opportunity of showing that hobbyists are concerned about the coral reef environment. I am sure if this project could be developed - and provided it continues to be a cooperative effort involving knowledgeable representatives of the hobbyists, together with conservationists, we will take a major step in improving our hobby in terms of conserving the coral reef environment on which we depend.

So what next?

I must say, that in our modern world, with all its amazing technology it seems incongruous to me that we have still to rely upon natural reef ecosystems to provide us with the subjects for our aquariums. Undoubtedly the economics of cheap labour in the Third World supplying countries and the high productivity of the coral reef ecosystem contributes to a continuation of this practise but in doing so the development of alternative mariculture methods are stifled.

Many such projects around the world are held back by the lack of funding, and if some of the finance directed into providing high-tech holding facilities and fish collecting vessels could be redirected to such projects, we would, in a short time, be buying healthy cultured specimens of many of our aquarium favourites.

Mariculture projects

One mariculture project I have been closely associated with for a number of years, raises Queen Conch *(Strombus gigas)* to replenish overfished areas throughout the Caribbean, and illustrates the point very well.

The technology required, and the facilities available at this mariculture station on the Island of Providenciales in the Turks and Caicos Islands would be admirably suitable for raising a wide range of reef invertebrates and fish.

The usual drawbacks in attempts to culture delicate reef subjects are those of maintaining optimum water quality; finding a suitable food for the emerging fry; and the ability to maintain a low mortality rate during the first months of life.

Mariculture projects based at the natural location of the cultured subject have a massive advantage in having a constant supply of clean ocean sea water and natural plankton.

Culturing live foods such as diatoms and other algae for feeding on is easy with the aid of bright sunshine at these locations, overcoming the difficulties of feeding microscopic juveniles. Large floating nursery enclosures of fine mesh can provide natural open water conditions, free from predators, for growing-on animals to marketable size.

Undoubtedly, in the future, this will be the way we will choose. I only hope that it is not, as it has been with the Queen Conch, a method of restoring natural reefs to their former glory following our unthinking abuse.

Your decision

The final decision regarding the rights and wrongs of keeping a marine aquarium and the morality of keeping marine creatures from the wild in captivity rests with the individual.

Anyone who is fascinated by the marine life of a coral reef and enthused by the challenge and joy of keeping a small slice of reef life in the living room must feel a strong commitment and concern for the captive creatures depending on the aquarium as a life-support system AND a special concern for the preservation of the reefs which provided such rare and beautiful gifts. ■

"Some fish begin to die at the six week old stage." ... "Losses can be almost total." ... "It's my *Aspidoras* fry.....my *Ancistrus* fry.....my *Sturisoma* fry." The queries are the same. It's only the species which varies.

In this two-part special, I will assume that the reader has already accomplished basic fishkeeping challenges, and has spawned community or other aquarium fish. As a consequence, they'll already be aware of the important factors - which usually relate to water quality and dietary requirements - and of course have the ability to sustain fish to sexual maturity.

Healthy fish will spawn in aquaria, providing they are offered the correct water conditions, the ideal spawning site and a reasonably broad-based diet.

In creating the correct water conditions you must take into consideration the ideal range of pH, hardness, temperature, volume and even the depth of water.

Above: A pair of Severums will guard their eggs, and later their fry, until they can fend for themselves. Right: Day-old **Rineloricaria** *fry.*

Breeding success - naturally

DAVE SANDS of the 'Aquarian'Advisory Service, begins a two-part special on raising fry. This month, he looks at the spawning techniques employed by various species and at the extent, if any, of their parental care.

The correct spawning site might be a smooth boulder, a pitted rock, a cave, gravel, sand, a tube, plants, or a vertical and horizontal surface, to name but a few.

Finally, the proper diet may include bloodworm, shrimp, larvae, earthworm, peas, lettuce, carnivore or conditioning flake, pellet and tablet food.

Having all the major parameters right enhances the chances of fish spawning in aquaria, providing the fish are sexually mature, are a pair and are ready to spawn.

The latter factor can be extremely important if the fish in question are wild-caught. Fish taken from nature often carry a natural spawning clock which is synchronised with the seasons and phases of the moon. On the other hand, farm-raised fish many generations down the line from wild-caught parents may not be critical to the time of year or water conditions.

Even wild fish can have a wide tolerance to water conditions. *Corydoras barbatus* caught by myself in a pH of 4.8 with zero hardness in Brazil, happily spawned in a pH of 7.8 and very hard water.

The spawning site

SOME fish species are very particular about the egg-placing site and will not accept alternatives. Certain *Geophagus* species and *Hypostomus* and *Pterygoplichthys* spawn in burrows in the river bank in South America. The site is extremely difficult to replicate in an aquarium and as yet they have not accepted alternatives in captivity.

Rineloricara spawn in hollow branches in nature and they will happily put PVC tubes to this purpose in aquaria.

Many fish migrate to spawn and have to go through changes ▶

in their environment - this period of change in nature is difficult to simulate in captivity. Certain species require very deep water and again, this can be impossible to replicate in aquaria.

Thankfully, most species of fish will adapt to life in captivity and do what comes naturally to them when the conditions are right to breed. Spawnings in captivity can provide clues to what occurs in the wild, but it is wrong to assume that all behaviour in aquaria relates to nature. Many neotropical fish spawn against flooded river banks in the wild, taking advantages of submersed terrestrial plant leaves, roots, vertical soil banks and so on. These options are not offered in captivity, therefore a vertical wall of glass becomes the equivalent, strange as that may seem to us.

But it would be incorrect to assume that because fish behave differently in aquaria than is described in books, that fish are not "abiding by the rules." Natural options govern the laws of natural selection, whereas captive options are governed by the laws of necessity.

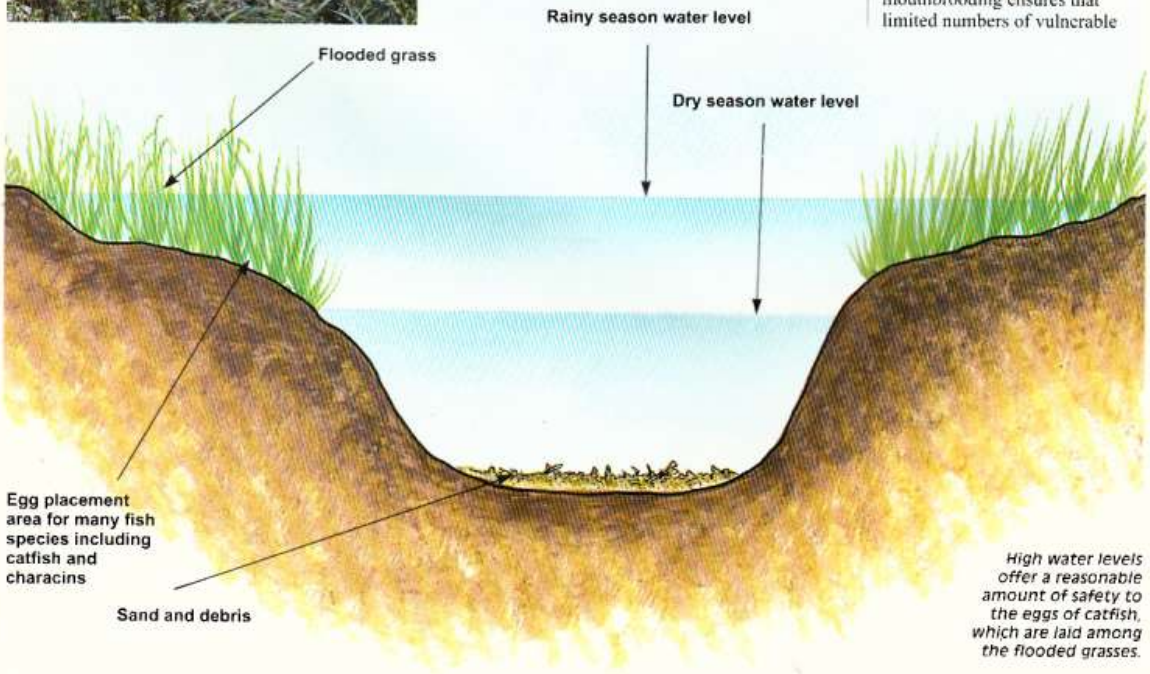
The male of the **Loricariid** *species takes sole charge of the eggs.*

Left: Flooded channels and swamped river banks are chosen by **Corydoras** *to lay their eggs – and leave them.*

Parental care

ONCE a spawning has occurred, the first priority for fishkeepers is to ensure the eggs hatch and that the emerging fry progress. Sometimes this is made easier by the parents displaying bi-parental or single parent care. In these cases, many Anabantids, Cichlids, some catfish, many Gobies and some obscure fish, such as Arrowana, care for the eggs and emerging fry until they are more able to fend for themselves.

In some cases, with some Cichlids and catfish, mouthbrooding ensures that limited numbers of vulnerable



High water levels offer a reasonable amount of safety to the eggs of catfish, which are laid among the flooded grasses.

juveniles can be protected and fed during the early stages of development. Mouthbrooding has to be one of the most efficient methods of offering close protection to fry in the world of fish.

Parental fish will see the fry through from hatching to foraging stage and sometimes, as with Discus, Uaru and Severum cichlids, even offer body mucus as an initial food.

Not all captive parental fish prove to be good parents, but there is usually a good reason for failure. The fish may be immature, badly matched, poorly bred, genetically weak or not even a true pair.

Sometimes in the close confines of aquaria a brood may be vulnerable to other inhabitants of the tank. Nocturnal hunters, such as many catfish species, will take delight in stealing hatchlings during night time excursions. In nature the spawning site may be much more easily defended, or less easy for the catfish to detect.

Given the right situation, well established parental fish will raise a brood quite happily. Success in numbers reared may depend on the quality and quantity of foods offered to the juveniles. In nature, food is always plentiful for young fish. They can browse continually under the protection of the parent fish. In this way they eat a "little a lot"

This situation is difficult to recreate in aquaria without overfeeding and polluting the water. Under the protective fins of their parents, fry can wander within a small radius in nature, whereas, in aquaira, unless the breeding pair are in a purpose-built breeding set-up, other fish - in a feeding confusion - will be allowed to stray in among the fry.

The exception to this rule is related to certain Tanganyikan and Central American cichlids which would thrash the living daylights out of any fish that made the fatal mistake of coming too close.

Dad takes charge

SINGLE parent protection is not unusual in the world of fish. In bubble-nesters such as *Ictalurus*, *Hoplosternum* and *Callichthys*, Siamese Fighters and most Gouramis, the breeding passion usually ends up with the male defending the breeding site. The females tend to wander off and leave him to it.

Above: Single-parent protection is not unusual in fish. This is a male **Sturisoma** *guarding his eggs.*

Right: A spawning pair of **Aequidens**.

In South American suckermouth catfish of the genus *Rineloricaria* (Whiptail cats), *Ancistrus* (Bristle-Nosed cats) and *Sturisoma* (Giant Whiptails), the male attends to the eggs while once again, the female minds her own business.

Fending for themselves

THE other main groups of fish are non-parental. Many catfish, most Characins, Killifish, Rasboras, Carp and Barbs simply scatter eggs and leave it at that. In the case of Clariids (African and Asian Walking Catfish), each female, embraced by a male, dumps half a million eggs in among the many twists and turns. Males splash sperm and the eggs, in among the shallows progress within 24 hours. Predation is so high that these numbers are necessary for a few to survive.

Huge shoals of Characins, in the shape of Headstanders, *Semiprochilodus*, *Prochilodus*, *Leporinus*, *Collosoma*, and *Metynnis*, possibly migrate hundreds of miles along the mighty Amazon. They leap cataracts like salmon until they reach spawning shallows. There, in the safety of these shallows, it is believed they spawn in numerous groups with eggs and milt meeting before the fertilised eggs fall into the muddy substrate. Some of the larger Barbs in Africa also migrate during the flood times and end the journey in a wild orgy of spawning. Again the eggs are left to progress, until they migrate back downstream to start the cycle off again.

Dry mud and flooded grasses

SOME Killifish may inhabit nothing more than a puddle which is drying up as each day progresses. Spawnings happen in the muddiest remains of the water and the parents either die as the water disappears or as terrestrial predators find them easier to reach. The eggs lie dormant in the dry season until the rains return to start the puddle cycle all over again.

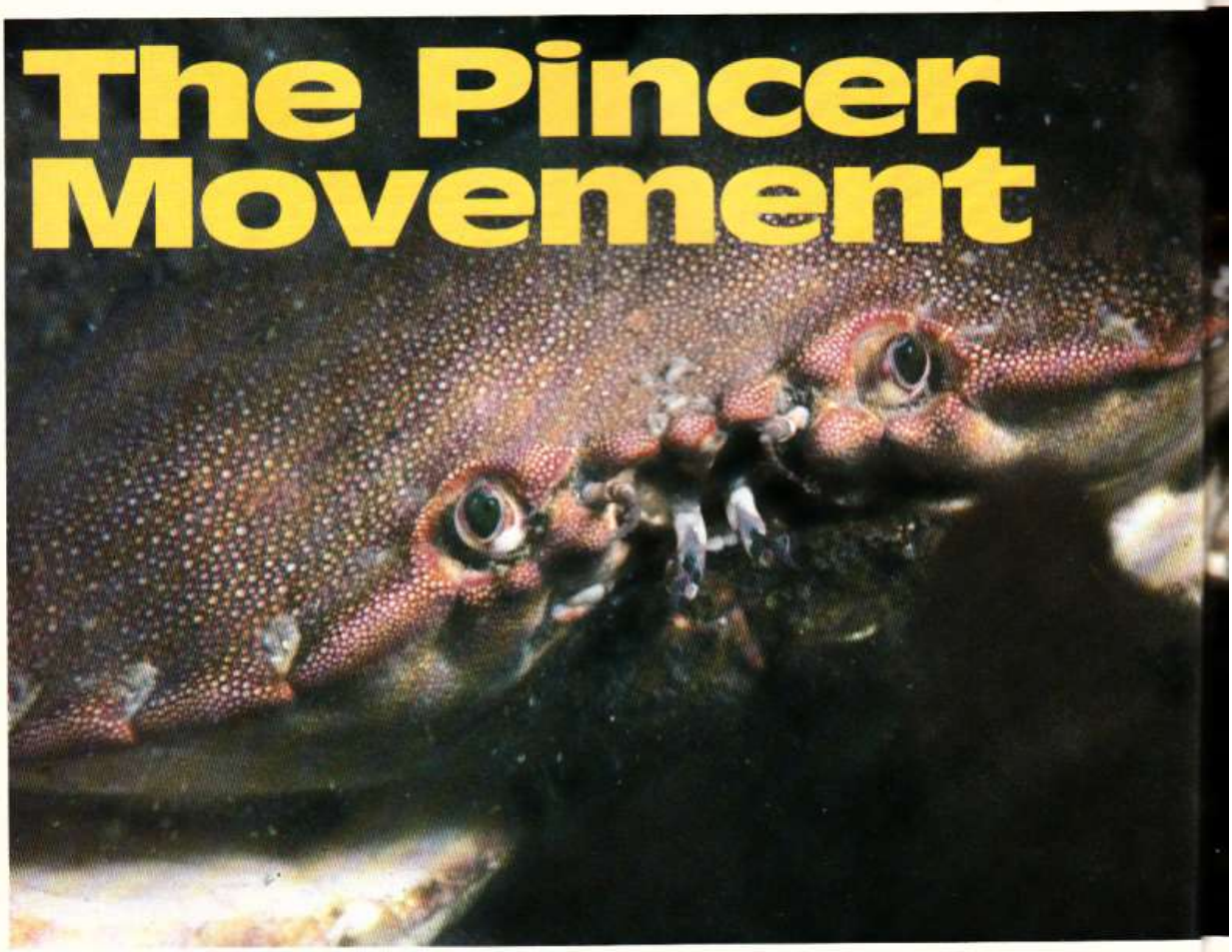
Corydoras choose flooded channels, swamped river banks and submerged grass as the place to leave their eggs. There is no parental care beyond the plan to place the eggs out of the reach of predators in among the flooded grasses. The shallows form a perfect nursery for juvenile fish and while there are no parents watching over them, the hatchlings are allowed to grow in a nutrient-rich, warm environment.

As the flooding recedes, the youngsters grow until they are large enough to join the main shoals of adults in the deeper creeks and tributaries.

Watching a young *Corydoras adolfoi* fry no larger than a few millimetres keep up with adult fish, as they dart across my three foot square University study aquarium, is proof enough for me that they do not require too long in the protected shallows before they are ready for the big river. ■

• Next month Dave looks at some of the secrets relating to looking after the offspring of non-parental fish.

The Pincer Movement



ANDY HORTON continues his study of British marine life with a look at Crabs

All crabs have ten legs, of which the first two have developed into formidable claws, (or chelae), used for grasping and cutting their food, and fighting each other. Crabs are aggressive, greedy and quarrelsome, and hardly the sort of animal that you would want in a delicate invertebrate aquarium. Even with a juicy succulent worm in its mouth, the common Shore Crab, *Carcinus maenas*, will try to steal food from another crab. In their numerous fights, they will often lose one of their major claws. Claws, or legs, will break off, if forced, in a process called 'autotomy'.

British Species

At least 67 species of true crabs inhabit the seas surrounding the British Isles. They vary in size from the giant Box Crab, *Paramola cuvieri*, which is a rare and unusual deep water species, to the inquiline Pea Crab, *Pinnotheres spp.* Crabs are measured in scientific circles from between the eyes, across the shell to where the legs adjoin.

The Box Crab measures up to 21 cm, but has very long claws

The Thornback Spider Crab, **Maja squinado** *is intolerant of salinities below 3.2%.*

estimated at 70 cm, with a span that may reach 183 cm. However, it is not the heaviest crab found in British waters. This record is held by the brick red Edible Crab, *Cancer pagurus*, which is commonly seen in fishmongers. A specimen of 6.35 kg (14 lb) has been captured. This crab is broader than it is long, and the width of this giant was 27.9 cm, with a length estimated at 14 cm. Small specimens are quite common, buried in sand under rocks on the lower shore of rocky coasts. It is illegal to collect these under 14 cm wide. In any case they are to be avoided in aquaria, because they will destroy the undergravel filter, and even small specimens have been known to destroy the aquaria itself. They do this by hurling rocks around, which can be up to ten times their own weight.

Claws of dead Edible Crabs are sometimes found washed up. Pick them up and you can observe the lever action of the claws.

Growing up

All crabs belong to the phylum of animals known as the Arthropoda (jointed animals), and belong to the major class (or sub-phylum) called the Crustacea, which includes prawns, sea lice, minature copepods and sandhoppers, and millions of insect sized organisms, that comprise the most numerous group of animals in the sea, and on this planet.

All crustaceans are protected by a hard exoskeleton, which is the shell, or cuticle, of which the armoured carapace is most

Left: The Edible Crab, like most types of crab, is aggressive, greedy and quarrelsome. Pic by Trevor McDonald.

Right: Humbugs, **Pisa tetradon,** *decorate themselves with pieces of weed which they fasten to their outer shell.*

Right: The aptly named Hairy Crab, **Piluminus hirtellus** *fares well in aquaria without the presence of sharp-toothed fish.*

noticeable on all crab species. This gives them protection against their many enemies. However, there is one major disadvantage. As the crab grows, the harder outer shell does not grow with it and has to be periodically discarded, or shed.

This is a very dangerous time for the crab, as the new exoskeleton growing underneath is soft. The crab has to hide away under stones until the new shell has time to harden, in part by incorporating calcium salts from the surrounding water. This is known as the ecdysis stage of the moult. A crab can grow back a new claw, which will appear at this stage, smaller than its original and its pair.

Fishkeepers will realise that the ecdysis is also a dangerous time for any captive species, because any sharp toothed fish like wrasse and blennies, will attack the vulnerable and defenceless crustacean. Also, if the water is deficient in calcium, insufficient salts will be absorbed. This is more likely in the larger species. The crab skeleton is also made up of a substance called chitin, which is obtained through its food, and then synthesised.

Discarded shells are often seen floating on the surface of the water.

Shore Crabs

A visit to a rocky shore, or even some sandy shores with groynes, or just a minimum of shelter, will find them inhabitated by numerous crabs, in all different shapes and sizes, hiding under stones, and in early summer when they are particularly abundant, scampering over the sand and gravel at low tide.

The most likely species to be seen is a green or brown crab, known mostly as the Shore Crab. It will also be found in estuaries and in almost freshwater during the hotter months, where it is able to adjust its salt balance (osmoregulate) and breathe air.

It is pugnacious and predatory, and disruptive in aquaria, and because it is drably coloured and so abundant, it is not rated highly as an aquarium subject. However, it's worth a mention because it is difficult to avoid accidently introducing this animal, as miniature specimens hide in rocks and weed. Some will survive the attentions of the fish.

But students of the seashore, who are interested in the behaviour of the various marine creatures, may like to set aside an aquarium for this hardy species, which will then demonstrate its ability to consume various different types of prey; worms, snail-like molluscs (gasteropods), mussels and cockles (bivalves), and shrimps. Even the most sedentary fish can escape from its claws.

They will survive up to 24°C, and for short periods at higher temperatures, if they can find rocks above the waterline, which will enable them to escape from uncovered tanks.

Biology

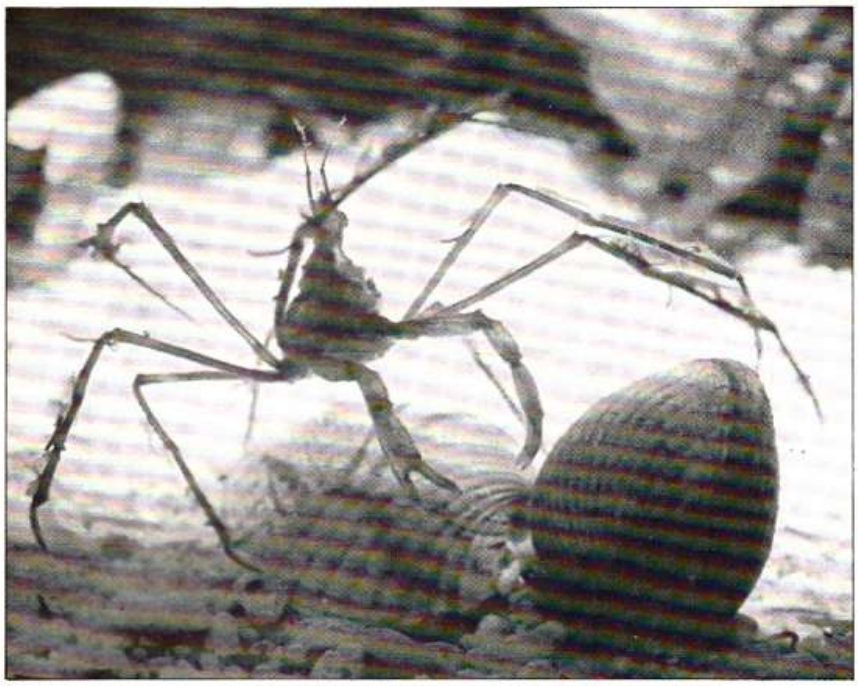
Crabs have two eyes perched on stalks that protrude from underneath the hard carapace, and two pairs of feelers; the longer antennae, and the antennules.

Female crabs are sexually impregnated in a freshly moulted condition. They will often be found carrying a clump of eggs on the underside of their body. These are incubated for several months before being released as tiny larvae to take their chances in the sea.

Carrion provides nutrition for many scavenging crabs. Food is gripped and broken by the claws and sometimes serrated by the mandibles, before being passed to the mouth, which is also capable of tearing the flesh.

Other intertidal species

Some rocky shores provide a home for the ferocious Velvet Swimming Crab, *Liocarcinus puber,* which is sometimes known as the Devil's Crab, because of its bright red eyes and its mordacious nip. Its rear legs are paddle-shaped and prettily lined with blue. This species is too large for permanent captivity, and predates on smaller crabs like the aptly named Hairy Crab, *Pilumnus hirtellus.* Found in piddock holes in chalk, and under rocks and in crevi



The bicycle-like swimming action of the Long-Legged Spider Crab is fascinating to watch.

most rocky shores, this is one species that is not too aggressive and fares well in aquaria without sharp toothed predatory fish. It attains only 15 mm, and is often smaller. One claw is naturally larger than the other.

Two species of small Spider Crab are occasional visitors to the intertidal zone. The Long-legged Spider Crab, *Macropodia rostrata,* could be mistaken for a clump of twigs, and feeds principally on zooplankton, which can pose feeding problems in aquaria. Its bicycle-like swimming is fascinating to watch.

The Short-legged Spider Crab, *Pisa tetraodon* or Humbugs, are abundant in shallow water, and decorate themselves with pieces of weed, broken off by their claws, and fastened to their outer shell. A specimen is known to have survived for two years in aquaria, before it was consumed by the Dahlia Anemone, *Urticina felina* which had been in the small tank for the same length of time.

The large Thornback Spider Crab, *Maja squinado,* is a common offshore species often seen in public aquaria, and intolerant of salinities below 3.2%.

Swimming in the surface inshore waters is the smallest (6 mm) species of true crab, the male Pea Crab, *Pinnotheres pisum,* one of two British species. Females are completely unable to swim, and are found inhabiting the inside of live mussels, feeding on the food meant for the host. When the bivalve opens to filter diatoms, the male swims in to fertilize the captive, which is effectively imprisoned because it is too large (10-13 mm) to escape.

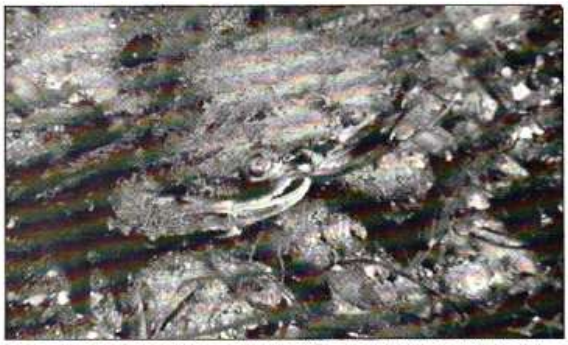
Occasionally the Masked Crab, *Corystes cassivelanus,* can be uncovered at very low tides. This crab buries in sand, about 5" below the surface, with just two long antennae protruding to enable it to pass water over its gills and extract oxygen.

In the south-west of Britain, the littoral fauna includes the Furrowed Crab, *Xantho incisus.*

Offshore species

Most people who keep British species of crabs are rockpoolers, so the shore species are envisaged to be of most interest. However, offshore, the Crown Crab, or Cleanser Crab, *Liocarcinus depurator,* is a particularly common swimming crab; and from the south and west the Running Crab, or Angular Crab, *Goneplax rhomboides,* has been collected, but with little success in captivity. It inhabits muddy burrows, and would require a separate aquaria.

In ideal circumstances, if crabs were allocated a tank on their own, given considerable amounts of the correct food, had the water renewed often enough to maintain calcium and essential salts, most species could be kept. However, in community aquaria, where predation, including cannibalism, especially at the ecydsis stage of the moult, and competition over food is an important factor, long term success rates are lower.



Liocarcinus depurator *is a common offshore swimming crab. Pic by Trevor McDonald.*

Anomura

Regular visitors to the shore will quickly realise that I have overlooked four particularly common species; the Hermit Crabs, Squat Lobsters, and two species of Porcelain Crabs. This is because they are not true crabs of the taxa (infraorder) of Brachyura, but they have evolved along a slightly different route, and are classified in a different taxa of ten-legged decapod Crustacea; the Anomura. (See Table).

Even for the fishkeeper, they pose different problems of husbandry, especially feeding, which is beyond the scope of this article.

True brachyuran crabs are a highly successful group, and the most advanced of the Crustacea, since they first appeared on Earth during the Jurassic (180 - 135 million years ago) period.

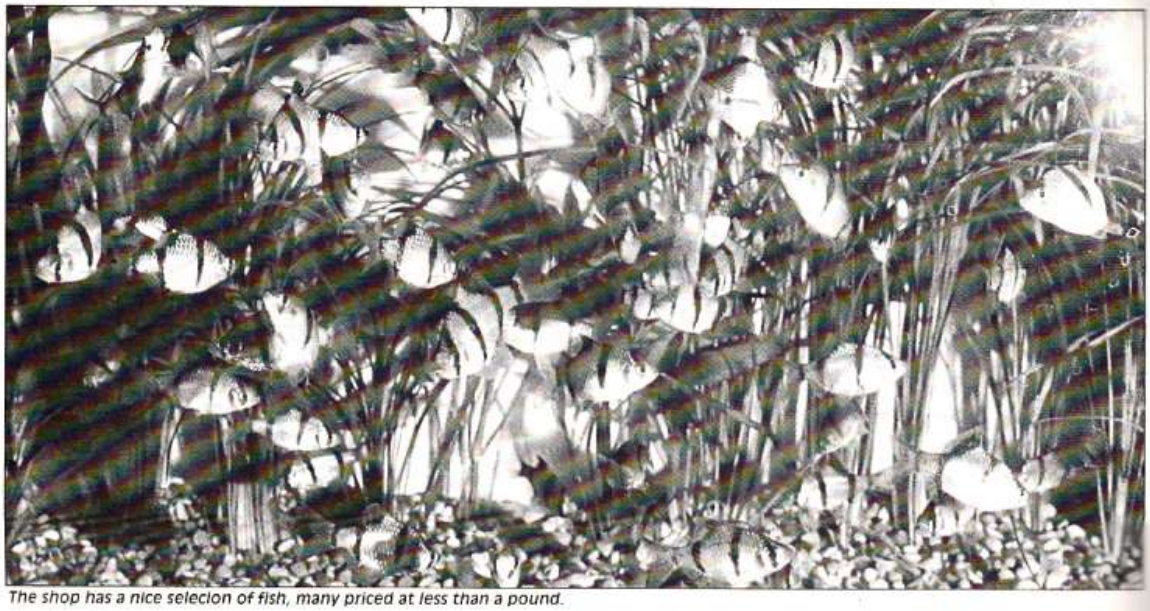
Taxonomy

DECAPODA
Caridae: prawns and shrimps.
Astacidae: true lobsters and crayfish.
Palinura: lobster-like crustaceans with small claws.
Anomura: Hermit crabs, Porcelain crabs, burrowing prawns etc.
Brachyura: true crabs.

Summary

A study of the ecology of the seashore would not be complete without including the crabs. Watch for habitation of the larger shore crabs to tidal cycles - I have never been able to correlate this - and observe how they tackle different items of food. The Hairy Crab needs holes to hide in, and will venture out during the hours of darkness.

The best way to capture crabs is to lift up stones and look under them, always remembering to return them the same way up as they were found. A baited dropnet can be used in deeper water. ■



The shop has a nice selecion of fish, many priced at less than a pound.

PETS are PALS

We visited Pets are Pals, of Chapeltown, Sheffield, on their special Open Day.

Pets are Pals is not a huge outlet. It's not ultra-modern in appearance and it doesn't stand out from the rest of the shops in the street. But our shopcall on the Pets are Pals open day on November 30, turned out to be one of the best days out we here at PFK have ever had.

Ernie Stanton and his wife, Pat, have built the shop up over two and a half years, since Ernie left his job as a technical manager for Hagen.

It sells not only fish, but a large variety of birds and small mammals, including chipmunks and Chinchillas, with a range of accessories like we'd never seen before.

The fish section is split into three. There's an indoor tropical section and two coldwater areas, one indoors and out. All are well-stocked. The tropical selection includes the new Albino Oscars and some enormous Clown Loaches, in addition to a good selection of general community fish, many priced at under a pound. For those with something a little different in mind Ernie stocks wild lobsters.

Ernie Stanton has built his business up over two and a half years since leaving Hagen.

The coldwater selection was somewhat depleted, due to the time of year, but still offered a nice range of fancy goldfish and Koi, at reasonable prices, along with plenty of pond equipment.

The whole of the first floor is given over to a large display of aquariums, cabinets, stands and various cages, with the downstairs department housing the livestock, equipment and food.

The open day was geared towards enabling people to learn more about their pets, with the help of experts in each field.

These included Dr. David Pool from Tetra, on tropical fish, with Graham Moss from Moss Lodge Fish Farm, giving advice on the coldwater side of the hobby. Additional coldwater information was provided by Harry Ackroyd, from Aquatic Installation and Supplies.

For those wishing to get their fish into the Christmas spirit - after all, it was that time of year - Fantacy Lights were available to demonstrate their range of Christmas lighting - for inside the aquarium.

Help was at hand for the less fishy-minded customers. Gordon Iscock, a breeder of birds for conservation purposes, had plenty of help and advice on buying feathered pets - in fact, we came home with a bird cage, complete with budgies and optional accessories. Gordon brought along a selection of his own birds, including a tame Bengal Eagle Owl and a buzzard, which proved to be a great favourite among the younger visitors. Thankfully for those parents who break into a cold sweat, during the run-up to Christmas, every time they hear those dreaded three words: "Can I have....?" - neither of these birds was for sale.

Experts were also available to answer questions on rabbits and Chinchillas.

There were prizes of all shapes and sizes to be won. At timed intervals, anyone at the cash counter was a winner, the nature of the prize depending on which type of pet the goods being bought related to. Prizes ranged from a £200 Hagen starter kit to bags of doggy goodies.

Ernie expected 2000 people through his door on November 30. He wasn't far wrong. At times, due to the crowds and the fact that the floor space is quite small, the shop resembled rush hour on the M25 ring road during major road-works - but despite that fact, everyone seemed to be having a good time - which is what the day was all about. ■

● Pets are Pals is at 39/41 Station Road, Chapeltown, Sheffield. Tel. 0742 450004.

Newsround

The Editor says...

When fish do the high jump

One of the perils of the number of casual and experimental tanks we run around this office is that there aren't enough hoods to go round.

Our battle-scarred and often repaired selection of tanks includes one which "didn't quite make it through the post"; another which split during recent office moves; yet another that lost a side panel in the boot of a staff member's car; and a two footer that has housed an ever-changing fish population and decor style, as we've tested yet another new idea.

Into this last, which has a condensation tray, but no hood, we recently moved a Red Tailed Black Shark. Within 24 hours it had committed suicide by leaping through a crack less than the width of its body.

As if this wasn't distressing enough, we'd already lost two Knight Gobies from a brackish tank - which was open-topped for the escape of the first - then covered with a condensation tray when the next leapt out, again through a miniscule gap.

Add to this the flying leap of our Black Shark, which crashed the condensation tray straight off the top of another tank (fortunately he's none the worse for wear) and you may see why I'm becoming neurotic about my fishy charges.

How?

How they do it is a good question. The most likely way is that, following their old instincts, they jump towards the light. Unfortunately the modern drip tray has a flexible edge which is easily flipped up for the fish to pass through - closing again to make sure it can't return.

I'm inclined to think that they also locate the gaps by the draughts that come through them.

The problem is that most equipment will have wires attached, and these will almost inevitably push the condensation tray up and to one side. Like many hobbyists, I'm loathe to cut a condensation tray, as cuts quickly become cracks in many cases. Have readers got better ideas?

Why?

Why they jump is another good question. It does seem to be something that afflicts recently-moved fish, those that seem to be less than happy in their new surroundings. It's as if they are trying to jump back to their old home; which is odd as current studies suggest that fish have little or no memory.

The obvious answer is instinct. A tropical fish trapped in a stagnant pool will jump to try to find better conditions. So if fish suddenly flip from your tank you may have a nitrite problem. In the case of the Red-Tail Shark it was undoubtedly a change in pH that unsettled him.

Natural causes

Of course, other fish like Lungfish, Snakeheads and Walking Catfish actually make an excursion from pool to pool part of their lifestyle.

Likewise many of the Gobies, which pop out for a bask on the rocks and flip from pool to pool - which probably explains my Knight Goby problem. (I felt, incidentally, with the Knight Gobies that the problem may have been territorial).

Surface dwellers like Butterfly or Knife Fish spend their time flipping about at the surface, and are always likely to make one flip too many.

Now if someone can just tell me why these escapes always take place when you're elsewhere.....

Write for PFK

This month Practical Fishkeeping welcomes a new designer (Rob Holmes) and moves to a desktop system of publishing. Eventually this outlay in humming computer technology will help us to produce a larger and more colourful magazine.

One of the changes is the use of a mysterious device called a scanner that, given nice black and white copy from our contributors can "read" it, and transfer it onto our screens.

Using this device, and the dual task of contacting our correspondents with guidelines on presenting their copy, made me wonder if we are guilty of scaring off thousands of readers, with interesting information to share. Don't be put off because you're worried about exposing yourself on paper. There are several ways we can help you:

- **We can 'ghost' articles.** That means we can visit you in your own home, talk to you about the article and write it for you, perhaps using your notes and rough diagrams. We're just as happy to do this on the 'phone.
- **We can rewrite the article** from your rough notes, which need not even be typed.
- **We can visit you and produce a 'feature' article** on your project, tank or pond.
- **We are not offended by grammatical or spelling errors** (we make a few ourselves) and are in the business of getting the style and sense of your article over to our readers.
- **Few subjects are too complicated or too simple to interest our readers.** What you may feel is 'old hat' may just be ready for a revival and we're always interested in new ideas or original thinking.
- **Many of our readers are skilful and creative handymen and fishkeepers who will learn from your project.**
- **We pay for most published contributions.**
- **We are always in need of good colour pictures of fish - both photographs and illustrations.**

If you'd like a set of notes for contributors, write to me at **Practical Fishkeeping, Bretton Court, Bretton, Peterborough PE3 8DZ**

Steve Windsor

Steve Windsor

- **The winner of the Hackney Aquarium in the Ocean Aquatics prize draw was Mr. I. G. Clough, from Netheringham.**
- **The winner of the phone-in competition was Mrs. T. Fiello, from Grimsby, South Humberside.**

Ideal hobby

There could be 600,000 newcomers to the hobby after this year's Ideal Home Exhibition, if Stan Kemp of Kingfisheries has his way.

Kingfisheries Ltd. of Beckenham, Kent have got together with 'Aquarian' and Underworld Products to host a stand at the four week show at Earl's Court, which runs from March 12 to April 5, where they hope to introduce visitors to the world of fishkeeping.

A number of celebrities from the hobby will be at the stand during the weekends of the show to answer any questions related to fishkeeping.

Unless the temperature in the tank drops by more than 7°F, your fish should come to no harm, as the water cools too gradually to cause them any shocks.

DON'T PANIC

As the winter draws in, the possibility of power cuts increases and many fishkeepers express understandable concern for their fish during these times. However, in most instances they cause more distress to the hobbyist than they do to the fish.

Drop in temperature

Short power cuts, with a duration of three or four hours, do not present too much of a problem, especially if the tank is kept in a fairly warm room. Consider the amount of time it takes a heaterstat to raise the temperature of a tankful of water, say 10°F. You'll realise that it will take quite a while for the water to cool down enough to cause any harm to the fish and because it cools so slowly, it won't shock them.

Longer spells without electricity can be more of a problem. If the tank water begins to cool too much for comfort, (more than about 7°F) try wrapping a blanket around the aquarium, or insulating the sides with polystyrene tiles. This will considerably slow down the rate at which the water cools. You can also add boiled water, although this must be done very gradually and the water mixed well between each addition, to prevent any hot spots. This last method is not possible with marine water, as the salt reacts with cooking utensils. The best method for warming up marines is to float a bowl of hot freshwater in the tank, changing it each time it cools down.

Naturally a tank without a hood or condensation tray will cool far quicker than a covered tank, as will a small aquarium compared to a bigger one.

If you have a large fish house, you may be as well to invest in a portable gas heater to keep the place warm during such times - or get a small generator.

A battery-operated air pump is handy for emergencies. It can be fitted to a box filter if required.

Don't feed your fish

Filter bacteria begin to die as soon as the water ceases to move over them. In extreme power cuts (more than twenty four hours) the effectiveness of the filter will be reduced when switched back on. It's a good idea to keep one of the commercial bacterial starter kits handy as a standby, in case this happens. Some of these have an unlimited shelf-life until opened.

Don't be tempted to feed your fish during a power cut because the wastes they excrete will build up in the unfiltered water.

Keep a check on the water quality and carry out partial water changes only if required. Never be tempted to carry out a large change using much warmer water, as this will shock the fish.

Battery operated air pumps are available from Rosewood Pet Products and Interpet if you become concerned about lack of oxygen during a power cut and they can also be connected to a box or polyfoam filter in order to provide some form of filtration. Keep spare batteries handy.

Air pumps fitted with check valves will escape the damaging backsyphoning which can occur when the power unexpectedly goes off.

Generally, so long as your tank is not overstocked and your water quality is good, power cuts should not present too much of a problem for your fish and unless circumstances dictate otherwise, it's probably best to leave them alone. ■

A te

Don't miss your chance to win an Aquarian test kit in this month's Young Fishkeeper Spot The Difference competition

Keeping a check on your water quality is of the utmost importance and regular testing is essential if you are to avoid a potential tragedy.

This month we're giving away some **'Aquarian'** test kits as a prize. One checks nitrite, the other monitors pH, hardness and alkalinity.

The kits are simple and perfectly safe to use. All you have to do is dip a test strip into the aquarium water, wait 25-30 seconds for the results to appear and match them to the colour chart on the side of the container. There are no liquids to mess around with and none of those complicated instructions which make you feel like giving up fishkeeping and buying a hamster.

All you have to do is study the two cartoons on the right and spot the ten differences between them. When you have found them all, mark the differences with a cross on the right hand cartoon, fill in the entry form and send them to:
Young Fishkeeper January Competition, Bretton Court, Bretton, Peterborough, PE3 8DZ, to arrive before the closing date, which is **January 28.**

All the correct entries will go into a bag and the sender of the first one drawn will win the test kits. You must be aged 17 or under to enter.

• The winner of the November competition was Darren Stephens, from Swindon, Wilts.

esting prize

The winner of this month's competition will receive these 'Aquarian' "dip and read" test kits.

Name: .....

Address: .....

.....

.....

.....

.....

Age: .....

Floyd

by fran

Marine Answers

■ Easy to breed . . . hard to raise

I recently introduced three Cleaner Shrimps to my 100 gallon tank. Soon after I noticed one of them swimming along the water surface. On closer examination, I saw that there were young Cleaners darting away from her.

I managed to gather up a couple of dozen, although many were eaten.

I put them in a three gallon brine shrimp rearing tank and fed them with invert food. None survived.

Could you please give me some information on how to rear them, in case it happens again?
C. Winter, Derby

I get many letters telling me that Cleaner Shrimps have bred in the aquarium, but unfortunately no one that I know of has succeeded in rearing them to adulthood.

You could try rearing only a few - say a dozen - in a 2' tank and feeding them on rotifers, but I can't guarantee positive results.

■ Spawning signs

I have two Humbug Damsels in a two foot tank. The more dominant fish keeps digging up the layer of sand in the tank. It has dug down to the gravel tidy and tunnelled into the bottom of a piece of tufa rock. It keeps swimming over to the other fish and dipping its tail. Is this behaviour normal?
P. Millard, Hereford

I am pleased to inform you that it sounds very much like your Damsels are a pair and that they are preparing for spawning. The male finds a safe spot, which may involve digging and then he displays to the female, encouraging her to follow him and lay eggs.

■ A case of worms

I have a 6' x 2' x 2' reef tank. There are many thousands of small, reddish brown flat worms which are on the glass and rocks.

Can I introduce some sort of predator to eat them?
D. Minister, Essex

These flatworms not only feed on algae, but seem to photosynthesise food within their own tissues. There are no known predators as they appear toxic to all commonly kept marines.

The only way I have found to get rid of them is to syphon the majority off and then pipette out each colony as they come to light - which might mean four or five times for months. If you leave only one behind it will multiply.

Sea-Horses fare rather better when kept in a species tank with optimum water conditions and plenty of live foods. Pic. by Max Gibbs; The Goldfish Bowl.

How do I keep Sea-Horses?

Q I have a three foot tank in which I would like to keep Sea-Horses. Please could you give me some information on how to keep them?
• H. Thomas, Sheffield

A When keeping Sea-Horses it is essential to follow a few guidelines:-

1. Obtain good quality stock that is already feeding normally; ask to see for yourself.
2. Water quality must be high all the time with plenty of good quality water changes.
3. Live foods must be offered frequently - four or five times a day is not too much.
4. They need plenty of space and should be kept in a species tank of no less than 3'. (You are fine in this respect).

Remember that these are most sensitive fish that have been much abused in the past, giving the very wrong impression that they are hardy. In the right conditions they will do very well.

LETTER OF THE MONTH

An Interpet test kit goes to R. I. Cookson from Sussex for his letter of the month.

Q I am experiencing problems with my Jewelled Puffer *(Canthigaster solandri)*. Since I obtained the fish over two months ago, it has been troubled with cloudy bluey-green eyes.

I have tried various remedies, but the only one which has any effect is Sterazin. This leaves the Puffer with crystal clear eyes, but the cloudiness returns within a couple of days.

Nitrite readings are clear. The fish is in a four foot tank with undergravel and external filtration with a protein skimmer (these last two were turned off while the medication was given). Its companions include a Regal Tang and a Royal Gramma, all of which are fine.

*Jewelled Puffer (**Canthigaster solandri**). Pufferfish are prone to problems with cloudy eyes. Pic. by Max Gibs; The Goldfish Bowl.*

A I strongly suspect that your Puffer is suffering from a parasitic infection which is common but difficult to eliminate. It is believed that when medication is added to the water the parasites 'contract' giving the impression that they have been killed. However, as the medication loses its potency the parasites expand and the cloudy eyes return.

If a maximum of three courses of Sterazin fail to cure this problem completely then I would suggest a freshwater dip which is effective and harmless if carried out properly.

Use a container in which the fish will fit comfortably and fill it with freshwater treated with Aquasafe. The temperature and pH should match that of the tank exactly - use a pH buffer if necessary. Carefully put the fish in and leave it for ten minutes before returning it to the aquarium. This process may need to be repeated two or three times every couple of days for permanent results.

Puffers seem prone to this sort of parasite - so much so that some people even think it's normal. However it is not normal and can cause great distress leading to blindness. Other fish suffering the same condition seem to benefit greatly from this treatment.

Keeping your cool

Q **I have a coldwater marine tank which does very well from October to June but after that the temperature rises to about 78°F and I start to lose things. Please could you give me any information on a device for cooling tanks down?**
• M. Balfour, York

A The problem with native marines is in keeping the tank cool enough all year round. Marines from our waters require a temperature of 56°F. Once things start to rise into the 60°s, problems begin.

The only real solution is a chiller, which could be a converted beer cooler or a purpose-built machine.

Coldwater marines, like this Fifteen-Spined Stickleback, will suffer in the summer unless a cooler is fitted to your set-up.

Contact Lahaina Systems for details on 0343 89209.

One request though - if you can't keep native marines during the summer, please don't let them die. Return them to the sea or refrain from keeping them until proper arrangements have been made.

NICKS TIP

One thing has always made me uneasy: the use of dead coral skeletons as aquarium decorations. I've always thought it a wasteful practice - and it's not very environmentally friendly. So I am delighted to see that Aquarium Systems are marketing a full range of replica corals which are manufactured in the Philippines.

Not only will this replace the collection of a great deal of living coral, but it secures jobs for the local inhabitants.

"Reeforms", as they are called, are lighter and displace less water than normal corals and are contaminant free. They are easily cleaned with a soft brush and do not require bleaching.

A very sound, ecologically responsible alternative. If you have any trouble obtaining them, contact Kingfisheries Ltd., 081-650 3716 for details and prices.

Q **I have a four foot tank with undergravel filtration coupled with an Eheim external power filter. All readings are satisfactory and I conduct partial water changes every 10-14 days. The tank has a protein skimmer.**

My first fish was a Clownfish which ate well and seemed happy. After six weeks I added a Yellow Tang and a Coral Beauty. All the fish came from the same supplier.

About a month after I added the new fish, the Clown began to act strangely, swimming up the water pump flow and rubbing itself on the coral. I noticed small brownish white spots on its head. I dosed the tank, thinking it was Oodinium, but the problem got worse with the fish exhibiting rapid gill movements and swimming on its side. Eventually it died.

Could the addition of the other fish have any bearing on its death?

Please could you also give me some information on sexing and breeding Yellow Tangs? Is there an association which could provide me with any details?
• Ian Daly, Dorset

There are no obvious sexual differences in Yellow Tangs and the species does not appear to have been bred in captivity.

Stock slowly

A Yes, I do think the introduction of the two new fish had a bearing on why your Clownfish died. Introducing two fish at the same time would have sent ammonia levels up enough to stress the Clownfish and cause the outbreak of disease.

Aquaria should be stocked slowly to give filtration bacteria a chance to multiply in response.

Yellow Tangs are not visibly sexable and have not been bred in captivity - to my knowledge. There is no club specifically for Tangs, but you could join the International Marine Aquarist Association, Freepost (BS7498), PO Box 7, Ilminster, Somerset, TA19 9BR. Annual membership is £15.

Test your tapwater

Q **I have a three foot tank with an undergravel filter with two AquaClear 250 powerheads, a protein skimmer and a Fluval 103 which returns to the tank via a full length spray bar into a 36" x 3" x 4" trickle filter.**

The tank is populated by soft corals, tube worms, anemones and hard corals as well as three Clownfish and a Pyjama Cardinal fish.

I carry out 10% water changes each week. Nitrite is always zero, but nitrate levels are around 50ppm - even after a water change. Is this level dangerous?

My trickle filter media (ceramic rings and a layer of activated filter mat) is becoming very overgrown with brown/green algae. Would it help if I changed the media to Siporax?
• D. Burton, Kent

A The reason why your nitrate level remains so high, even after water changes, is probably because your tapwater contains a very high level. Test it and see. If it does, filter the water through a Nitragon.

A level of 50ppm is far too high for corals, especially hard ones, although fish will tolerate this level quite well.

Do not disturb your trickle filter, but protect it from light to stop the algae forming - although this is not harmful. Use a bin bag or similar material.

NICK DAKIN is your expert on the saltwater scene

You must include a stamped, addressed envelope and attach the Marine Answers coupon, below, to the front of your letter when you write in with your query or your tip to: Marine Answers, Practical Fishkeeping, Bretton Court, Bretton, Peterborough, PE3 8DZ.

■ DON'T FORGET – the Star Letter and Tip of the Month in every Marine Answers wins an Interpet Test Kit.

Use the address above for tips *and* letters.

MARINE ANSWERS

☐ Nick Dakin

Everything you wan

KOI

We begin a new series for lovers of - and newcomers to - Koi, destined to cover every aspect of the popular pond fish. This month, history, by NIGEL FLASHMAN

The Koi - or, rather, its wild ancestor, the common carp - is an international traveller. *Cyprinus carpio* is a member of a large family of fish spread across the world, except for Australia and South America; a family that includes the goldfish, the various barbs popular in the aquarium hobby, and many of our own native species of rivers and lakes - roach, tench, rudd and bream.

Yet the carp is not itself a native, though it has been around long enough to earn honorary resident status. Over the centuries, in its association with Man, it has been subjected to changes in its shape, colour, scalation and status.

Now, in its various guises, the carp is appreciated as a source of food, as a sporting adversary and, as Koi, the crowning glory of the ornamental pond. But, as with so many domesticated creatures, the carp was originally cultivated to be of purely practical use, as a table fish. Only by chance did it come to be appreciated for its beauty, although long before a recognisable Koi appeared, carp had a reputation for durability and persistence that earned them the respect of the Orientals and wove them into folklore as role models for successive generations.

In Japanese homes, Koi kites are still flown on the festival of Tan-go-no-sek-ku, to celebrate the coming of age of the young men.

The European equivalent is probably the Atlantic salmon. Even though science has gone a long way to explaining why these fish return to the rivers of their birth to spawn, there is still an element of awe and respect among salmon-fishers for their quarry.

Origins

The original wild carp probably came from the region of the Caspian Sea (modern-day Iran), where they were discovered by Roman soldiers and brought west to the Danube and Black Sea.

We now take fresh protein for granted. But, in those times of primitive transport, livestock tended to accompany Man 'on the hoof' - or, in the case of carp, packed in damp moss. The soldiers soon found that carp were - to use a phrase I cherish from a series of Brooke Bond tea cards on freshwater fish - "tenacious of life".

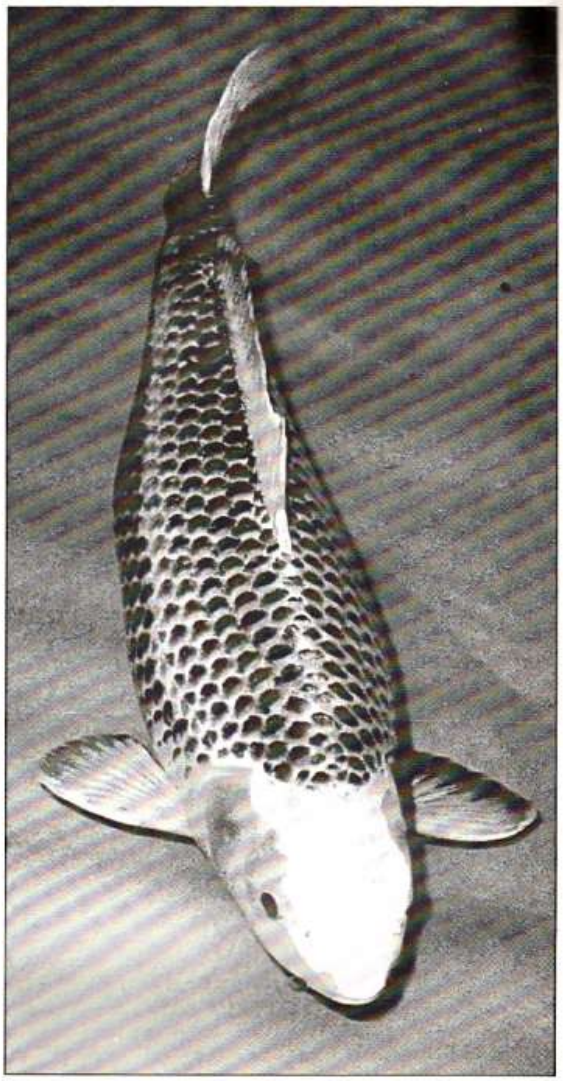
So it was not surprising, given that the Roman army could march 30 miles a day, that the fish soon extended their range. Fish culture was well-known to the Romans who, I am sorry to say, abused the talent.

In coastal regions, they built ponds containing moray eels, to which were fed malefactors.

But they also found that carp could adapt to almost any water conditions, grew fast and could be fattened on almost any food. Such adaptability proved useful to the fish when the inevitable escapes occurred.

China

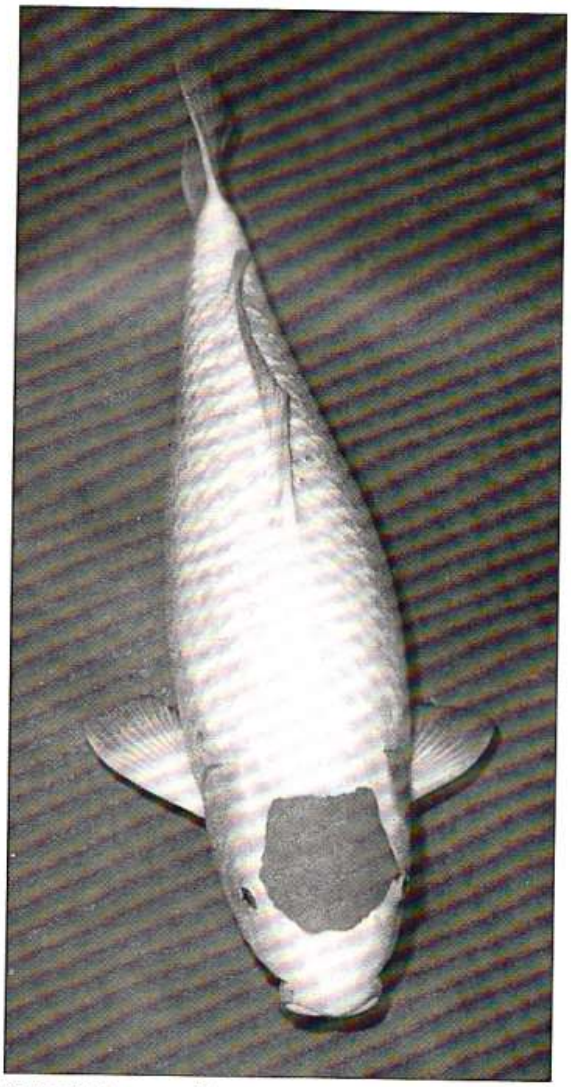
While Europe was being colonised by carp, the species was also spreading much farther eastwards, to China. Again, it was soldiers of an



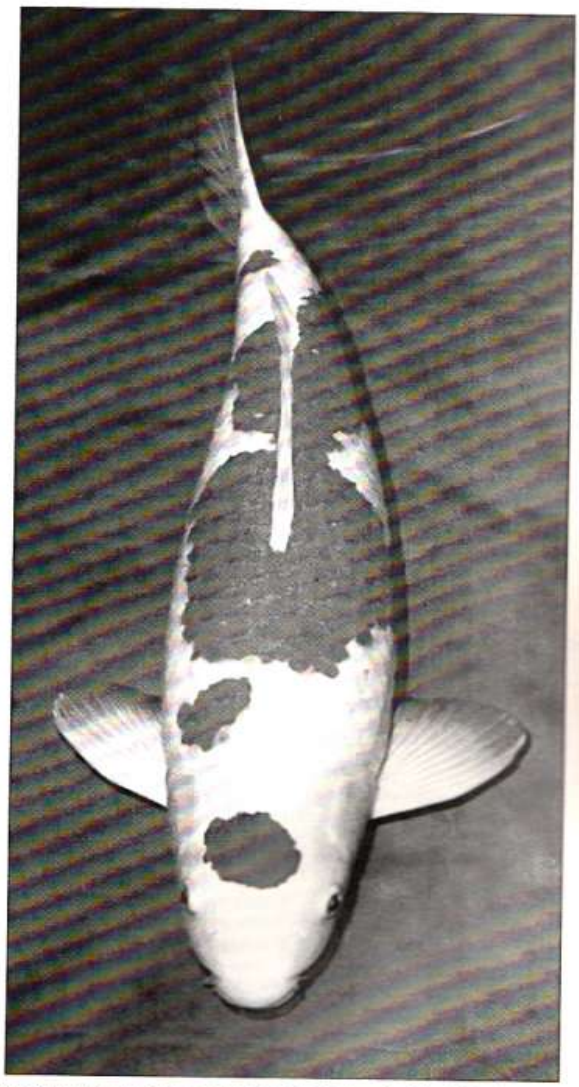
The Asagi is used, along with an iron-grey Magoi, in the breeding of many other types of Koi.

Koi means 'carp' in Japanese, so 'Koi Carp' is a repetition of the same word in two languages. 'Nishikigoi' or brocaded carp refers specifically to the ornamental fish.

...ted to know about...



Koi-keeping became popular in Japan after the second world war, when international commercial air travel made it possible for the fish to survive exportation. Picture shows a Tancho Kohaku.



A carp with red markings on its cheeks produced white Koi in its own fry. These were crossed with the red Higoi to produce what eventually became the Kohaku.

imperial army, along with traders, who were responsible. Rice culture and fish-farming made easy bedfellows in China and later, around AD 200, in Japan.

Carp were spawned in the spring, when the rice paddies were planted out, and the eggs hatched into fry that fed upon mosquito larvae.

As they grew, the young fish were fed a by-product of another Oriental industry - cocoons of the silkworm moth - and even today, Koi are believed to benefit from these.

Nowadays, the Japanese rear very few carp for food. But in Third World countries the same principle of fish culture as a spin-off from other forms of husbandry is being exploited. This time, various species of Tilapia, a type of cichlid, are the living crop.

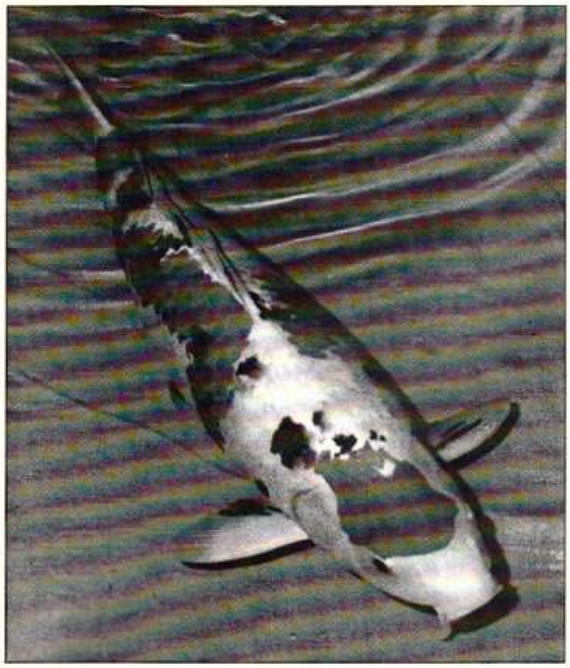
England

The introduction of carp across Europe was completed by about AD 600, and from then on, pond culture of these fish was developed into an art form, mainly by monks.

The original wild carp were not at all plump, but fully-scaled, streamlined and broadshouldered fish. Selective breeding, from fish that were the fastest-growing, brought about carp much deeper in the body and with a more favourable weight-to-length ratio.

England though, lagged behind in fish-culture, and the first carp were not brought over from the continent until between 1450 and 1500. An old rhyme celebrates the event: *"Hoppes and turkeyes, carpes and beer, came to England all in a year."*

There had been monastery ▶



The Showa Sanke was developed along with other popular varieties in Japan between 1914 and the end of World War II, although the Taisho Sanke had been produced many years before.

◀ stewponds long before then, but these were holding pools, probably for perch and eels.

The beginnings of Koi

As far as Koi are concerned, the introduction of carp into England was a dead end. This is not true of Europe where, in response to demand for table fish that were easy to clean, selective breeding brought about mirror and leather carp. These are simply fish with either fewer, but larger, reflective scales, or no scales at all.

As we shall see, their descendants were much later introduced into Japan, when Koi culture was already well established, to produce the strains known as 'Doitsu' - the nearest the Japanese could get to pronouncing the word 'Deutsch', meaning German.

But where and when did the first fish recognisable as a Koi originate? We must be careful, if only because 'Koi' means nothing more or less than 'carp' in Japanese. 'Koi carp' is a repetition of the same word in two languages, and a safer terminology is 'Nishikigoi', or brocaded carp, which refers specifically to the ornamental fish.

Just to complicate matters further, the Japanese call ordinary, common carp Magoi, or black carp. Though still *Cyprinus carpio*, the race is much darker than that found in Europe, and is often thought to be a separate species.

Carp culture proper began in Japan in the mid-17th Century, in the Niigata Prefecture west of Tokyo - a mountainous region where villages were cut off by severe winters and had to rely on their own food sources.

In the early 19th Century, colour mutations were noticed among the dull Magoi - red, white and yellow. Such fish had been known of for many hundreds of years, but now, for the first time, the rice farmers of Yamakoshi village began crossing and back-crossing to fix the strains.

A carp with red markings on its cheeks produced white Koi (Shiromuni) in its own fry, and these were crossed in turn with the dull red self-coloured carp known as Higoi, to produce the forerunner of Japan's most popular Koi variety, the Kohaku.

Asagi

Away from the Niigata Prefecture, other mutations that were the forerunners of what we know today as the Asagi were arising from Magoi - which at that time, had themselves evolved as three distinct sub-races of *Cyprinus carpio*. One was iron-grey, another mud-coloured, a third reticulated. The Asagi is now not only a fish in its own right, but is used, along with iron-grey Magoi, in the breeding of many other types of Koi.

In Niigata, by 1880, the Nishikigoi industry was booming, with established bloodlines for several early varieties. Fish were changing hands for sums quite beyond the ken of the peasant farmers. As a result, there was even a temporary ban on Koi production, though it did not last long.

Coming of the Doitsu

In 1904, a few specimens of German (Doitsu) carp were imported into Niigata and crossed with Koi. The most important result of this was the Shusui, emerging in 1910, and effectively a mirrorscaled Asagi.

But now, virtually any Koi variety has its Doitsu equivalent. Some, like the Kumonryu, or Rising Dragon, are undeniably beautiful. But, along with the scalation, came a less desirable characteristic - the deep body shape, ideal in a table carp but ugly in an ornamental fish.

It's no accident that carp, stocked into British lakes for sport and predominantly mirrors or leathers, are often referred to as 'pigs'. The purist angler prefers the 'wildies' - which are nothing of the sort, merely the descendants of the early introductions to this country.

In the same way, one of the key appreciation points of the Koi is a streamlined body. Since ornamental fish-farming has become big business, and the gene pool has widened, perfectly-shaped Koi are not to be taken for granted.

Koi monopoly

Until 1914, Niigata Prefecture had the monopoly on Koi production. Then, the mayor of Yamakoshi sent some fish to the Tokyo Exhibition, where eight were presented to the emperor's son, Hirohito.

These fish were installed in the lake of the imperial palace and, inevitably, the interest in Koi by the 'Living God' was mirrored by the efforts of farmers, particularly in the region of Ojiya, to outdo one another in seeing who could breed the most colourful fish. From then until the end of World War Two, with an intervening setback in 1920 caused by an economic depression, the Japanese Koi industry grew steadily and still more varieties were developed, including the Showa Sanke (the earlier Taisho Sanke was developed in the time of Hirohito's father).

The Koi bug spreads

Only from 1945 onwards did Koi-keeping become popular outside Japan. Stories must have been brought back to the United States and Britain, via occupying forces, of those brilliant living jewels - and, for the first time, international commercial air travel made it possible for Koi to be exported with a good chance of surviving the journey.

As communication links were opened up between remote Niigata and the centres of population, the way was clear for the very best fish that Japan could produce to find their way into the homes of ordinary pondkeepers in Britain. So it was that the plain common carp, spread across the globe by hungry adventurers, returned in new livery to one of the countries she had colonised centuries before. ■

In Japan, Koi were fed on cocoons of the silkworm moth, which is said to be of benefit, even today.

A-Tech Aquastat

Price: £99.95

The new digital Aquastat from A-Tech is a neat-looking device with a good, solid feel.

It has a temperature range from -40°F to 122°F. It's as easy to set as your digital watch and the absence of knobs means that you can't accidentally knock the temperature control soaring into the 90°s.

The Aquastat has two temperature settings. The 'low' reading is the everyday temperature you require in your tank. The 'high' reading should be set 4°F above. If the temperature rises above this 'high', due to excessive lighting etc., a warning alarm sounds until it drops again.

A memory button will tell you at a glance how **high** or how **low** the temperature has gone during the day.

On the whole the Aquastat is a good buy, although there were just one or two important points. The first is that, in a device which already features an audible warning alarm for high temperature, why couldn't there be some sort of audible low temperature/mains failure warning?

Another point is that the reading is set in Farenheit. If you want it in Centigrade, you have to cut a wire link. This means you'll need to rejoin these wires again, should you ever want to revert back to the Farenheit reading. A switch would have been better, so that you could interchange between the two if required.

The Aquastat comes with self-adhesive pads for mounting and an alkaline battery. **K.Y.**

•The Aquastat is available in many aquatic outlets - for the name of your nearest stockist contact Aquastat at PO Box 18, Aylesbury, Bucks HP18 0UG. Tel: 0296 770034.

Star rating	
Quality	★★★★
Practicality	★★★★
Price	★★★

WHAT'S

New aquaria from Tahiti

Tahiti has two new aquarium ranges, the Islander and the Bermuda, plus some new tank accesories.

ISLANDER AQUARIA

The new Islander tanks have a black plastic hood to match their trim. Although this gives the impression of being a slightly flimsy moulded affair, it's a well-designed and thought-out bit of kit, with gulleys to the rear which will support two starter units for the two tubes (which clip neatly and reliably into place), and arguably room for a small air pump, or other items. The hood of this lighting section could be painted white or silver or lined with foil to good effect.

Lighting cables can be fed out of the rear of the hood and held tightly in place by a screw down box (the actual function of which is unclear).

At the front of the hood there is a sensibly-sized lidded area for feeding and access.

The main criticism of the unit is the lack of space to the rear for the exit of cables and airline. Using items from the new "Aquarian" range for our test run we found we had the cables jammed under the edge of the lid. We wouldn't want to cut this type of lid as we find them prone to cracking under such circumstances.

The tank itself is neatly and tidily finished beyond criticism.

R. R. Prices range from: £10.94 (18x12x12) to £39.95 (48x18x12); hoods to match from £14.96 to £34.95

Star rating	
Quality	★★★★
Practicality	★★★★
Price	★★★★★

STANDS

Perhaps the nicest feature of these tanks is the new range of stands, which allow you to display a range of ornaments on a lower glass tray - and nicest of all allow you to have two tanks on what is still an acceptable piece of furniture. The open elegance of these stands may well be marred by the way they leave cables in full view; but don't be afraid of their stability. Despite appearances they seem remarkably stable and should be even better with two tanks in place.

R.R.Prices range from: £36.94 (18") to £49.95 (48"); tinted glass shelves for the lower section £2.96 to £6.94

Star rating	
Quality	★★★★★
Practicality	★★★★
Price	★★★

CONDENSATION TRAYS

A new condensation tray range is available for Tahiti's tanks.

Prices around £3

BERMUDA AQUARIA

The Bermuda range consists of three new aquaria. These are, as the name might suggest, triangular, the apex being at the bottom of the tank and the tank being held upright by two "random coloured" feet. The bright primary colours of these match the lid.

A minute quantity of substrate can be placed in the bottom of the tank - enough to hold some plastic plants.

It's claimed that the shape brings the benefits of extra lightness (well, water does weigh heavy) and that the tank can be placed on a normal shelf or other basic furniture and be "the perfect replacement for the goldfish bowl".

Well a small goldfish perhaps - or better maybe, some White Cloud Mountain Minnows or a Paradise Fish. Filtration is virtually impossible in these tanks due to the space and lack of substrates, so regular water changes will be essential - and with such small amounts of water, I do mean regular if a greedy goldfish is your proposed inhabitant. We estimate that the largest tank, at 20" x 9.5" x 9.5" will only hold at the most three gallons.

You'd expect a mystery in the Bermuda triangle - the mystery is why anyone has bothered to produce such a tank with so little practical use.

The sad thing is that such a tank which *could* be competently run by an expert, will find its way into the hands of novice fishkeepers.

Three models from 15" x 7.5" x 7.5" at around £12

Star rating	
Quality	★★★★
Practicality	★★
Price	★★★

VIVARIUM LID

The new Vivarium lid will turn an aquarium into a vivarium in style. The lid has a sliding glass access panel and a ventilation grille. A cut out is provided for heating and lighting, plus anchoring brackets to hold the whole thing in place. I'm not convinced these brackets are that well designed.

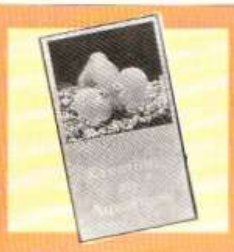
R.R.Prices range from £11.95 (18") to £24.94 (48")

Star rating	
Quality	★★★
Practicality	★★★★
Price	★★★★

•For more details and local stockists contact Tahiti Aquariums, Aquarius Centre, Queens Rd., Hurst Cross, Ashton under Lyne, Lancs OL6 8EW Tel: 061 339 3131.

NEW

The latest equipment, reviewed by Editor STEVE WINDSOR, pond expert NICK FLETCHER and Staff Writer KAREN YOUNGS.



Setting up on video

Creating an Aquarium by Renaissance Vision
Running time 60 mins.
Price: £15.99 plus p&p

This video is aimed at all would-be tropical, freshwater and marine fishkeepers who are setting up a tank for the first time.

It begins with a short introduction on fish in their natural habitat and then goes on to take each type of set-up in turn, from positioning the aquarium and adding the equipment, through to the eventual stocking. It features some interesting graphics with useful information including maturation time, heating requirements and stocking levels.

The tropical section of the video is by far the best. The Bubble-Eyes, Celestials and Red Caps chosen, among others, to illustrate the coldwater side of the hobby did nothing to persuade me to keep them - rather the opposite - but I'm sure some people like them.

The marine set-up was fine, although I personally would have preferred to see a reverse-flow undergravel filtration system rather than the simple external power filter adopted in the video, especially since the tank was intended to incorporate inverts.

On the whole this video is quite watchable and of great use to the beginner, as it's always easier to be shown how to do something than it is to read about it. But there's not really a lot of information on fish, although a few are covered in each section and there's very little on health, disease or breeding, which most books cover in detail, so I'm not sure how useful the video will be once you've set up your aquarium. **K.Y.**

- **The video is available from Renaissance Vision, 9 Capitol House, Heigham Street, Norwich, NR2 4TE. Tel. 0603 767272.**

Star rating

Quality	★★★★★
Practicality	★★★★
Price	★★★

DIVERS VIDEOS
The Kingfisher Video experience
Various videos at £9.95 + p&p

The Kingfisher Video series now includes 12 different videos, the latest featuring an extensive look at fish farms in Singapore.

Many of the others are devoted to marine diving, and some sequences from these underwater films were included in the Creating an Aquarium video featured on these pages.

You get a close-up look at butterflies, damsels, File fish, nudibrancs, sharks, Frog Fish, Banded Sea Snakes, Puffers, Triggers, Heniochs, Coral Catfish and Groupers.

Above the water, there is an interesting view of three Discus Farms in Bangkok, and various fish markets; and cichlid and Discus breeding establishments in Germany.

- **The complete series is available from Kingfisheries Ltd, 308 Croydon Road, Beckenham, Kent BR3 4HR Tel: 081 650 3716.**

Star rating

Don't bother	★
Barely acceptable	★★
Average/adequate	★★★
Good	★★★★
Very good	★★★★★

Electric fence zapped

I am not the most unbiased of reviewers to be set loose on the domestic electric fence system brought out by Colchester company P & L Supplies, but if I need reasons for dubbing it a bad Essex Joke, I need only quote from the RSPB booklet *'Birds and the Law'*.

"A number of methods of killing, injuring or taking birds are prohibited. These include gins, springes, traps...snares, nets, bird lime, electrical scaring devices, and poisonous or stupefying substances."

I once encountered the sting of an electric fence in Denmark. Whirling a wet keepnet round my head, to divest it of the more obvious traces of Scandinavian roach, I made effective contact with the wire - and my heart almost stopped.

Don't tell me that Protecta-Fence will not send herons to that great aviary in the sky. Anything which will stop a fox, a badger or a dog in its tracks (as the literature claims) is not suitable for a bird that weighs, at best, only a few pounds - even with your prize Koi in its crop.

The makers of Protecta-Fence (formerly known as Poultry and Livestock Equipment) even have the gall to suggest their product as a training aid for your dog.

No, there is a limit to how far civilised people can go in protecting their ponds and I, for one, am not about to turn my garden into an aquatic concentration camp with 'Arbeit Macht Koi' over the gate. **N. F.**

- **Protecta-Fence costs £99.95, including VAT and delivery, from P & L Supplies, Unit D1, The Seedbed Centre, Wyncolls Road, Severalls Park, Colchester, Essex C04 4HT. Tel: (0206) 855488.**

A cure for ulcer disease?

Ulcer disease has long been a bane among Koi-keepers, and some years, even the best maintained fish succumb to erythrodermatitis. It causes holes in the flanks and bellies of ornamental fish. Often, the osmotic balance of an affected fish is upset, and it dies of dropsy.

Cases caught early enough are treatable by injection of antibiotic, but this is costly and involves netting out of individual fish, stressing them further. **Aquaculture Vaccines Ltd** has announced Aquavac-Cyprivac CE, a vaccine that gives long-term protection against erythrodermatitis.

Unlike antibiotics, the new vaccine is available without prescription. Fish are immersed in a dilute solution of the product, and field tests carried out in Germany, have confirmed both its safety and effectiveness.

The product is likely to be of interest, not only to hobbyists, but to importers and wholesalers.

It consists of a brown, opaque fluid prepared from formalised cultures of three strains of Aeromonas salmonicida, the disease-causing bacteria. In commercial application, it is advised that Aquavac-Cyprivac be diluted nine to one with clean water, and fish at a density of no more than 0.45 kg per litre of vaccine be immersed. Repeat dips are possible up to a total maximum of 10kg fish/litre.

Hobbyists are unlikely to be dealing with such large quantities of Koi, and the contents of the bottle have to be used in one go. Still, bearing in mind the value of top-grade Koi, and how even healed ulcers can render them useless for show purposes, this vaccine seems a good purchase.

Immunity is achieved 14 to 21 days after administration, at 10°F. In colder conditions, it will take longer. After that, "long-term" protection is claimed **N.F.**

- **Further information on Aquavac-Cyprivac CE from AVL, 24-26 Gold Street, Saffron Walden, Essex CB10 1EJ. Tel: (0799) 28167.**

Star rating

Quality	★★★
Practicality	★★★★
Price	★★★★

Coldwater Answers

A dose of salts

Are there any benefits in putting tonic salts into an aquarium or pond?
Gavin Smith, Lincs.

Natural waters such as lakes and rivers contain many dissolved minerals that are beneficial to fish growth. In the pond or aquarium environment, the fish will absorb these minerals but the water may also become depleted. The idea of adding tonic salts is to replenish the mineral content of the water. **BB**

Several causes for murky water

I have a 1000 gallon pond with a UV and a 1200 Lotus pump.
About three weeks after installing the UV the water was lovely and clear, but has now reverted to being murky again. Do you have any suggestions as to the cause?
D. Wood, Brighton

There are several causes of murky water, not all of them down to single-celled algae.

If your pond is an awkward shape, dead spots can occur where debris sinks to the bottom and is disturbed every time the fish pass over it.

If you do not have a bottom drain or a means of flushing or vacuuming water and part-replacing it, you will eventually get a build-up of waste. **NF**

Pruning vegetable filters

I have set up a vegetable filter, and I would like to know if and when it will need cleaning out, and whether the plants need cutting back.
The first tank contains Lytag and the water in this is pumped to a second tank before being returned to the pond. The water is crystal clear.
R. Pegg, Lincoln

I would delay cleaning until such a time as flow rates are interfered with.

Cut back the plants as you would normally - remove dead leaves and generally thin out the foliage in readiness for winter.

This may reduce the effectiveness of the filter, but by then your fish will be eating less, slowing down and producing less waste matter. Next spring, it may pay you to use a basket of zeolite in the filter channels until the plant growth takes off again. **NF**

A natural pond should not be cleaned, as removal of the silt at the bottom will destroy the beneficial bacteria. Pic. by Gordon Wigens.

Should I clean my natural pond?

Q **I have a small natural pond which is approximately 4' x 2'6" and 18" maximum depth. It is planted with oxygenating plants, Soldiers, Dwarf Lilies (12" above water level), Azola floating plants and a dwarf Water Lily.**

I have read that I should clean out the pond entirely, prior to the first frosts. Is this correct?

The pond contains Comets, Tench and a few frogs. Two of the Red Comets have what I can only describe as white sores, which look like dormant volcanoes. Each fish has one sore only and there is no sign of weeping or trailing threads. The fish are feeding well. What do you suggest?

• Peter Hadwin, Herts.

A It is very bad policy to clean out a natural pond, as the silt that builds up on the bottom is also housing the bacteria that break down the highly toxic fish waste. Cleaning out the pond usually results in the unneccessary mortality of the fish.

Be careful not to have too many pond plants - even so-called "oxygenating" plants, because during the summer months, as the temperature increases, oxygen dissolves less readily into the water. During the hours of daylight, the plants will put oxygen into the water, but during the night will compete more successfully than the fish for available oxygen.

The spots you describe do not sound infected. Infections in fish show the characteristic inflammation and swelling of local tissue. If the white spots are quite large and have a waxy appearance, then the fish are suffering from fish pox. This is caused by a virus, which is related to the Herpes virus which affects humans. There is no effective cure and the lumps will eventually slough off. **BB**

Bitten by the Koi bug

Q **I have recently become very interested in Koi, but my knowledge, unfortunately, does not keep pace with my enthusiasm. Could you recommend a book for a beginner, such as me, which will give me information on keeping and identifying fish?**

Are there any clubs or societies I could join?

• Mark Clark, Tyne and Wear

A So far as I am concerned, the best book is the Practical Encyclopedia of Koi (Salamander Books, £19.95, ISBN 0 86101 405 7).

You might like to consider joining your local section of the BKKS. Membership is very reasonable. Write to: Mrs. B. Barton, 316 Bournemouth Park Road, Southend-on-Sea, Essex, SS2 5LY. **NF**

Newcomers to the world of koi are often confused by the number of varieties and the names given to them. A good book will provide the answers. Pic. by Michael Edwards.

No cure for goldfish

Q **We have a pond containing Koi and goldfish. One of the goldfish is very bloated from behind the gills; so much so that the scales are standing out from the skin. It swims and eats normally. Please could you advise us on this problem?**
• I. & B. Hofayz, Gwent

A The description of your fish sounds very much like "dropsy", in which the scales stand out from the body in a classic pine cone appearance. Dropsy is only a symptom and not the underlying illness. There are numerous causes of dropsy, such as stress, exhaustion, kidney failure and viral or bacterial origins. Unfortunately fish rarely recover from the condition. **BB**

Dropsy is an outward sign of another problem. There is no cure for the condition and fish rarely recover.

Giving the frogs a bath...

Q **I intend to sink a cast iron bath into my garden for use as a frog pond. I will fill the holes left by the taps and plug with cement and place bricks in the bottom to act as shelves for oxygenating plants. I would like to add just a couple of goldfish and perhaps a lily plant. Please could you advise me on this project?**
• Carol Hamilton, Welwyn Garden City

A The idea of sinking a cast iron bath into the garden as a frog haven is attractive and there is nothing inherently wrong with it - except for one thing. Do not use cement to block off the holes left by the taps and the plug. Cement contains free lime, which is deadly to fish and amphibians.

I suggest you block the tap holes only with something like a car body filler paste and leave the plughole assembly intact. Then after digging the hole to take the bath, I would go down another 18" at the point where the plughole meets the soil and fill this chamber with coke and/or hardcore ... in other words, make a simple soakaway.

With such a low fish population and with the plants you suggest, this mini-pond will be virtually self-sustaining, but inevitably there will come a time when you need to give it a thorough cleanout. That's when a plughole comes in very handy.

I would use engineering bricks for shelves as these will not leach into the water as ordinary bricks might. They're also much more durable. **NF**

A luxury diet

Q **I have two Bullhead catfish, one of 8", the other of 5". I feed them on earthworms, bloodworms and river shrimp. They live in a goldfish pond 8' x 5' x 2' deep which is well planted and filtered.**

Please can you tell me if their diet is alright and whether the water is deep enough to overwinter them outside.

If my fish are a pair, what are the chances of them spawning?
• Jim Quirke, Beds.

A Effective angling baits are those that fish consistently find nutritious, and when I tell you that in the States they fish for Bullheads with stinking liver, cheese, lumps of bacon and fish offal, you will appreciate that yours are living in the lap of luxury. Their diet is fine - and don't forget that they will also be benefitting from any insects which find their way into the pond.

The depth of the water is okay - just.

The addition of a few pieces of broken drainage pipe might help improve your chances of breeding Bullheads, if your pond is big enough.

These catfish build nests in mud depressions in creek beds and the male cares for the large, oily eggs. Assuming you have a pair (50-50 chance) then adding a few pieces of broken drainage pipe might increase your chances of spawning - always provided there are no other fish in the pond to mop up the fry. Don't expect to profit if you do crop a brood, however. Bullheads are not the most compatible of coldwater fish. **NF**

Purer water

Q **I have a 750 gallon concrete Koi pond and I intend to build a new 3000 gallon pond next spring.**

I'm becoming concerned about the sometimes lethal concoction that we draw from our taps and I would be obliged if you could give me some information on water purifiers which I could fit to the hose for topping up and filling ponds. I need a reasonable gallonage throughput and a filter which will last a while before refills are required.
• D. Worbey, Herts.

A I agree that the quality of water from our taps leaves a lot to be desired and an in-line filter to process topping-up water for Koi ponds is not to be dismissed lightly.

Purity on Tap produce a range of filters which remove chlorine and chloramine from tapwater. The top of the range CB6600 is also claimed to remove herbicides, pesticides, insecticides, PCBs and many other substances which cannot be removed by chemical means. The manufacturers reckon that the cost is as little as 0.1p and as the specification suggests, the unit will treat 6600 gallons per charge. Filter housings are guaranteed for five years. **NF**

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

■ **Taking care of your general coldwater queries we have our regular expert, DR DAVID FORD, Senior Consultant to the 'Aquarian' Advisory Service**

■ **Koi and pond enquiries go to NICK FLETCHER or BERNICE BREWSTER.**

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

COLDWATER ANSWERS

☐ **General queries; Dr David Ford**

☐ **Koi or pond queries; Nick Fletcher or Bernice Brewster**

Practical Pond

A case of fair

New MAFF rulings on the ingredients and use of pond and other aquatic treatments bring forth some controversial and thought-provoking ideas from our practical pondsman NICK FLETCHER.

Can you imagine dosing your dog or cat with folk remedies, every time it's a bit under the weather? No, of course not - you take it to the vet. Yet, when your pond fish show signs of ill health, the usual course of action is to trot down to the aquatic shop and buy a bottle of chemical which, according to the integrity of the manufacturer, may or may not do what it's supposed to.

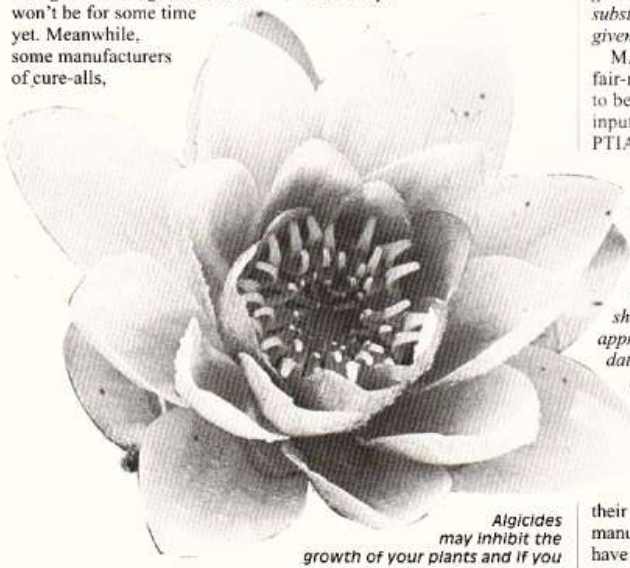
Part of the problem is that the veterinary profession is not geared up to treating pet fish. Until Koi became popular, it was simply not an economic proposition to seek professional advice when cold-blooded pets fell sick.

The situation is changing, admittedly, with full-time aquatic consultants like Bernice Brewster, but there aren't enough of her to go round and won't be for some time yet. Meanwhile, some manufacturers of cure-alls, algicides, herbicides, snail killers and other pond treatments have been getting away with murder - at least of fish - for a long time.

Common but dangerous?

You have only to look at the universal use of malachite green in treatments against external parasites to see what I mean. It is a powerful dye which, if inhaled in powder form or allowed into contact with the skin, can severely damage your health - and, if wrongly administered, that of your Koi and goldfish.

The same applies to formalin, traditionally combined with the former chemical. Not that this remedy doesn't work, of course. It's just that it has been caught in a time-warp.



Algicides may inhibit the growth of your plants and if you overdo it, you could actually kill them.

New legislation

Following year-long negotiations with the Pesticides Safety Division of the Ministry of Agriculture, Fisheries and Food (MAFF), the Pet Trade and Industries Association have negotiated what amounts to a reprieve - albeit temporary - for currently unapproved aquatic medications for amateur use.

But it is only a stay of execution...sooner or later, everything you buy off the shelf must come within the requirements of the Control of Pesticides Regulations 1986, or be sunk without trace. And it looks as though many household-name products just aren't going to make it - I quote:

"In the absence of data to support an application for continuous use of malachite green and dimethyl urea...these substances are unlikely to be given approval."

MAFF are, in fact, acting fair-mindedly, and the PTIA are to be congratulated on their input. Again, I quote from the PTIA press release:

"Subject to an immediate review of safety considerations and conditions in respect of labelling and use, MAFF proposes that products for which applications are made should be given provisional approval while full supporting data is obtained and submitted."

What MAFF are doing is giving the makers of products currently in the hinterland of legality a chance to state their case, and to this end, the manufacturers should already have submitted to MAFF a letter of application.

In this, they should detail **precisely** the names and quantities of the products' active ingredients and co-formulants, accompanied by three copies of the proposed label. These product details will then be presented to the Advisory Committee on Pesticides, and those considered suitable will be accepted, charged a fee and given provisional approval, subject to any immediate label changes.

This approval will then be published in the Pesticides Register, alongside data on products already approved. This last move is not mere bureacracy, but sound sense.

Labelling saves lives?

At present, if a child gets hold of a bottle of aquatic fungicide/bactericide and downs the lot, it is not enough - in some instances - to take the bottle, along with the child, to Casualty, and expect the appropriate treatment. Why? Because the ingredient information is either

treatment?

Dipterex and Masoten are nerve poisons. Overdosing with these will cause rapid deaths in your fish, affecting the smaller fish first. A massive water change may save the rest - if you're lucky.

vague, misleading or nonexistent.

The deadline by which the manufacturers must submit their labelling and formulation details hasn't yet been negotiated with MAFF by the PTIA, but there is no room for complacency; after the cut-off date, those that haven't complied will be out in the cold, and that ominous phrase "enforcement action" will ensure that no further advertisement, sale, supply, storage or use takes place.

Guidelines

Committee on Pesticides has published a priority list of existing active ingredients under review, and applications containing these substances will be accepted - though continuing approval will be subject to the outcome of the review.

Applications for substances considered unacceptable, for safety reasons, will be rejected and the products concerned will be withdrawn.

The correct dose

Human and fish medications share much in common. If I have a headache and take a couple of Paracetemol, the pain will go away. If I take the whole bottle, it's Goodnight America. Few of us unintentionally overdose ourselves, but we are much more likely, for all the right reasons, to add 'one more capful' to our pools.

We are impatient creatures: and a perfectly natural reaction, if a remedy isn't working or showing results fast enough, is to double the dose: *"The fish will get better twice as fast"*.

Rule One, then: **"If you follow manufacturers' instructions, the product will more than likely prove safe"**

Pond remedies are nearly all biocides - in other words, they kill biological systems. But because not all systems are equally sensitive, we get away with their use.

Fluke medication does away with flukes, but too much fluke medication does away with fish, too. Algicides kill single-celled plant life before they knock out waterlilies, but they do tend to inhibit the growth of the very aquatic plants you are trying to promote - and, if you overdo those delayed-action granules, you will actually kill them.

Hire a flow-meter when filling your pond for the first time, so you know the capacity of your pond to the nearest gallon.

Organophosphates

We must be especially careful with Organophosphorus insecticidal compounds (Metriphonate, Dipterex, Masoten etc), commonly used in the treatment of external parasites. These compounds are actually nerve poisons.

Overdose your Koi pond with Dipterex or Masoten and you will suffer rapid fish-kills. The smaller fish will be affected first, and it is just possible that a massive water-change will save the rest.

The essential pond volume

Luckily, these insecticides are broken down quite quickly by biological filtration, but this leads naturally to Rule Two: **"Be absolutely sure of the volume of your pond - don't just guess"**

Only then can you be confident you are not overdosing. When building a new pond, hire a flow-meter as you fill it for the first time. This will give you its capacity to the nearest gallon.

In the age of the electronic calculator, it is still easy to inadvertently overdose, even if you know the precise capacity of your pond.

Many chemicals are bought as stock solutions: a ten-per-cent solution comprises 100 grams of the chemical in one litre (1000 millilitres) of water.

So, if you want to achieve a pond concentration of 0.01 milligrams per litre of medication, using a 10% stock solution, you must add just 0.001 ml per ten litres.

Because of the large volume of a pond, when compared with the average aquarium, pool remedies tend to be based on stronger stock solutions - otherwise, you would need a trailer to carry your drum of anti-yuck to the waterside.

But it goes without saying that it's easier to overdose with such potent concentrations: and equally apparent why you must **never** medicate a tank with a pool remedy. Check those decimal points.

If your remedy requires dilution before it's introduced into the pond, then dilute it and spread it evenly over the surface with a watering can. Don't then use the same can for aquarium water changes.

Other checks

Have you checked to see whether any of your fish are sensitive to a particular remedy? If they are, do you have alternative accommodation for them while treatment is taking place? Another possible pitfall (though the manufacturers are only trying to be helpful) is when you encounter plastic containers whose caps ▶

uble as measuring cups. But do they mean the inner (smaller) cap, or the whole thing, that fits over the container? It's worth checking.

It's important to remember that almost all pond remedies are biocides.

Another thing to beware of is not removing dead plant or animal matter that results, quite legitimately, from use of a biocide. Dead blanketweed and snails, in particular, can decompose and lead to a rapid deterioration in water quality, sometimes speeded up by a reduction in the efficiency of your filter caused by the chemical itself.

And pollutants

There is another topic which shouldn't be overlooked - alien substances that find their way into a pool, either accidentally or wilfully.

Look, next time you're in a garden centre, at the array of sprays and puff powders aligned against everything from greenfly to rose canker. Almost without exception, they will display a warning: "Keep Away from Children and Pets" or, more specifically, "Toxic to Fish". Some Pyrethrins (natural insecticides) can kill fish in concentrations as little as one thousandth of a part per million. The reason they don't kill us, or the domestic cat who is being dosed against fleas, is that warm-blooded animals have an enzyme called Chrysanthemase that breaks them down. Fish don't - and, being in a confined environment, they can't swim away from pollutants.

Almost anything that comes in a spray can should be viewed with suspicion. Realistically, detergents are not likely to be introduced accidentally into your pond in sufficient concentration to harm the fish.

However, we cannot discount the vandal in society, and I read recently of a pensioner whose fish had been wiped out by morons dumping washing-up liquid into his pond.

If this happens to you, a massive water-change is the only answer. If using **any** garden chemical spray, administer it only on still days and use a hose or sprayer nozzle with a narrow, controllable jet. If in doubt, don't.

A fashionable gadget these days is the high-pressure domestic jet washer which will blast dirt off cars. Some double-up as garden sprayers, with the chemical contained in a reservoir and released at a controlled rate; or the reservoir may be filled with cleaning compound.

Take care if you use these near a pond; they are so powerful that they create splash-back which can go unnoticed until your fish float belly-up.

The MAFF policy on garden pond pesticides is eminently fair, and should make life easier for the amateur when he treats his fish. We must still beware of dubious products imported from abroad, of course, but most of all we must not relax our vigilance. ■