PRACTICAL Fishkeeping

■ WHAT OUR READERS SAY:
"Remarkably interesting and informative"

BRITAIN'S No.1 MAGAZINE FOR ALL FISHKEEPERS
October 1992 £1.70

COMPLETE GUIDE TO TANK MAINTENANCE

ANABANTOID COMMUNITY PROJECT

WAKE UP TO SLEEPER GOBIES

STERLETS AND STURGEON

WIN A-Tech Solar System Lights from Top-Up Aquatics

KOI IN THE 21ST CENTURY

PLUS: Panchax Killies • Undergravel filters Rice Fish • New pond ideas • Malawian and South American Cichlids Discus • Angels & Butterflies

FREE! PFK TETRA FISH CARDS
If no gift attached ask your newsagent

BREEDING MARINES: Facing the ultimate fishkeeping challenge?

9 770262 580046 10

BUYERS' GUIDE TO TANKS, CABINETS & HOODS

OCTOBER 1992
on sale SEPTEMBER 14

PRACTICAL Fishkeeping

BRITAIN'S BEST MAGAZINE FOR ALL FISHKEEPERS

ABOUT PFK

131 What's in next month's Practical Fishkeeping?

WHERE TO FIND

INFORMATION FOR TROPICAL FISHKEEPERS pages 4, 8, 10, 12, 16, 26, 34, 37, 40, 50, 57, 62, 74, 97, and 131.

INFORMATION FOR MARINE FISHKEEPERS 4, 34, 37, 46,68, 74, 87, 90, 97, and 131.

INFORMATION FOR COLDWATER & POND HOBBYISTS pages 4, 8, 26, 37, 46, 74, 92, 97, 103, 106, and 131.

PRACTICAL FISHKEEPING,
Emap Pursuit, Bretton Court,
Bretton, Peterborough PE3 8DZ
Tel: 0733 264666

Top: Sleeper Goby Mogurnda mogurnda - see page 34.

Left: Queen Angel - see page 87.

Below: Curvaceous pond project - see page 60.

● Cover shows a Belgian Ridge Tetra. Pic by Max Gibbs, The Goldfish Bowl, Oxford.

◀ The frequency of filter cleaning again depends on many factors. Once every two weeks is often suggested, but be guided by your water quality tests.

Cleaning the substrate

When syphoning out water for a water change you can remove any accumulated dirt - or 'mulm' as fishkeepers call it - from the surface of the gravel by moving the tube over the floor of the tank. You may need a little practice to find the right height to remove the mulm without removing gravel as well.

A purpose-made gravel cleaner will not only make this easier, but will allow you to clean the lower depths of the gravel too.

One type fits onto the end of the syphon tube and sucks up the gravel, swirling it about and removing the muck. When you lift the tube a little, the gravel falls back to the tank's base as the dirt is syphoned out.

Powered gravel cleaners are also available, either self-contained or run by an air pump. These clean the gravel in a similar way, but return the water to the tank. These are often referred to as 'hoovers' - a real Hoover is not recommended!

If you use an undergravel filter it is important to clean the gravel regularly as all the dirt in the tank will accumulate there.

If the gravel gets very dirty in this time you may be overfeeding your fish.

With other types of filtration there should be less dirt in the gravel, but it still needs to be cleaned as dirt can give rise to harmful bacteria as it decays. This will use up precious oxygen, and some decay bacteria can also attack your fish, causing disease.

Clean the gravel every week, as you will be syphoning for your water change anyway.

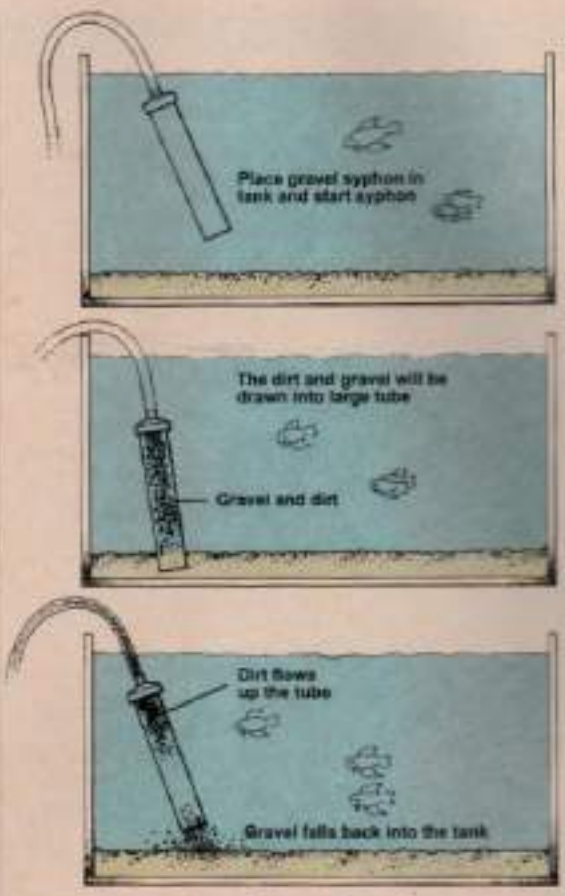
SAFETY TIP: Your syphon tube should never be used for anything other than fish water, and ideally you should have a particular bucket which is also reserved for fishy activities. Any trace of household chemicals from the bucket or tube could kill your fish.

Air pumps

These too need very little maintenance. The better pumps have a filter for the incoming air. This needs to be replaced when it looks dirty.

Eventually the internal valves will need replacing, but not for several years if your keep the intake filter clean.

Air stones can become clogged after prolonged use. Some newer designs can be dismantled for cleaning, but with cheaper types you may as well replace them.



Syphoning

When two bodies of water are connected by a water-filled tube, they act as one, and flow down hill. The speed of flow is governed by the difference in water levels, and the diameter of the tube. A wider tube will syphon more quickly, but may suck up gravel or even fish if it is too big. You can slow the flow by squeezing the tube, or partially blocking the end with a finger.

A large-bore gravel cleaner tube will pick up the gravel and stir the dirt out of it, but if attached to a smaller bore syphon tube it will keep the gravel in the tank.

Light maintenance

Maintenance of lighting is limited to replacing tubes or bulbs as they reach the end of their useful life.

Many fluorescent tubes lose much of their useful output after about six months' use, even though they appear to be working normally.

For best plant growth they should be replaced regularly. Unplanted tanks, or those with plastic plants, only need enough light for you to watch the fish.

You can get the best value out of these used tubes by using them for non-fishy purposes until they stop working altogether.

Some tubes are designed to stop working completely when their useful life for fishkeeping is exhausted.

Pruning the plants

If you are growing real plants, they will need a little attention from time to time.

Any dead or dying leaves need to be removed - nail scissors are ideal for this, but keep a pair just for tank use.

Don't be too quick to remove new plants that are not growing vigorously, just remove the dead leaves. If the roots are still healthy the plant may start to grow again after it has recovered from the shock of being moved.

Plants which grow too large may need pruning. If you cut or pinch off the tips of trailing plants, like Cabomba, it will encourage them to grow in a more bushy shape, sending up new stems from the base.

Rosette shaped plants, like Amazon Swords can be kept in check by removing the old, outer leaves as new ones grow in the centre.

Plastic plants, of course, do not suffer from dead leaves or rampant growth, but they may start to look scruffy after a while, as algal growth, and dirt, accumulates on them. Take them out and scrub them clean, but if you use any chemicals - bleach works well - rinse them very thoroughly and use a chlorine remover on them before replacing them in the tank.

Algae

A certain amount of algae will grow on the surfaces of your tank. They may be green or brown. Brown algae indicate a low light level, and if you have plants in your tank you need to increase the lighting. Green algae do not cause any problems unless they get so rampant that they smothers everything in the tank. Algae on the front glass, of course, obscure your view of your fish. A number of gadgets are available to remove this growth.

One device is a plastic holder on the end of a stick. The holder can take a razor blade for scraping the glass clean. It also incorporates a plastic blade for cleaning plastic tanks, which may be scratched by a razor blade. Keep the blade away from the silicone sealant, which must not be damaged or scraped off the glass surface. A similar type uses a special scouring pad on a handle.

The other popular device is an algae magnet. This is actually a pair of magnets, one of which goes inside the tank, and the other outside. The inner one has an abrasive surface to clean off algae, and the outer one has a soft face to protect the glass from scratches.

Cleaning the outside

The outside of the tank, and its cabinet, hood and so on, can be cleaned and polished with normal household materials. However, it is vital that no polish or cleaning agent is allowed to get into the water. Switch off the air pump while cleaning the tank, and also while cleaning other furniture in the vicinity.

Special aquarium polishes are available which are non-toxic to tank inhabitants. These should also be ideal for cleaning the inside of the hood, getting the best out of the lighting.

TIP: Use a non-toxic aquarium polish for household items near the tank, as well as for the tank.

Maturing the tank

Ammonia is the first stage of waste breakdown, and is very toxic. It will probably increase when you first start to stock your tank with fish, but should decrease over a few days as the filter breaks it down.

Ammonia is converted to nitrite, which is also toxic, although less so. Again the level will rise, and then fall as the filter bacteria multiply to a level which can deal with the amount of waste.

The nitrite is converted to nitrate, which is less toxic still. Most community fish can tolerate about 100 ppm of nitrate.

10 ppm of nitrite, or any detectable ammonia at all, is too much in an established tank. Although these levels may be tolerated for a short time while your tank is maturing, and the filter approaching full efficiency, you should aim to keep both nitrite and ammonia at zero in the long term.

Stocking

When stocking your tank add a couple of hardy fish at first. Do not add any more fish until the increase in pollutants from the first ones are under control. Then you can add another pair or small shoal, and again wait for filter system to catch up with the demand placed on it.

Remember New Tank Syndrome from *PFK* July? If you suddenly stock your tank to its potential maximum you could lose all your fish. Build up the stock slowly and monitor the water daily at first.

Any build-up of pollutants can be diluted by additional partial water changes.

If you are hoping to keep any fish which are known to be delicate wait until your tank is more established, and add these fish last. Remember not to buy so many other fish in the time that the ones you originally wanted will make your tank overstocked!

When your tank is fully stocked its maintenance will become a more settled routine, as you will be able to clean your filter according to a timetable and not the fluctuations in water quality.

Monitoring water quality

To ensure that your maintenance routine is keeping your fishs' water in top condition you should test the water for waste products regularly. Any problems will require additional partial water changes to dilute the wastes.

When your tank is mature and your filter working at full efficiency, nitrate and ammonia levels should be zero.

Nitrate will gradually rise, but will be diluted by your regular partial water changes.

Test kits for ammonia, nitrite and nitrate use chemicals which change colour according to the concentration of the measured substance. The chemicals may be liquids in dropper bottles, or in tablet form.

A sample of tank water is put into a container (usually supplied with the kit and marked with the level to fill it to) and the reagent(s) added. The number of reagents and the amounts used vary from one kit to another, so read the instructions carefully.

If you have adjusted the water chemistry to suit specialised fish, you will need to test the pH and hardness as well. The test kits for these are basically similar, and should come with complete instructions. ■

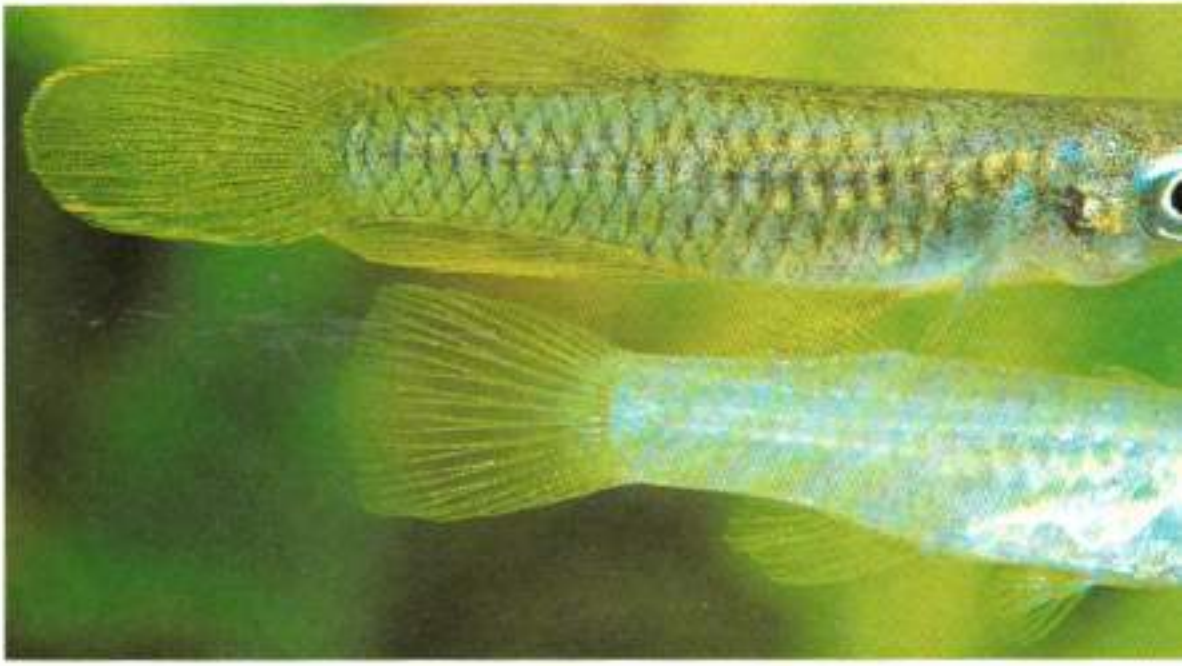
Internal filter media should be cleaned in different ways – but always in tank water.

WHAT ON EARTH IS...?

Algae: Tiny plants that grow on, and sometimes smother underwater surfaces.
Ammonia: The major poison from fish waste.
Carbon: Filter medium which adsorbs dissolved organic substances.
Gravel cleaner: Device for separating dirt from gravel in the tank.
Hardness: Dissolved calcium salts in water – critical for specialist fish.
Impeller: Part of a filter pump that drives the water along.
Ion exchange resins: Specialised filter media.
Mulm: Solid wastes accumulated on the tank floor.
New Tank Syndrome: Rapid build-up of toxic wastes when a new tank is stocked too quickly.
Nitrate: End product of waste processing by the filter.
Nitrite: Intermediate break-down product from fish waste.
pH: Scale of acidity and alkalinity of water – critical for specialist fish.
Pheromone: Organic substance released by an animal which affects others.
Powerheads: Water pump driving undergravel filter.
Substrate: Another name for the gravel or other substance on the tank floor.
Syphoning: Removing water and debris with a tube and bucket – see panel.
Tapwater conditioners: Proprietary compound to neutralise chlorine and other potentially harmful substances in tap water.
Test kits: Available from your dealer to measure various aspects of water quality.

Maintenance schedule

Algae scraping – as required
Gravel cleaning – weekly
Water changing – weekly, 10% but monitor the water
Filter cleaning – fortnightly & monitor water quality
Outside glass and cabinet – as required
Replacing light tubes – every six months
Clean powerheads impellors – every three months



Small is beautiful

Size isn't everything, as DEREK LAMBERT illustrates, with this look at some of the smallest fish in the hobby – the Rice Fish.

Rice Fish of the genus *Oryzias* have been known to the aquatic hobby for many years.

The most common species found in the hobby today is the Medaka or *Oryzias latipes*. There are two varieties of this species. The original was a greenish grey in colour with a hint of yellow in the fins.

The sport which has since taken over in the aquarium world is the golden form. In this form the body is a lovely yellowish gold and the fins are yellow to orange. Males have elongated dorsal and anal fins with a somewhat more slender body shape. Females are slightly larger at 5.5cm, as opposed to males which only achieve 5cm when full grown. The females are paler in colour.

This species comes from much cooler climates than most of our tropical fish and will do well at normal room temperatures. They can even be placed in a tank or pond outside during the summer, provided they are brought in before the winter sets in.

Another three species are seen in the hobby from time to time. The most common of these is *Oryzias javanicus*, or the Japanese Rice Fish. This species is a plain greenish grey in colour with a bright blue iris to the eye. The fins are clear with a few black spots. This is not such an attractive fish as the Golden Medaka, but the iridescent blue iris stands out like a beacon in the aquarium. This is a small species, only achieving 3cm for the males and 4cm for the females.

A recent introduction to the U.K. hobby is *Oryzias melastigma*. This species is very similar to *Oryzias celebensis* with which it was originally confused. Both fish have a black 'V' in the caudal fin but *melastigma* is a larger and more robust species. Having said "larger" it still only attains a length of 5.5cm for both sexes.

The latest introduction is what must rank as one of the smallest fish in the world. It is *Oryzias nebulosus* and even when fully grown it barely achieves a size of 11mm for the male and 14mm for the female. This is truly one of the pygmies of the aquatic world and justly deserves the common name of Pygmy Rice Fish. The colouration of both sexes is plain

silver grey with clear fins and a black eye. Males have a bright orange edge to the upper and lower rays of the caudal fin. The photograph shows a young male only 8mm long - I almost needed a microscope to see it, let alone photograph it!

Aquarium care

All the Rice Fish are hardy in the aquarium and will adapt to most conditions. However, slightly hard, somewhat alkaline water is preferred and a temperature in the low 70°s F seems to suit most species admirably. All are peaceful fish which fit well into most small fish communities. Care must obviously be taken with the Pygmy Rice Fish as they may be seen by the other fish as lunch rather than a tank mate.

Bunches of eggs

When breeding, the male will court the female by spreading his fins and wagging his body in front of her. When she has been sufficiently worked up she will allow the male to swim next to her and wrap his anal fin around her body. The sperm is then expelled and is channelled along the anal fin to the vent of the female. Here it passes into the body of the female to fertilise the eggs. The pair then go their separate ways.

Livebearer or Egglayer?

The internal fertilisation of the eggs has led some scientists to classify Rice Fish as livebearers. Others say that you have to look at what is produced and ask yourself the question "Is it an egg or a baby, capable of independent life?" If it is an egg then it must be an egglayer.

After some hours, or even the next day, the female will expel the eggs which will then hang like a bunch of grapes underneath the vent. Once the mother finds a suitable group of plants she will rub herself against them until the semi-adhesive eggs become attached to them.

Here they will remain until they hatch in about ten days and the fry are free-swimming after another 24 hours. A fully adult female will, on average, produce a bunch of ten eggs every two or three days.

The Pygmy Rice Fish will only produce one or two eggs, but they are nearly as big as those of the other species, so this represents a major effort on the female's part.

If your pair are housed in a mixed community tank, then it is unlikely that the eggs will survive until they hatch, and even if they do the new born fry will be gobbled up as soon as they are seen by the other fish.

To solve this problem you can set up a small breeding tank, or alternatively the female can be netted once she is carrying a bunch of eggs and these can be gently pulled off and placed in a small tub of tank water. After the eggs have hatched the fry can reared in the tub for the first few days and then released into a larger tank for rearing.

The fry are able to take newly-hatched brine shrimp once they start to feed and will grow very quickly if given a good diet. At about four months old the youngsters will be sexable and may even have started to breed. ■

Above: A pair of Oryzias javanicus. Pic: Max Gibbs, The Goldfish Bowl, Oxford.

Right: Female Oryzias melastigmata with eggs.

Below: Male Oryzias melastigmata.

Below left: Oryzias mekongensis.

■ **References:** *Description and Karyotype of a new Rice Fish, Oryzias mekongensis, from Thailand* by Hiroshi Uwa and Wichian Magtoon. Copeia, 1980(2), pp 479-478.

Popular Panchax

A. M. I. C. Oughton takes a look at some of the requirements of these colourful little fish.

The various species of Panchax are all members of the Cyprinodontidae family, which also includes Top Minnows and Killifish.

Members of the family are widely distributed and can be found in tropical zones, as well as warm areas of the more temperate ones.

They live mostly in fresh and brackish water, but some species can even be found in the sea. In fact, the family consists of so many varieties, that it is sometimes very difficult to spot the differences between them.

In general, Cyprinodontids are inclined to be aggressive and most species are not suitable for a community environment.

However, because of their beautiful colouration they are sought after by home fishkeepers and can be kept by themselves or with fish of a similar size. This is particularly true of the Panchax.

The Lamp-eyed Panchax should be kept with larger fish.

The Lamp-eyed Panchax

The Lamp-eyed Panchax (*Aplocheilichthys macrophthalmus*) is another species that does particularly well in the aquarium.

Originally coming from Nigeria – and reaching 1¼" in length – the Lamp-eyed Panchax should be kept with fish that are larger than itself.

This species has an overall colouration of light green, which is lighter on its undersides. A dark band marks its back, while a pair of aquamarine stripes stretch down its flanks. The upper one of these runs from the pectorals to the tail and the lower travels to the tail from the gill covers, via the ventral.

The male's tail fin is light green edged in electric blue and decorated with red spots.

The female's tail is similar, but has no dots. In both sexes the remainder of the fins are clear. The eyes are large – when compared with the size of its body - and reflect a beautiful gold and green light. However, they are not luminous.

Preferring a temperature range of 65-90°F, although its optimum breeding temperature is 72°F, *A. macrophthalmus* should be fed on live foods, chopped earthworms, pieces of fish and meat and occasionally dried foods.

The Fire-Mouth Panchax

One of the most ideal representatives of the Cyprinodontidae for the home aquarium and one that has been kept and bred successfully all over the world, is the Firemouth Panchax (*Epiplatys dageti*).

Despite its pike-like appearance, the Firemouth Panchax - which originally comes from West Africa and reaches 2½" in length - does not attack other fish unless they are small enough to be swallowed whole.

As a result, it can be kept in a community environment with tank members of a similar size.

The fins and markings of *Epiplatys dageti* are striking to look at and of the two sexes the male is more colourful. They breed quite easily in the aquarium and this takes place during late autumn and early winter.

If you intend to breed these fish, place three females and one male into a small, half filled aquarium, that contains old water and plenty of floating plants or Spanish moss.

Here, the male drives one of the females into the plants, where she lays an adhesive egg. He then fertilizes it and leaves the site to look for another female.

This procedure may continue all day and, during this time, each female can lay up to 24 eggs.

You must then remove the egg laden plants and place them into a separate aquarium to hatch - which usually occurs two weeks later.

Spawning continues in this way for a week to ten days and it is best to keep each day's eggs separate, as the fry tend to eat their younger relatives as they hatch. Immediately on leaving the eggs, the fry should be fed with newly-hatched brine shrimp.

Although males always seem to be ready for spawning, females need a week's rest in which to recover from their efforts. It should also be noted that when they are not being used for breeding the sexes must be kept apart.

Epiplatys dageti thrives on live foods - such as Tubifex worms, white worms, daphnia, bloodworms and earthworms - pieces of meat and fish; and will occasionally take dry foods.

They prefer temperatures in the range of 65-90°F.

The Dwarf or Green Panchax

The Dwarf or Green Panchax (*Aplocheilus blockii*) originally comes from India and Sri Lanka.

As one of its names suggests, it is a shiny dark green in colour and has a reddish purple belly. Its gill cover is adorned with a brilliant green spot and its flank contains alternate rows of green and red dots. These also appear in the dorsal, anal and tail fins of the male - which are orange in colour in both sexes - but do not appear in the female's.

The male's anal fin is also edged in flaming red.

Growing to a length of 2" the Dwarf or Green Panchax thrives on live foods and can be kept in a

Male and female rice-rivulin Panchax are best kept separately if they are not being used specifically for breeding purposes.

All pics by Max Gibbs, The Cornish Bowl, Oxford

community environment, provided its tank mates are at least of a similar size.

A. blockii also prefers a temperature range of 68-88°F, although it can even be kept in an unheated indoor aquarium for a while, tolerating temperatures as low as 50°F.

Yellow-finned Panchax

This member of the Cyprinodontidae family originally comes from Nigeria.

It reaches 1½" in length and should be kept with fish of its own size or larger, as it tends to worry smaller specimens.

Aplocheilichthys flavipinnis is greenish in colour, the back being much darker than the belly. The dorsal and anal fins of the male have a lovely blue trim, while his pelvic fin is reddish.

In contrast, the female's fins are completely colourless.

Yellow-finned Panchax spawn at 1½" and it is possible to communally breed them in water of pH 6.8 at a temperature of 68-78°F. They should be fed on live foods and pieces of fish and meat, and can survive a wide range of temperatures from 60-90° F.

Banded Panchax

This Cyprinodontid (*Epiplatys fasciolatus*) reaches 3" in length and originally comes from West Africa. It is peaceful enough to be kept in a community environment - with fish of a similar size - and prefers slightly brackish water in the temperature range of 65-85°.

The male has a tarnish maroon back and each scale seems to contain a silver mark, topped by a small red dot. Stretching from just behind the eyes to the base of the tail are ten dark vertical stripes and his fins have an overall colour of aquamarine.

The dorsal fin and tail, and sometimes the pelvics, are peppered with red, while the tail and pelvics also have a border in a similar colour. In contrast, the female is olive brown and has few colour variations.

As with other members of the species, the Banded Panchax should be fed on live foods - such as Tubifex worms, whiteworms, bloodworms, Daphnia and mosquito larvae - although it will also take pieces of fish and meat. ■

The Blue Panchax is best suited to a species tank.

Blue Panchax

The Blue Panchax (*Aplocheilus panchax*) grows to 3" in length and comes from Burma, India, the Indo-Australian Archipelago, the Malay Peninsula and Thailand. Although this species is best kept on its own, it can still be found in aquatic shops as it is colourful and easy to breed.

The dorsal, anal and tail fins are orange in colour with lighter borders. These vary slightly in colour - the male's being more colourful than the female's - and the dorsal fin also has a large dark spot at its base.

Preferring a temperature range of 70-85°F, the Blue Panchax should be fed on a diet of live foods and pieces of fish and meat.

Our three cichlasoma experts, PHIL ROBINSON, JEFF CHALLANDS and MARTIN CHANDLER complete their look at breeding this fascinating fish.

Above: A 12" male C. synspilus. Females will require protection in the shape of the right-sized piping.

Right: This male wild-caught grey form labiatum was one half of a difficult pair.

Left: The divider system was successful in spawning this pair of orange form C. labiatum.

Aggr and

Difficult pair - a case history

One of us tried for over eighteen months to spawn a pair of wild-caught *labiatum* - without any success. The female would often lay eggs on her own, and often crossbreed with other species, but not with the male of her own species.

At one stage she sustained such damage that the whole of her tail was missing and her fins were torn to shreds - and yet the pair had previously gone through the pre-spawning ritual.

All of the above methods were tried, and when the female entered her pipe, the male would keep her there for days on end. In desperation a ridged plastic opaque divider was made, with a hole just large enough for the female to pass through, - but not the much larger male. The edge of the hole was covered with plastic tubing that had been cut along its length to cover any roughness.

The divider was fixed firmly into place, at an angle, so that it was jammed tightly between the base of the tank and the stiffeners at the top. If the male rammed the divider to knock it over, it jammed even tighter. After several days he gave up, and contented himself by digging up the gravel and spitting it through the hole in an attempt to cover it. The female just dug the gravel out of the way.

Eventually nature took its course, the pair spawned, and they now have 500 young. The male still turns on his mate, so the divider has been left in place, and she is able to get out in safety.

Last month we described what takes place in cichlid breeding when things go as nature intended. But there will always be pairs that do not get things right.

Some males can be so aggressive they almost kill females when introduced. Other pairs may be egg or fry-eaters. Often newly-formed pairs venturing out on their breeding cycle will eat several batches of eggs before they get it right.

Aggressive pairs

With the more aggressive species there are several

ressive pairs d after care

things the prospective breeder can try.

■ First there is the divided tank method. With this a divider is cut so that it just clears a piece of slate or similar potential breeding site, but is not high enough from the base of the tank as to allow the male to get underneath. When the female lays eggs on her side of the slate the male can fertilise them from his side, his sperm passing under the divider.

■ Another method is to use a length of plastic pipe in which the harassed female can retire if the male gets too aggressive. One author has had great success with this method in his attempts to breed wild or near-wild fish.

In one such case a male *fenestratum* was overly aggressive and, despite the female wanting to breed, he would turn on her. She was slightly smaller than the male and so an 18" plastic waste pipe (the type that sinks!) was put into the tank. The female could retire into it, but the male could not enter.

Since using this method the pair have never been parted, and several broods of young have been raised. This method has also been successful with large species such as *labiatum* and *citrinellus*.

With Cichlids of the same age, the female tends to be smaller, and as long as the pipe is long enough for her to enter without the male getting more than his snout in, the chance of losses occurring are greatly reduced.

Quite often with very large Cichlids, the male is quite capable of pushing a tank divider over in his attempts to get at the female. By using the length of pipe in conjunction with the divider, the safety of the female is even more assured.

CULLING

As the fry grow they will need to be thinned out, because of the space available. The young may still be in the tank in which they were born, often still with their parents, but as they increase in size their surroundings stay the same, thus reducing the space available to each individual.

In nature - survival of the fittest

We have all heard the saying "only the fit and strong survive", and in the wild this is true. Where Cichlids are concerned, once they have become free-swimming, the parents are only capable of caring for them for a limited time.

As the food supply in the immediate area is exhausted the young begin to wander further and further afield. This, with the parents' inability to defend an ever-increasing territory and recover the wandering offspring, means that losses begin to occur. This is known as "natural selection" and those young that cannot escape predation, find an adequate food supply, and eventually to lay claim to their own territory and mate, will not survive.

It is nature's way of culling the weaklings and making sure that the species survives. ▶

Male C. centrarchus – this fish was carefully chosen from the fastest growers in the fry shoal

What to cull

Ensure that any weak, deformed, badly-coloured or stunted young are disposed of. They can be used as food for conditioning pairs getting ready to breed for example. In nature these specimens would be among the first to be preyed upon by other fish.

Things to look for are those that cannot get up from the bottom of the tank, or may only be able to swim in jerky movements before they drop back onto the substrate. These are usually the first to be noticed while still very small. Other things to look for are:

- fins that are twisted or bent;
- missing fins or eyes;
- short gill covers;
- twisted or bent bodies;
- body markings that are not constant and regular;
- and runts. Some fish never seem to get much larger no matter what space they have or the amount of food they are given.

In the aquarium - culling

As the fry grow they can be thinned out in one of two ways.

- Firstly you can simulate nature by moving the fry to larger quarters.

- The second method is more attuned to natural selection but adapted to the aquarium.

As the fry grow, and become more crowded, the larger, more dominant ones produce a pheromone, a natural substance which slows the growth of the others. In crowded conditions only very few will grow at a natural rate and the rest will become stunted. A large percentage will eventually die off, but a small number will survive that will be capable of growing large enough to reproduce, - though never reaching their potential adult size. If these are allowed to breed we are on the road to the species being spoilt.

Right: The large teeth of C. octofasciatum.

Below right: Juvenile C. maculicauda, the Kareke or Black Belt cichlid. Don't allow young fish to spawn too soon.

Surprisingly, this pair of Red Devils have lived in harmony for two months, raising some two hundred fry.

■ Constant attention must be paid to the young's growth rate. You always get one or two that appear to grow very fast - not that the others are stunted or deformed.

These larger fish should be removed to other quarters. If left, they will take more and more of the available food, while the smaller ones remain small. Often as not these that seemingly shoot ahead turn out to be males, and will form the beginnings of the next generation for breeding purposes.

The young remaining will then come along nicely and one or two more will begin to outgrow their brothers and sisters. Once again these should be removed.

Why cull at all?

If you had unlimited tank space and were able to raise the hundreds of young that a large pair of cichlids can produce, what would you eventually do with them?

You would not be able to sell them, or even give them away, unless it was to feed larger fish. Many of them would be imperfect and thus should not be allowed to grow or reproduce.

You would find it far easier to keep and raise a small number, ten percent say, of the total produced. You can cull by using the fry as a source of live food on which to raise and condition your growing cichlids.

A 3" male C. nigrofasciatum - "The Convict", is often cross bred or inbred.

Inbreeding problems

There are a number of species of Cichlasoma, not only large ones, that have been in the hobby for years and have been inbred so often the fish end up looking nothing like their wild counterparts.

As well as inbreeding, crossbreeding of species has also spoilt many cichlids. For example the Convict Cichlid, *Cichlasoma (Archocentrus) nigrofasciatum*, and the Blue-eyed Cichlid *Cichlasoma (Archocentrus) spilurus*, are often among the first species of Cichlid bred by the novice. These species have been so inbred and crossbred that that they can be found in a variety of shapes, sizes and body patterns. The more a species is inbred, the higher percentage of the offspring is deformed.

One of the most common effects of potentially-large cichlids being spoilt by careless breeding is their size.

As the popularity of large American Cichlids has diminished over recent years, imports of new stock have been greatly reduced, and the available breeding stock has, in some cases, been inbred to such a degree that the fish have been getting smaller. While some fishkeepers may find this an advantage, in that they can keep larger numbers or use smaller tanks, it gets more and more difficult to find large examples of a species.

For example, Cichlasoma (Theraps) *synspilus*, which has a potential overall length of 12", has been inbred to the extent that mature pairs turn up where the male is 6" overall and the female even smaller. These specimens were well developed, and fully coloured but they had been inbred, and bred at too small a size, to such a degree, that they had become "dwarfed".

Another popular species which is often stunted is Cichlasoma (Paraneetroplus) *managuense*, which has a potential size, in males, of 99" or more. Such fish should not be allowed to reproduce until the male is at least 12" long and the female 8". Fully developed pairs have been seen breeding at five inches.

It is not only large Cichlids that have been allowed to become "dwarfed", but smaller ones as well. Species like the Convict and the Firemouth have been inbred to such degrees that pairs are breeding when the male is only 2" long and the female half this size. With the wild imports over the last year or two this problem can be reversed and controlled by those who want to keep and breed those fish, and ensure their availability for years to come.

Right: Female C. managuense should not be bred until she's 8" long.

Conclusion

Without doubt the breeding of these cichlids is one of the most exhilarating achievements of fishkeeping. Because of their size and destructive capabilities (being able to arrange just about anything in their tank to suit themselves) plus the care they give to their young, their behaviour and display patterns at every stage of their lives, the care and maintenance of these animals is a real challenge.

They have given the authors a lot of headaches, frustration, pleasure, sense of purpose and achievements over the years, and will always form a vital part of their fishkeeping lives. ■

Tropical *Answers*

How deep should my tank be?

Q **Please could you give me some information on Altum Angels as I have recently been offered a pair. What size of tank do they require? Do they have the same needs as ordinary Angels?**
• F. Hunt, Norfolk

A The Altum Angel may grow up to 10" in height (that is from the tip of the dorsal to the tip of the anal fin. Therefore a deep tank is vitally important. They require at least a 60" x 24" x 24" tank. The pH needs to be between 5.8 and 6.8 and temperature 78-82°F. They need plenty of plant cover as they are quite nervous fish. Make sure your tank has an excellent filtration system. A decline in water quality may cause their fins to become tatty. In the aquarium these fish will take flake, freeze-dried and frozen foods, but try to offer them plenty of live foods, such as disinfected Daphnia and bloodworm.

Altum Angels need a good filtration system to prevent bacterial problems which may affect their impressive finnage. Pic. by Michael Edwards.

Kissing Gouramis have soft mouths so their sparring doesn't do them any physical damage. Pic. Jane Burton. Bruce Coleman Ltd.

Kissing isn't dangerous

Q **I have been keeping tropical fish for almost four years and I have a healthy community tank which is 24" x 12" x 12". It contains three Platies, a Swordtail, a Penguinfish and a pair of Kissing Gouramis. I am beginning to wonder if my tank is too small. The Gouramis are extremely aggressive. I also keep discovering large amounts of fry in the tank. These are probably Platies. What should I do?**
• Eleanor Wheeley, North Yorks.

A For the number of fish you are keeping, your tank size is fine.

If by aggression, you mean your Gouramis are continually kissing, this is a harmless form of jousting. There is nothing to worry about, for the fish can do themselves no harm, as their lips are soft. If they were hard and causing damage to one another, then that is the time to worry.

As for the problem with the fry, this is a bit of a difficult question to answer, as I presume you do not wish to keep them. If this is the case, do you have any friends you could give the fry to? Or try your local shop. Failing that the only other options are to separate the males and females, or dispose of the fry painlessly. You may find the Gouramis eat some of the fry. **PD**

■ Not a natural decor

I will soon be setting up a tank to breed Mbuna. As I want the tank to be as natural as possible could you suggest some plants that occur in the Mbuna's habitat?
C. Middlemiss, London

Mbuna are Cichlids from Lake Malawi. They live in hard alkaline water with lots of rock caves, but no plants. They certainly eat green food, but this is mostly algae growing on the rocks.

If you want to use plants as decoration try Anubias spp., Cryptocoryne nevelii, and Java Fern. These should stand up to the Cichlids, and tolerate the water conditions. **BG**

■ Lighting a deep tank

I am setting up a planted tank, 8' x 2' x 2'. What lighting would you recommend?
E.M. Waller, Skegness

Fluorescent tubes are insufficient for a tank 2' deep. I recommend metal halide lamps. You will need four 125W lamps for a tank your size. **BG**

■ How thick?

I am planning a new aquarium, 36" x 18" x 18", and am unsure as to what thickness of glass to use. I will use a kitchen worktop as a base, on a cupboard supported by 2" x 2" timber.

I intend to use internal filters, probably a Fluval 4. With this depth of water will two 40W Fluorescent tubes - one Powerglow, one Grolux, be sufficient for good plant growth?
R. King Barnstaple

Your proposed construction should be strong enough, but I recommend a full timber frame with the bottom horizontals spreading the weight across the floor.

Your tank will hold about 200 litres (45 gallons), which should be turned over by the filter a maximum of once per hour.

Your lighting would also be adequate. Do not use lamps that peak in the blue (other) spectrum, as they encourage algae. Use soft, white colours like Sun-Glo or similar. You need at least three tubes, and some reflection. **BG**

High pH

Q **I have set up a 36" planted community tank. I have not stocked it with fish yet, as the pH is 8.4-8.5. My tapwater is between pH 7.6-7.7, so I suspect the substrate I have used, even though I bought it from a reputable dealer. It consists of fine gravel with fine white chips. Can I reduce the pH without changing the substrate?**
• N. Vink, Stratford.

A It sounds as if your gravel has marble chips or similar in it, which are dissolving to give the high pH. Peat or acid salts will not remove the problem. It would be best to replace the substrate with better quality gravel. **DF**

Compatibility

Q **We have a 36" x 15" x 12" tank with a biological filter, powerhead and airstone. We have a few Guppies and a Siamese Fighter. We would like to have the following fish: four Corydoras, two Clown Loach, six Guppies, one Siamese Fighter, one Angelfish, two Dwarf Gouramis. Your advice on numbers and suitability would be appreciated.**
• Mr & Mrs Bunting, Norwich.

A All the fish you mention, and the numbers, would be compatible, but make sure the Guppies are adults, otherwise the Angelfish may eat them.

With Angelfish it is important to provide plenty of cover, or they can be nervous. Although much of the aggression has been bred out of these fish over the years, some are more boisterous than others. You can keep more than one Angel if you like.

Your tank could house a maximum of 36" of fish, and could quite happily take some more community fish. There are many Barbs, Tetras and others to choose from.

Your list contains a balance of fish that swim at different levels in the water, so try to maintain this. **PD**

Territorial Sharks

I have a 36" x 12" x 12" tank, and I hope to house my two Tinfoil Barbs and Plec, as well as three Clown Loach, two Silver Sharks, Red-tail Shark, Red-fin Shark, and Albino Shark. Would this work?
Shaun Kelly, Plymouth.

Both Silver Sharks and Tinfoil Barbs can attain a length of around 12", and growth is rapid, so your tank would soon be overstocked.

The Red tail Shark, Red-fin Shark, and Albino Shark are all territorial, and aggressive towards similar species. Limit yourself to the fish you have, and perhaps the Clown Loach and one of the Labeo sharks. **PD**

Width is important too

Could you tell me if the following would be suitable for rehousing my 12" Semaemus denticulus? At present the fish is in a 48" x 18" x 12" tank, but has difficulty turning round. My proposed set-up would be a 45" x 23" x 23" tank with an undergravel filter powered by a Whisper 1000 air pump, Fluval 4 internal filter and Fluval 103 external, both with spray bars. Depth will be 2" of gravel, with several boulders and some plastic plants, siliconed to the base. Lighting will be by a 15W cupboard light as the fish does not like bright lighting.
R. Huggett, Eastbourne.

You have highlighted an important, but often neglected point about keeping big fish. Not only is the length of the tank important, but so is the width.

Your proposed set-up should suit your Semaemus well. **PD**

Low sex drive

My male Guppies do not seem interested in the females. Is there anything I can do?
A. Dougal, Dyfed.

I suggest you add a few more females and another male. A fresh male can induce rivalry between the others, and result in breeding. **PD**

The four-eyed fish is an unusual brackish water species. In actual fact it only has one pair of eyes, but they allow the fish to see both above and below the water surface at the same time.

Choose a more suitable substrate

Q **I've recently set up a 36" x 12" x 15" aquarium furnished with tufa rock, dead coral and a coral sand/cockleshell substrate.**

Filtration is by undergravel run by a powerhead and also an internal filter.

I intend to keep brackish species - possibly four Mono, two Bumblebee Gobies and a Shark Catfish.

How much salt will I need and how often should I carry out a water change? Any other information will be helpful.
•K. Walker, Norfolk.

A I think somewhere along the line you have misunderstood the definition of brackish water.

Broadly speaking it should be defined as "the region where two bodies of different water (ie. freshwater and seawater) meet" - estuaries, for example. I say this because your set up so far would be more suited to marine than brackish water species. I am sorry to be the bearer of bad news but if you want to keep brackish species, you will have to strip down the tank and start again.

You should not use coral or cockle shell as a substrate because brackish water has a lower pH (7.6-8) than a marine environment and coral sand and shell over a period of time will begin to dissolve and will result in an increase in the water's calcium concentrations, thus having a dramatic effect on the pH. Tufa rock will also have a similar effect. A more suitable substrate would be silver sand, but this would result in having to install a different filtration system as the sand would clog up the filter plates.

For decoration, use bogwood and plastic plants. Some live plants will survive in brackish water, including Java Moss, Giant Vallis and Giant Sagittaria, but if you keep Scats, the plants will be eaten.

The specific gravity should be 1.002. Use marine salt and not table salt. Carry out a water change every 3-4 weeks depending on the water's stability.

Shark Catfish grow quite large and need to be kept in shoals. More suitable fish include Gobies, Archer Fish, Mollies, Killifish, Scats, Halfbeaks and Four-Eyes. **PD**

Keep them apart

In my 48" x 18" x 12" tank I have two Cichlasoma citrinellum, three Firemouths and two Convicts. All are juveniles. Could you tell me how to sex them and also how I can breed the citrinellum?
Lee Ridley, N. Ireland

In all three species it is next to impossible to sex juveniles. In young fish of the same age, any which outgrows the others is likely to be a male and smaller specimens - if not obvious runts - are usually females. Males also tend to have slightly longer fin extensions and in the case of the Firemouth, the male is more colourful.

You will need to re-house your citrinellum, as this species grows rather large and is extremely aggressive. If you have a male it is likely to kill any females and any other fish unless they are as large and nasty as it is. The normal method of breeding is to have a divided tank and to remove this when the female is about to lay her eggs. Replace it when they have spawned. An alternative is a perforated divider, or one with a slit at the bottom, so the male can fan his sperm through, or if there is a large difference in size, it may be possible to protect the female by providing caves which she can enter but which are too small for the male to get into. **MB**

Cooler water preferred

Please could you give me some information on the Golden Barb? How big will it grow and will it be suitable for my community tank housing a Sucking Loach, Swordtails, a pair of Kribensis and some Giant Danios? I have been told it is a coldwater species, but that it can be kept in tropical tanks. Is this true?
Jacqui Trent, Cambs.

The Golden Barb, or Schubert's barb, as it is sometimes called, grows to around 2½". It prefers cooler temperatures, but will tolerate water up to 77°F. It's a peaceful, shoaling species which is very hardy and eats most aquarium foods. They're easy to breed: females are less brightly coloured than males. It prefers a planted tank which is brightly lit. It should be at quite at home in your community tank, so long as the temperature doesn't exceed 77°F.

Hungry mother

Q **I recently moved my mouthbrooding *Pseudotropheus zebra* to a spawning tank where she released a dozen fry (her first brood) but then proceeded to chase and harass them. I put them in a breeding trap for a week during which time she seemed happy and the babies grew well. I released them back in with their mother - and in two days I had been reduced to five fry. I transferred the mother back to the main tank and the other fish attacked her. Now she is back in the spawning tank and the babies are in the breeding trap again. Please could you give me some advice? Also could you tell me if coral sand would be all right as a substrate?**
• Jeanette Gibson

A It is very unusual for a mouthbrooder female to turn on her fry, though it does happen occasionally. It may be that she is desperately hungry. She must be well fed before spawning to see her through her three week fast. Offer her some substantial food, such as earthworms, as soon as she releases her fry.

It's always difficult to re-introduce a female to the community. Use a net box type breeding trap for the fish to be introduced and leave it in this for a couple of days so the other fish get used to it; then sink the trap. The residents will know they can't get at the intruder, which in turn will have a refuge in the trap. It will gradually work its way back into the community over a week or so. When it no longer retreats into the trap you can remove it.

I would advise against a substrate of coral sand alone - time and again I see Mbuna scratching like mad in such tanks, probably because of the "dust" stirred up during digging. It is also too light and reflective and can result in nervous fish. Use 10-20% coral sand as a pH buffer and ordinary gravel for the rest. **MB**

Slovenly Snakehead

Q **I recently rescued a 13" Snakehead from a small tank and placed it in my own, which is 60" x 24" x 24". The tank is filtered by a Fluval 403 external and a Visijet internal. My pH is 7.8 and the nitrate level is nil. The Snakehead's diet consists of lancefish, Gamma fish and fresh beef. The fish spends most of his time laying on the bottom of the tank. I have had him for six weeks and I would have thought by now he would have had time to settle in. I can't get any advice on diet and behaviour. The fish is about eleven months old. Please help.**
• B. Hepburn, Cleveland

A Snakeheads are one of the hardiest fish I have ever encountered and suffer little or no effects from being moved.

The reason why your fish spends a lot of time on the floor of the tank is due to its natural behaviour pattern. In the wild it exhibits this very same behaviour which usually occurs after feeding. Remember that these are predatory fish which are prone to eating large meals and the Snakehead will need to digest this food, which it does by lying on the floor. Youngsters are more active than adults.

Providing your fish is feeding, you have little to worry about.

These fish will accept a wide range of water conditions. Don't forget they come from poorly oxygenated ponds. I find a pH of 7 with a hardness of 8°dH and a temperature of 26°C suits them best. It is important that you leave a gap between the water surface and the condensation tray from which the Snakehead can gulp air. The diet you are feeding your Snakehead is all right, but I would give it beef heart rather than the flesh. Whole sprats are also substantial.

If you decide to add another fish to the tank, try a large Oscar, Giant Gourami, Tinfoil Barbs or large armour plated catfish. **PD**

Corydoras are probably the best choice of catfish for a community set up. This is C. metae.

Small tank community

Q **I have set up a 24" tank which is filtered by a Fluval 2 and a small sponge filter. I have provided plenty of caves. Please could you advise me on some suitable fish and plants for this set up? I am quite fond of catfish.**
• A. Sowden, Oxford

A There are a multitude of small fish suitable for an aquarium of your size. A community system could include Corydoras, Glass catfish, a small Pleco, Dianema, Neons, Tetras, Loaches, small Barbs, Danios, White Clouds and Rasboras.

Providing you have the correct amount of lighting, most plants are easy to keep. Some of the hardier species include the *Cryptocoryne*, especially *C. nevillii*, *C. pontederifolia*, and *C. beckett*, along with Malayan Sword, Amazon Sword and Indian Fern. **PD**

Xenopus may lay up to 500 eggs at a time, but they will need to be hatched separately, as these frogs are highly cannibalistic
Pic: Jane Burton; Bruce Coleman Ltd

Totally aquatic frogs

Q I have two Xenopus frogs which are kept in a tank on their own, at a temperature of 75°F. I feed them on floating goldfish sticks. The tank contains flowerpots which are on their sides and are buried quite deep into the gravel. The frogs like to burrow into these. I also have plastic plants which float at the surface which they can climb onto. They are doing very well, but I would like to know more about them.
• M. O'Byrnes, Isle of Wight

A The African Clawed Frog (*Xenopus laevis*) belongs to the family Pipidae, often called "tongueless frogs" which is a primitive family with representatives in both Africa and South America.

Xenopus reaches about 12cm and is a totally aquatic frog, spending much of its time hanging just below the water surface. Although it may appear sedate, when the need arises it is capable of rapid propulsion which is derived from the huge, well-developed hind legs and feet. The forelegs are a great deal smaller and essentially used to shovel food into the mouth.

Try to vary your frogs' diet by providing them with earthworms and small strips of fish, meat or liver. Feed them two or three times a week.

Males are smaller than females and the females have anal papillae (fleshy flaps of skin) above the cloacae. They can be bred by raising the water level in the tank, at the same time initiating a sudden drop in temperature.

The eggs (500 or so) are best removed to prevent them from being eaten and incubated in a small tank or other suitable container. Remove any which fungus. They hatch in 48 hours and the tiny tadpoles feed on suspended food particles which you can provide with Liquifry. Divide the tadpoles into smaller groups as they grow, because they will eat one another. **PD**

Moving long distances

Q I am soon to move house which will involve a four hour car journey. Please could you give me some advice on the best way to transport my fish and tank? I have Tetras, Corydoras, Harlequins, Danios and Gouramis.
• David Mainwaring, Clwyd

A The best way to transport your fish safely is in strong polythene bags. As your journey will be a long one, keep the number of fish in each bag to a minimum.

Fill each bag to about a quarter or half full with aquarium water and place some ammonia remover in the bottom. Secure the top of the bag with an elastic band, trapping as much air as possible. The bags should then be placed in a polystyrene box to help keep them warm.

Try to keep as much water as you can from the original set up. That way you will be less likely to suffer from New Tank Syndrome. **PD**

Tumour trouble

Q One of my 8" Piranhas has developed what appears to be an enlarging tumour on the edge of its operculum, although it doesn't seem to have affected the well-being of the fish. Is there anything I can do?
• A. Longman, Co. Antrim

A There are many environmental factors which are believed to cause benign and malignant tumours or growths to develop on or in the fish's body. These can include chemical pollution, certain viral infections – or it may also have been inherited.

Fortunately tumours are rarely infectious, though any fish suffering from such a problem should be isolated and the condition monitored carefully. As yet there is no effective treatment for tumours. Some vets may attempt to remove it, but it often reappears later.

Providing your Piranha is eating and appears otherwise happy, there is every chance it will be all right. If, however the growth increases significantly and causes visible discomfort to the fish, it would be kinder to painlessly destroy your Piranha. **PD**

Filter out of balance

Q One of my Angelfish began to bully the other, so I transferred the bully to a quarantine tank, using mature water from the main tank, and a Fluval 1 internal filter. The nitrite level in this tank rose, and is still high, even after replacing the filter with a mature one from another tank. Why have I got new tank syndrome when everything in the tank has been matured?
• D.M. Benson, Herts.

A You have the classic symptoms of new tank syndrome, but it will fade away quicker, because of your mature water and filter.

The disturbance to the filter has upset its balance, but it will soon settle down. In the meantime, partial water changes will dilute the nitrite. **DF**

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

- Answering general queries and specialising in "oddballs and tankbusters" is **PAUL DONOVAN.**
- Plant problems are the realm of **BERTI GESTING** of Aquatic World.
- Cichlid fans deal with **MARY BAILEY,** treasurer to the British Cichlid Association.
- Discus queries go to **STEVE DUDLEY** of Euro-Discus.
- For all your technical questions, you can write to Dr **DAVID FORD** of the 'Aquarian' Advisory Service.
- If your problem concerns Catfish, send it to **GINA SANDFORD** of the Catfish Association of Great Britain.

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

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

TROPICAL ANSWERS

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

Dr DAVID FORD of the 'Aquarian' Advisory Service on the secret and infrequent sex life of the Sterlet.

Main picture: Atlantic Sturgeon, Acipenser sturio. Pic by Hans Reinhard, Bruce Coleman Ltd.

Left: Sterlet, Acipenser ruthenus. Pic by Hans Reinhard, Bruce Coleman Ltd.

Above right: Sturgeons are popular in the food world for their fine-tasting flesh and their caviar.

The caviar connecti

ion

The Sterlet has a simple problem - it is just one of the 20 members of the Sturgeon family. These primitive fish are a fascinating group but unfortunately they make good eating.

This is why they have been disappearing over the years because of overfishing in the past and pollution in the present.

The Sterlet

Acipenser ruthenus is the smallest Sturgeon, and is the only true freshwater Sturgeon in that it doesn't migrate to the sea.

It is found in Western areas of Russia and Eastern Europe where it is considered a delicacy because of high quality meat and good caviar.

It grows to about 40cm and the young have been kept in ponds and coldwater aquaria as novelty fish for many years. They are hardy and peaceful and readily eat all food from the bottom,such as Tubifex, earthworms, Daphnia, mussels and flake foods, especially Carnivore recipe.

This they find with the bristles on the long snout and hoover it up with the low-slung mouth. The body is covered with plates that resist parasites and give them a prehistoric look.

If you want to see wild-caught Sterlets, visit (before it closes) the Aquarium at London Zoo where they have been swimming with Shovelnose Sturgeon and Paddlefish for many years (and hopefully many years to come!).

The Bester

What has happened in recent years is that fish farmers in Eastern Europe have crossed the small Sterlet with the giant Beluga to give a fully fertile F1 hybrid called the Bester (Beluga x Sterlet).

This fish has the tasty flesh of the small fish but grows rapidly like the Beluga, giving an ideal farmed fish. It was found that the fish grows best in heated waters (about 20°C) on a moist commercial diet and being hardy is not prone to the diseases and parasites common in crowded fish farms.

The fish is a seasonal breeder but this can be controlled by injecting pituitary glands or releasing hormones into large breeding pairs and the fingerlings so produced now run into the hundreds of millions.

Inevitably some of these fingerlings are finding their way into the hobby market.

The fish has so many attractions, it looks unusual, it is very hardy, easy to feed, peaceful, can live in outdoor ponds, in coldwater aquaria or even adapt to the tropical aquarium.

However the Bester will grow rapidly, at a rate of 1kg per year reaching 80cm within 3 years.

Some species of Sturgeon can reach five metres in length.

Free of the restrictions of aquarium size Besters can grow in 130cm and 15kg.

If you want to own Sterlets do ensure that they are wild-caught *Acipenser ruthenus* which will remain about 15cm in the confines of an aquarium.

Unfortunately the appearances of the young Sterlet, the Bester F1 (hybrid and even the F2 (Bester x Bester) are the same...the difference is in growth.

After about 3 months the Bester is twice the size of the Sterlet. The fish has blue-grey sides and pale yellow belly, with spikey plates (the 'starlets" after which the fish is named).

It is a restless fish that cruises ceaselessly about the base area, but in a graceful way that is a delight to watch. This means a large base area is necessary, and a pond is obviously better than a tank. The long snout is used to dig and grub out any food, usually worms and crustacea in the wild, and so the usual aquarium gravel is not really suitable.

River sand is ideal or the white Silica sand. Water type is not important and temperatures can be cold to tropical but the ideal is 18°C.

Feed on tubifex, chopped earthworms and shredded fish and shellfish meat, with added flake for vitamins and minerals. Breeding in the aquarium or pond is not possible. The fish are seasonal breeders, but not annually, the females often developing eggs every third year.

This is why farmers use hormone treatment and handstrip the fish. In fact females may be incised to remove eggs and the wound sutured, rather than sacrifice the fish.

The males produce milt by just tail bending. The Sterlet is a beautiful fish but really only for the devoted specialist, in fact it is best left to the public aquaria to display the species. In fact it is one species that is best left in the wild...if only we can leave those wild conditions alone too. ■

The Sturgeons

It is from the Russian Sturgeon *Acipenser guldenstaedti* that caviar is obtained and the original wild fish, up to 3 metres in length, can produce kilos of these tasty fish eggs.

However, to obtain the eggs the fish has to be cut open, and the largest fish have long since been killed.

Additionally the Russian Sturgeon swam in the Danube, going upstream like a Salmon to breed. Dams built along the way did not include 'ladders' for the fish to climb so effectively blocking their natural breeding path.

Fish Farmers, such as PROPAGEN, with farms in France and Hungary, now captive-breed the fish for caviar production.

Other Sturgeon include *Acipenser baeri* the Siberian Sturgeon, a monster fish up to 5m long and living for up to 100 years.

There is an Adriatic species *Acipenser naccarii* which is considered extinct in the wild.

A middle-size (up to 2m) Sturgeon is the *Acipenser stellatus* from Russia, but the largest is the Beluga *Huso huso* which once could be caught 8m long weighing 1.5 tons!

Such magnificent fish have long been all caught but some smaller fish are still caught in the wild up to 450 kg.

There is an American Sturgeon, called the White Sturgeon *Acipenser transmontanus* which can be found in San Fransisco bay and up the Sacramento River.

The Mississipi basin has several species, such as the Shovelnose Sturgeon *Scaphirhynchus platorynchus* and the Lake Sturgeon *Acipenser fulvescens*.

The British Sturgeon is *Acipenser sturio* and could once be caught in our waters at 5m long.

There is a story of such a monster being landed (back in the 1920's) and the angler couldn't get it home without help. He asked the local farmer if he could borrow a horse and cart for the fish he had landed...what the farmer believed is not recorded.

Smaller versions of the fish are still in our estuarine waters but it is a Royal Fish now and any caught belong to the Crown.

It will soon be in the Red Data Book, which means any caught must be returned to the water.

Records on the fish's distribution are kept by the Marine Biological Association, Citadel Hill, Plymouth, PL1 2PB. If any angler does land a British Sturgeon please ring Silja (pronounced Seelya) Siruby at the Association on 0752 222772 ext. 230, so details can be recorded.

Sterlets are suited to outdoor ponds and coldwater aquaria but can adapt to tropical temperatures.

The Big SLEEP

ANDY PARKES can't quite put his finger on just what makes the Sleeper Goby so appealing. But whatever it is, this fish has lots of it.

Illustrations: Andrew Mackintosh.

Dormitator maculatus – 'Spotted Sleeper Goby'

This month, I would like to offer you a truly big fish in every sense of the word except, in the tankbuster world, that of size.

An exceptional specimen is fully grown at 30cm, 25cm being more like the maximum that should possibly be hoped for – but even at only 20cm, this fish really does **look** huge. It's a goby – usually seen as a small fish – writ large.

The fish in question is commonly known as the Sleeper Goby, though this name is also applied to a variety of the larger gobies. Slightly more specifically the title of 'Spotted' is applied, referring to the single dark blotch just behind the operculum on either side. The scientific name of *Dormitator maculatus* is our best reference.

Perhaps I imagine it, but each of my choices of fish I think, has its own particular charm and, if pressed, I can usually point out what that quality might be. This one though ... I suppose it's got ... it's kind of like ... to be honest, I just don't know what it is that appeals, but something does.

Cryptic colours

As mentioned, the body is very large from the thickly rounded head, the bulky body tapering only slightly through a 'heavy' caudal peduncle to the oversized circular caudal fin. The colouring is cryptic.

It does possess some beautiful colours, but they are not always visible. In peak health and catching the right light, there are a myriad of hues along the whole body; violets, blues and greens overlying the basic brown-green, with the dark blotch being almost jet black and edged in white. The dorsal and adipose fins are lined with pale bars running horizontally, but the ventral fin is almost pink with very pale blue, almost white, edging.

This pale blue can also be found as irregular patches over most of the body, predominantly towards the rear. As with the majority of fish, these colours do fade with age, but they never disappear entirely, and this fish is always an attractive addition to the larger species aquarium.

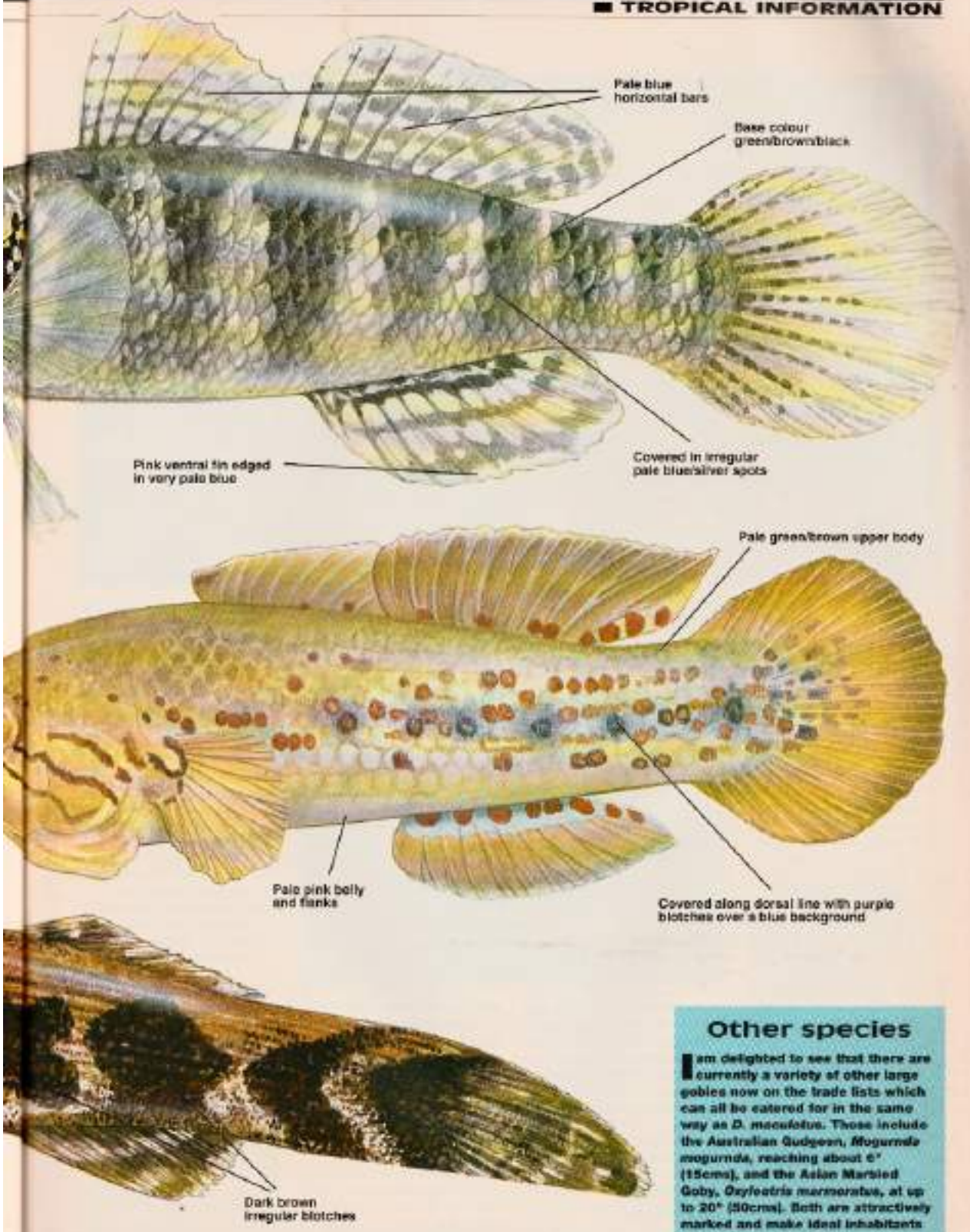
Sleeper prefers quieter waters

This is a South American species predominantly from the north western areas, inhabiting both fresh and brackish waterways. Ideally, the temperature should be around 22°C, but can be tolerated in the range from 18 to 28°C.

Although a small quantity of salt may be recommended by some, I have never found this to be necessary and have kept specimens from three to ten inches. The only concession that I do give is that the water should be fairly hard, in the region of 12-15°dH with an alkalinity of 7.8 to 8.2 pH.

Mogurnda mogurnda – 'Australian Gudgeon' 'Purple Striped Gudgeon'

Oxyeleotris marmoratus – 'Marbled Sleeper Goby'



Other species

I am delighted to see that there are currently a variety of other large gobies now on the trade lists which can all be catered for in the same way as *D. maculatus*. Those include the Australian Gudgeon, *Mogurnda mogurnda*, reaching about 6" (15cms), and the Asian Marbled Goby, *Oxyeleotris marmoratus*, at up to 20" (50cms). Both are attractively marked and make ideal inhabitants for the larger aquarium.

This Dominator at 8" long is quite a large specimen

D. macularius, will usually inhabit the quiet, still areas of water in their natural habitat, lying stationary among rocks and branches in wait for their prey. Therefore we should, naturally, try to simulate this environment as closely as possible.

Consequently, internal power filters have only had to cheese on the couple of occasions that I have tried them and even an external has to have a spray bar situated below the water surface for the return. I now rely on the good old undergravel filters when keeping this and any other goby, preferably with as many uplifts as possible.

To set up an ideal aquarium for one of these large gobies, you will need at least a three foot tank, preferably four foot. Undergravel filter plates should be as small as possible, ideally Rena or Hagen plates with four uplifts.

Unless money is no object (please contact me if this is the case), an air pump will be necessary rather than powerheads to operate four uplifts. An Algarde or a Hoffman pump would be the best choice.

Set the plates up with a three inch layer of gravel, preferably fine grade bearing in mind that these fish are fine and silty as they near the delta. Smooth boulders and driftwood provide ideal shelter and camouflage for the goby as they rest in the substrate, not unlike a boulder themselves. For the water gardener, I have found the more fleshy plants to be best in this sort of aquarium, Amazon Sword being a particular favourite, with one 24" Aquastar providing the illumination.

Meat and vegetables

When it comes to feeding, there can be some initial problems with some specimens proving particularly fussy. It does not appear to be what you feed, more the size of the food. One of the current inhabitants of 9" (23cms) will not take anything more than dice-sized pieces of food, but shows no marked preference for which variety it may be so long as it is meat based.

Rana frozen foods are a particular favourite for my own convenience, and one individual blister pack broken into the two halves is ample for a couple of days, using the mysis, discus mix, cichlid mix, bloodworm and special mix to provide a variety and on the day off from the meat, I give a few sticks of Doromin and Doregreen.

It should be pointed out that vegetable matter is an important supplement to all predators' diets, providing roughage and vitamins that are not found in pieces of meat. In the wild, these predators will feed on fish, many of which are herbivorous, and obtain a balanced diet this way. However, in our artificial environments, we have to supplement the diet in some way and I, for one, have often neglected this duty.

Consequently, I was delighted when I discovered Doregreen which is taken quite happily by those that are already on pellets and any that will not, a simple slice in the meat will accomodate a couple of sticks quite easily. ■

Suitable tankmates

There is one important thing to remember when purchasing your specimen and that is, if you'd like to keep it beyond three or four inches, then you are definitely limited to keeping just the one.

In fact, anything resembling a goby is out of the question.

My eight inch behemoth even took on a ten inch *Nandus nebularicus* regularly (it didn't get far!). Having said that, there are fish that it will mix with, and, bearing in mind that this is not the most lively of specimens, you will need something as a midwater swimmer.

A shoal of Neons is not recommended, but if you are a fan of certain large Cichlids, then I have to confess that these are ideal. Alternatively, there are a wide variety of the more unusual types that make ideal companions; the Garpikes, Pike Cichlids, Siamese Tiger Fish, - all having been covered previously - or Arowanas, Knifefish, large Characins and some of the larger Eels. Whichever you opt for, please ensure that it is of at least equal size, because the Sleeper Goby's mouth can engulf quite large morsels if the opportunity should arise.

■ **As always, please do not hesitate to contact me, c/o *PFK*, if you have any problems or would just like to share your experiences.**

I promise all letters will be answered, but an SAE would be appreciated.

PRACTICAL Fishkeeping COMPETITION

Win an A-Tech Solar System lighting set up from TOP-UP AQUATICS

The Solar System offers sunrise and sunset in any tank.

This month Practical Fishkeeping and Top-Up offer the chance to win a new state of the art lighting system from A-Tech Water Management Systems Ltd.

FIRST PRIZE: ONE SET OF SOLAR SYSTEM LIGHTING
This is the first ever fluorescent dimming system designed specifically for the aquarium. The Solar System artificially creates a sunrise and sunset by automatically regulating the brightness of fluorescent tubes.

As your mains timer comes on the tubes strike flicker free at a fraction of their normal brightness, reaching full power smoothly over 30 minutes. At the end of the day the procedure is reversed.

There are versions for two and four lamps, 4' and 5' lengths, and 1" and 1.5" diameter tubes (1" strike and dim to 10% brightness; 1.5" to just 2%) Splash and salt proof.

RUNNER-UP PRIZE: ONE SUPERSPOT SYSTEM 3
The new Superspot is a low voltage lighting system designed specifically to highlight areas of your aquarium. The Superspot System 3 comes with two spotlights that project narrow beams of light. (An extra spotlight can be added).

The beams of light penetrate the deepest aquaria giving an impression of shafts of sunlight - ideal for highlighting rockwork, bogwood or special plants.

More details from:
● A-Tech Water Management Systems Ltd., PO Box18, Aylesbury, Buckinghamshire. Tel: 0296 770034
● Top-Up Aquatics, 12-22 Elizabeth St, Congleton, Cheshire. Tel: 0260 275144

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

Top: Superspot. Above: Solar System.

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

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

■ If you answer all three questions correctly, you will be asked to leave your name and address. Please state which competition you are entering, and 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 October 13. The first name drawn will win the Solar System; the second will win a Superspot System.

QUESTIONS

1. How long does it take Solar System tubes to reach full power?
a) 3 hours
b) 30 minutes
c) one hour

2. Which size of tube will dim to just 2% brightness?
a) 1.5"
b) 1"
c) 4"

3. How many spotlights come with the Superspot System 3?
a) one
b) three
c) two

• DIAL 0891 600 067 •

Giant Gouramis

Teddington area fishkeeper Terry Haley has two Giant Gouramis to give away. Sold as Chocolate Gouramis the pair have grown to 8" and 12" respectively and despite being housed in a five foot tank, Terry feels it's time that the fish went to a larger home. Although the buyer must collect, they're free to anyone who can provide either or both with a tank of the right size - at least six feet and wider than 12". Contact Terry on 081 977 1280.

Courses for the Aquatic Trade and the fishkeeper

Capel Manor, the Horticultural and Environmental Centre in Enfield is offering a complete range of courses covering the aquatic trade from novice to expert. Culminating in a City and Guilds qualification the professional course covers water gardening and tropical marine aquatics.

Courses for the amateur fishkeeper also vary from novice to expert.

For more details contact Capel Manor, Bullsmoor lane, Enfield, Middlesex EN1 4RQ Tel: 0992 763849

Fish farming at home?

The Editor says

A few months ago, I enjoyed watching one of Stan Kemp's videos (from Kingfisheries) showing the spawning of Albino Oscars in tropical outdoor ponds.

Because each pair was given a large and easily defensible building block home, with only a fish width entry, they were able to spawn and defend their young with only minimal mayhem - while life went on outside in the shallow pond as usual. By limiting the number of sanctuaries the method ensures an amount of "natural selection" with hopefully the best and the toughest fish setting up home first.

Of course it need not be Oscars: many other cichlids would respond to the method, as would some other species including catfish and various tankbusters.

Equally a large well-planted area of water is more likely to induce spawning in most of the smaller species such as tetras, barbs, danios and gouramis. But despite the growth in extensions and conservatories, we rarely hear of tropical or semi tropical indoor ponds or even large tanks as purpose-built fishouses being used in such a fashion.

It makes a lot of sense in fact. Marine fishkeepers don't use large tanks because price is no object - it rarely is - but because they know large amounts of water are more stable than smaller ones. The man with a fishouse may well not be able to afford a vast eight or ten foot fishtank in glass. But a small pondliner and a wooden frame, if necessary, or various large plumber's tanks, can be made to hold considerably more water than a glass tank. Alternatively such a set-up can be kept in a garage or shed in the summer months without heating, and if insulated with polystyrene tiles might not cost a fortune to keep at tropical temperatures.

Filtration can be by a small pond filter or any number of home-made trickle systems - this will not, after all, be a display pond (except perhaps in the context of a conservatory). Lighting, aeration, decor, grain substrates are largely irrelevant. Planting may call for lighting; decor in the form of defensible caves may be necessary; dither fish (small fish that swim calmly around the tank and persuade cichlids that there is no danger at hand) may be necessary in some cases.

Those with weedy goldfish ponds generally find that the best and the toughest fish only survive when their fish spawn - hiding in the depths of the weeds. A similar situation could prevail in such a tropical pond or vat - with the annual removal of your shoal of display fish to the vat ensuring a renewed supply of prime stock for the next year.

If you've tried this - or you try it - please get in touch.

■ Many thanks to all the readers who wrote to me about their mixed coldwater set-ups.

The age old problem of bottom-dwelling fish for the coldwater tank has got a new solution with the recent importation of a coolwater form *Botia superciliaris* which we have come across in shops in Leicester and locally. Reasonably-priced, and apparently not impossible to keep in shoals, the fish does have the drawback of being a little shy, and in the case of the specimen we acquired, a bit of a tail nipper.

Another fish we have often recommended goes under at least three different names. Hong Kong Plec - which it isn't - or Chinese Algae eater which may well be a fair description of what it does and where it comes from or Myer's Hillstream Loach. The latin name is *Pseudogastromyzon myersi* and they will usually be found with their flattened, white undebellies suckered to the glass (rather than the bottom) of the tank. They don't do a lot - but they do eat algae.

In promising to put together and write about a new coldwater set-up, I had not accounted for the problem of finding a stand for the odd-sized tank I wished to use. Time to emulate my practical readers - and do it myself I think..

■ I hope you're enjoying the second in our series of Practical Fishkeeping/Tetra fish cards. Don't forget that there are two more sets of five to come in November and December.

STEVE WINDSOR

FACTFILE

Our monthly question and answer session with a well-known fishkeeper

Name: David Pool
Home town: Bishop's Waltham
Occupation: Consultant to Tetra
Hobbies (apart from fishkeeping)? Walking, football, fishing
Years of fishkeeping experience? 25
Favourite type of fishkeeping? Pond
Best book on fishkeeping? The Fishkeepers Encyclopedia of Water Gardening by James Allison
Favourite species? Discus and Koi
Least favourite species and why? None
How many tanks do you own? Two
What was the first tank/fish you ever had? Three goldfish in a 24" x 12" x 12" aquarium. Goldfish won by throwing table tennis balls...
What was the first fish you ever bred? Guppies - then angelfish and Discus.
Worst mistake in fishkeeping? The first water change I ever did was with cold water in a tropical aquarium - which resulted in the fish gilling white spot and many of them dying.
What's the most you've ever paid for a fish? £6
What do you think is the most important current issue in fishkeeping? Quality of tapwater.
Biggest fishkeeping gripe: Poor information given to hobbyists - particularly newcomers - resulting in them dropping out of the hobby.
Are there any fish you wouldn't keep - and why? I would not keep any species that I couldn't provide the correct conditions for.
Which fishkeeper do you most admire - and why? Chris Andrews - for making a career out of his hobby.
Favourite fishkeeping myth? That water changes are not needed.
Biggest fishkeeping ambition? To visit the large Koi farms in Japan.
If you were reborn as a fish, which fish would you be? A Koi - because of the amount of care given to them by their owners.
How would you like to be remembered in fishkeeping? For giving help to beginners in the hobby.

ch....Newswatch....Newswat

● Sir David Attenborough is calling for a hi-tech national aquarium to be set up, says *The Daily Telegraph*.

● In the same issue came the report that a carnivorous jellyfish, Craspedacusta sowerbyi, which is usually found only in South America was caught by an angler in a Sheffield canal.

● A Basking Shark, weighing five tons, was landed by two fishermen after becoming entangled in their nets off the coast at Durham, reports *The Times*. The two men fought the shark for two hours before it was finally landed and taken to the fish market at North Shields.

● *The Guardian* carries a feature on animals in "art". It tells of a 1971 exhibit entitled "The Portable Fish Farm" at the Hayward gallery in London which consisted of an aquarium containing 300 catfish. These were to be publicly electrocuted before being deep-fried and served to visitors. However, the organisers intervened after a window of the gallery was smashed and insisted that the electrocutions should take place out of the view of the public.

A new exhibit by Damien Hurst, which is on show at the Saatchi gallery in London has also been under fire. It features a Tiger Shark, suspended in a tank of green formaldehyde. The exhibit has been the target of animal rights protestors, who daubed it with what the gallery rather politely described as "dog mess".

● *The Forteau Times* carries the story of a trawler skipper's daughter, six-year-old Sophie Newell and the goldfish which she found lying by the pavement near her home. She asked her mother if she could take it home and bury it and the request was refused, but when they passed the fish again, twenty minutes later, her mother gave in. As Sophie rinsed the dead fish under the tap, prior to its burial, it began to gasp for breath. The fish has since been named "Lucky".

● *The Daily Mirror* reports of an enormous eel which dragged a ten year-old boy into mudflats near Portsmouth, before snapping the hook on his fishing line and leaving him stranded. The young angler was airlifted to safety after a passer-by alerted the coastguard.

● The *Daily Star* reader's letters page contributed the following gem.

"Returning home in the hot weather I found the milkman soaking his feet in my goldfish pond.

"Seeing my look of surprise he spluttered 'I haven't stepped on one of them - honest!'"

● At least one rare marine invertebrate is making a comeback it seems - the Australian Navy has been called in to move 9,000 'rare' clams to new sites because they are overcrowded on their Queensland breeding grounds. (Daily Telegraph)

● *Do you have a story for Newswatch? Send us your clippings, stating clearly where they have come from and the date. We'll pay £3 for every one printed.*

This month's contributors: V.G. Fox, Chris Isherwood, Johanna Tesson, Kate Howson, *PFK* staff.

Club for Oddballs

If you have a soft spot for the "oddballs" of the fish world, you may be interested to know that tankbuster expert **Andy Parkes** is looking to set up an Oddball club. Andy stresses that the club will not just be aimed at tankbusters, but also at some of the smaller fish which come under the oddball label. If you'd like to find out more you can write to him, through *PFK* and we'll gladly forward the letters on.

GOLD LINE FEEDS

PRIZE CROSSWORD

Here's the latest in our series of prize crosswords sponsored by Gold Line Feeds makers of Phoenix 2000 fish food.

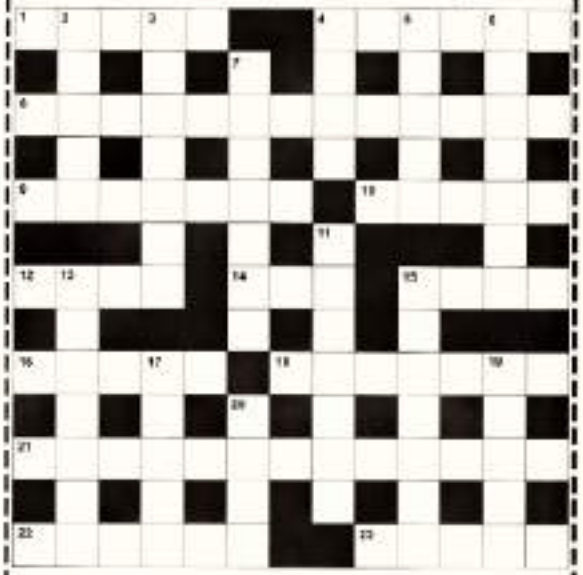
This month's prize is:

A £75 voucher towards a Koi from Koi Water Barn, Orpington, Kent.

Cut out the completed crossword and send it to *PFK Crossword, Gold Line Feeds, Pinfold Farm, Welham, Retford, Nottingham DN22 0SQ* to reach them by first post on October 12.

The August winner was David Longman of Gillingham, Kent.

If you'd like to try your hand at making up a crossword for the contest you can send it to the same address. Crosswords must be on a 13 x 13 grid.



Name .....

Address .....

.....

.....

ACROSS

1 The fish fancier's other passion? (5)
4 Fighting fish giving thanks after a wager! (6)
8 Fish or plant that's a bit of a softie? (8,5)
9 Fundamental nature (7)
10 &12 Fish disease caused by protozoa (5,4)
14 Main source of most fish (3)
15 Freshwater fish - showing signs of complaint? (4)
16 Unlikely perms for a kind of wheat (5)
18 Dwarfs or Kissing perhaps (7)
21 *Barbus nigrofasciatus* (5,4,4)
22 Fish that swears when confused! (8)
23 Jewel of a girl found in 17 down (5)

DOWN

2 They are sometimes found on the heads of sick fish (5)
3 Now a new, fully equipped tank would make somebody a nice one! (7)
4 You may find unfortunate goldfish leaving fairgrounds in plastic ones (4)
5 22 Across has sharp ones (5)
6 Essential accessory for tropical fish tank (7)
7 Talk about fish on the first of September! (7)
11 Cab followed by a disorderly mob and a plant for the aquarium! (7)
13 Well-liked (7)
15 Fortunately true of most fish diseases (7)
17 Fish swimming near these are often named after them. If you're on them you're broke! (6)
19 Voracious eel (5)
20 Type of goldfish (4)

This month's crossword compiled by Gordon Simpson, East Sussex.

CLUB NEWS

ISLE OF MAN: Robert Harrison wishes to form a fishkeeping club on the Isle of Man. He lives at **Janet's Corner** and can be contacted on **0624 824115**

SOUTH DORSET: The South Dorset A. S. has been around in its present format for over a year. They have a membership of approx 45 individual members, many of them gaining in experience from the keener members such as Chairman Pete Whelan, whose enthusiasm is contagious and vast knowledge spreading.

The Society has a varied programme of slide shows, sales, table shows, quizzes and a number of trips out, notably to Sandown and various open shows.

The Society meets the first Tuesday of every month at the Weymouth Rugby Club. Everyone is welcome. For further information on the Society, contact: **S P Cook, Hon Sec., 33 Shortlands, Portland, Weymouth, Dorset, DT5 2LG**

ESSEX: The East London Aquarist and Pondkeepers Association celebrates 50 years in existence on September 26 with its 44th annual Breeders' Show (see diary dates). All are welcome. A show schedule can be had from **Tony Stevens, 35 Tavistock Gardens, Seven Kings, Ilford IG3 9BE.** A child's painting competition is also being held - for more details contact Tony Stevens above - closing date is September 25.

LANCASHIRE AND THE NORTH: The Northern Goldfish and Pondkeepers' Society meets every 2nd Tuesday in the month at the Sports Centre, Silverwell St., Bolton. Subscription rates are £7.50 single and £10 family. **Details** from **Craig Platt, 6 Downs Drive, Timperley, Cheshire**

HUNTS AND CAMBS: Sandra Nicholas is the secretary of the newly formed St Neots and District Aquarist Society. More details of the new club from Sandra on **0480 212854**

DEVON: Westcountry Watergarden Centre has launched a pond club open to all - and free. The idea is to formalise the free information service they already give to fishkeepers all over the West Country and form a pool of information.

Members will also qualify for discounts on coldwater fish including Koi, and receive an annual newsletter. More details from: **Peter Muggeridge 0363 82438 (10am to 5pm)**

DIARY DATES

SATURDAY SEPTEMBER 19

■ **Plymouth Aquarist Society** are holding their open show at **Plymouth Polytechnic Main Hall**

SUNDAY SEPTEMBER 20

■ **Dunfermline and District Aquarist Society 21st annual show** at **Parkgate Community Centre, Rosyth Institute, Rosyth** plus possible **fish auction.** More details from: **Derek Long** on **0383 413279**

■ **Otley Aquarist Society** is holding its **Annual Open Show** (plus fish auction) at **Prince Henry's Grammar School, Otley, West Yorkshire.** More details **Simon Midcalf 0943 464672**

■ **Northampton & District Aquarist Society** are holding their Open Show at **Gladstone Lower School, Trinity Road, Northampton.** For further details contact **Paul de la Mare, 2 Southampton Road, Far Cotton, Northampton. Tel. 0604 766685**

■ **Basingstoke Aquarist Society** is holding an Open Show and Association of Aquarists Superbowl at **John Hunt of Everest Secondary School, Popley, Basingstoke.** For more details contact: **Paul Dean, 11 Spencer Close, Pamber Heath, Nr. Basingstoke, Hampshire RG26 6XL. Tel. 0734 701466**

SATURDAY SEPTEMBER 26

■ **The East London Aquarist and Pondkeepers 44th Breeders Open Show** at Cotterell Hall, Cecil Rd., Chadwell Heath, Essex - public viewing from 2pm

■ **Bristol Tropical Fish Club** holds its 31st Annual Fish Show (after a break in 1991) at **All Saint's Church Hall, Grove Road, Fishponds, Bristol.** Open to the public from 9.30am, fish auction 1.15pm, main show 3pm. Entry to hall free. More details **0272 324593**

SUNDAY SEPTEMBER 27

■ **Darwen A.S.** open show of and specialist fish auction at **Darwen Library Theatre, Darwen** - benching 11.30am. More information from **J. Gibson 0254 774960** or **B. Walsh on 0254 776567**

■ **Mid-Sussex Aquarist Society** are having an Open Show at **Southgate West Community Centre, Dickling Hill, Southgate West, Crawley, Sussex.** Benching will be from 9am to 12 noon. All enquiries should be addressed to: **Ian Shoesmith, 6 Hunter Road, Southgate, Crawley, RH1 6HU.**

FRIDAY OCTOBER 2

■ **North West Cichlid Group** are having their final table show at the **British Legion Club, Liverpool Road, Skelmersdale, Lancs.** The show starts at 8pm. For more information contact **Brian Wilson on 0695 21406 or Ken Hilton on 0565 653318.**

SATURDAY OCTOBER 3

■ **The Goldfish Society of Great Britain** are holding their annual Open Show at **St. Paul's Church Hall, Chigwell Road, Woodford Bridge, Essex.** For further details contact **Stuart Elton on 0206 562844.**

SUNDAY OCTOBER 4

■ **The East of England Fishkeeping Show** takes place at the **Ipswich International Community Centre, Woodbridge Road, Ipswich.** The show is open from 12 noon until 6pm and is part of the Association of Aquarists Superbowl tournament. Displays include hundreds of fish entered by hobbyists from all over the country. Koi and pond displays, reptiles and trade stands. For more information contact: **Ray on 0473 713027 or Adrian on 0473 611548.**

■ **Halifax A.S.** are holding their open show and auction at **Forest Cottage Community Centre, Cousin lane, Ovenden, Halifax.** Benching in 11.30am to 12.45pm, judging 1pm **Details: Dave Shields, 0422 360116**

SATURDAY OCTOBER 10

■ **The British Cichlid Association AGM** will be held at the **Baptist Church Hall, Belmont Road, Bennetts End, Hemel Hempstead, Herts.** Contact **Lynn Fern, 5 Winding Shot, Hemel Hempstead, Herts. HP1 3QQ.**

SUNDAY OCTOBER 11

■ **The 1992 British Cichlid Association Convention** will be held at **The Cavendish School, Warners End Road, Warners End, Hemel Hempstead, Herts.** Doors open at 10.30am. There will be guest speakers and a fish auction. Contact: **Lynn Fern, 5 Winding Shot, Hemel Hempstead, Herts. HP1 3QQ.**

■ **Preston & District aquarist Society** are holding an auction at **The Venue, Lancashire Polytechnic, Student's Union, Fylde Road, Preston.** For more details contact **H. E. Vinen, 60 Norris Street, Preston, Lancs. PR2 7QA.**

SUNDAY OCTOBER 18

■ **West Cornwall Fishkeepers** are holding their Open Show at **Camborne.** For further information contact: **W. R. Williams, Parc Cottage, Park Lane, Camborne. Tel. Camborne 717931.**

■ **Tamworth & District Aquarist Society** is holding its Open Show (Association of Aquarists Superbowl final round) at **Birch Coppice Miners' Club, Watling Street.** Further details are available from **Gordon Bush, 20 Tame Bank, Kingsbury. Tel. 0827 874811.**

MONDAY OCTOBER 19

■ **Reigate and Redhill Aquarist Society** are holding a Bring and Buy Sale at **Strawson Hall, Albert Rd., Horley, Surrey.** Doors open at 7.30pm, sale starts 8pm. Non-club members welcome.

SATURDAY OCTOBER 24

■ **Ilford & District Aquarist's and Pondkeeper's Society** are holding their annual exhibition at **St. John's Parish Church, Wanstead High Road, Wanstead, Essex.** The exhibition is open from 11am-4pm. Please note that this is not an Open Show. Contact **R. Downer, 8 Suffolk Drive, Laindon, Basildon, Essex, SS15 6PL.**

■ **The Northern Goldfish & Pondkeeper's Society** is holding an Open Show at the **United Reform Church, Altrincham.** Further details can be obtained from **Alan Ratcliffe, 2 [illegible] Close, Bursley.**

SUNDAY NOVEMBER 1

■ **The Portsmouth Reptile and Amphibian Society** is holding its first annual reptile fayre at **Brookfield School, Brook Lane, Locks Heath, Hants.** The fayre is open from 10.30am to 4.30pm. Further information is available from **Jon Hollingsworth, 39 Wykeham Field, Wickham, Hants. PO17 5AD. Tel. 0329 833017.**

FRIDAY NOVEMBER 6

■ **North West Cichlid Group** is having an Apistogramma slide show and discussion at the **British Legion Club, Liverpool Road, Skelmersdale, Lancs.** For more information contact: **Brian Wilson on 0695 21406 or Ken Hilton on 0565 653318.**

■ Max Gibbs' piece on Anthias has been held over to November, as has Jerzy Gawor's A to Z of Fish Health. Old Fishfinger is on an expedition and returns next month.

With a name like "Eyebiter", it's not surprising that this fish hasn't become too popular among cichlid keepers. MARY BAILEY leaps to its defence and reveals what you could be missing if you are put off by its name.

The Eyebiter's low rating in the Cichlid popularity poll isn't helped much by the fish's evil appearance. Pic: by Mike Sandford.

The Malawi

The Cichlids of both Lake Tanganyika and Lake Malawi are noted for their diversity of trophic adaptations, that is, the way that they have evolved to take advantage of the food sources available. In fact it is not unreasonable to say that there is at least one species of Cichlid adapted to feed on every edible item regularly available.

A good number of opportunistic feeders also clear up anything out of the ordinary or take advantage of any glut. This gives rise to interesting adaptations like the enlarged sensory pores on the heads of *Aulonocranus*, used to detect prey moving in the substrate; piscivores which rob brooding females of their eggs or fry; and species which follow digging Cichlids and snap up anything they miss; as well as many other unusual feeding methods. But perhaps the most remarkable example of trophic specialisation is that seen in *Dimidiochromis compressiceps*, unusual among rifts in that it has a long-standing common name: the "Malawian Eyebiter".

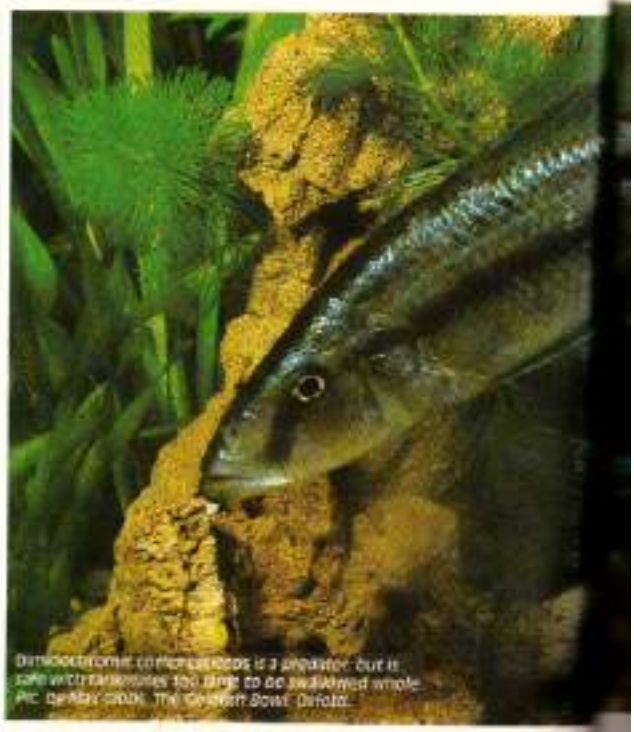
Don't be deterred

Unfortunately this common name has meant that this species is regarded by most fishkeepers as an aquatic analogue of *Tyrannosaurus rex*, which is quite unjustified. I must admit that I too was guilty of pre-judging on that basis, until put right by more adventurous friends. Duly enlightened, and ever ready to leap to the defence of the underdog/fish, I will try to show you what an interesting and innocuous fish you are missing if you are put off by the name.

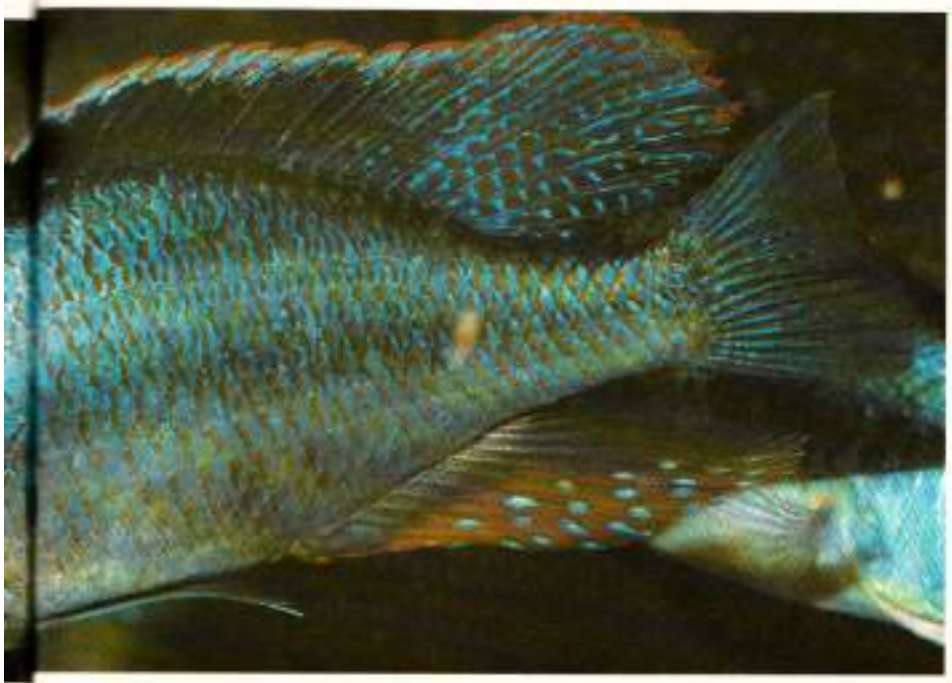
Very compressiceps

Although it can measure up to 7" or more in length in full-grown males and have a body depth of about 1½" at the deepest point (just behind the gills), it is only about ¼" to ½" thick when fully grown. We see a rather similar flattening in *Altolamprologus compressiceps* and *A. calvus* from Lake Tanganyika, but despite this their heads have a rather rounded aspect when viewed from the front. In *D. compressiceps*, however, the sides of the head remain parallel and flat; the forehead is likewise flat and joins the sides in distinct corners. The general effect always reminds me of a cardboard model of the slot and tab variety, though the finish is rather more professional in the case of the fish. I can think of no other Cichlid with this astonishing physiognomy.

As if this were not enough, the head is rather elongated, with the lower jaw protruding, so that the mouth opens upwards and the fish has a pronounced chin. All this has the effect of making it look almost as evil as its reputation suggests.



Dimidiochromis compressiceps is a predator, but is safe with tankmates too large to be swallowed whole. Pic: Gerald Cubitt, The Cichlid Room Archive.



The exception, rather than the rule

In practice, however, matters are not that simple. *D. compressiceps* is, to be sure, a predator, but its diet consists in the main of small fish, and eye-eating appears to be the exception rather than the rule. This may be a method of obtaining food when reduced breeding success in other species has led to a shortage of fish small enough for it to take. For all its predatory appearance, it does not have a huge gape, although the mouth is extensible. It uses both eyes to zero in on its prey, then lunges forward to seize it whole, sucking it into its mouth.

The eye-biting habit was first reported by Fryer & Iles (1972), who had been told of the behaviour by native fishermen. They were unable to observe it taking eyes, and failed to find any in its stomach contents. I have never heard of an

ian Eyebiter

aquarium specimen in the UK making any such attack on a tankmate, though Fryer & Iles report that German fishkeepers had confirmed that it would do so. I suspect that as long as there is plentiful food available then it will not find it necessary to indulge in antisocial eating habits. Obviously its diet should reflect its natural piscivorous tendency, but it will readily take all the usual aquarium foods, including pellets and flake.

Compatible species

Far from being a menace to its tankmates (unless they are small enough to be taken whole), this species is often patently unhappy when housed with more boisterous Cichlids. Its slim, elongated body is not the sign of a pursuit predator, but reflects its natural habit of lurking in *Vallisneria* beds, waiting for prey to come within reach. Its shape fits it perfectly for this type of existence, and it is also thought that its metallic

Despite its reputation, this fish is unhappy when kept with very boisterous species. Pic. by Mike Sandford.

reflective sides, dark above and light below, have a camouflaging effect when it ventures out over the sandy areas near the *Vallisneria*.

It is thus not a suitable inhabitant for the Mbuna tank, but is better fitted to share with other smallish Haps. Ideally it should be provided with an area of *Vallisneria* to give it some cover, otherwise it will tend to remain stationary, head slightly down, in the upper reaches of the tank, often in a dark corner. This is the "hunting pose", but I think also an attempt to maintain a low and unobtrusive profile for protection.

Aquarium care

Water conditions should be as for other Malawis - moderately hard, alkaline, and very well oxygenated water, with a temperature of 78-81°F. The water should be kept free of metabolic by-products by good filtration and regular partial water changes. In these days of poor quality tap water, remember to check, and if necessary treat, the new water before use.

Although I have seen one batch of young for sale this year breeding is rarely reported - probably because so many fishkeepers are put off keeping it at all by their fears of its effect on their other fish.

Over-enthusiastic males

When it is kept, this is all too often with rougher fish, so that males may find themselves unable to carve out the small breeding territory which is the prerequisite for breeding in Malawian mouthbrooders. In a large tank, however, with a relatively low population of species of similar temperament, it should present no problems.

Males may be a little over-enthusiastic in their courtship, so 2-3 females per male is an ideal ratio, and brooding females are best removed to a breeding tank unless there are several dense forests of *Vallisneria* for them to hide in. It must also be borne in mind that the fry are ideal prey for the parents if released in the community tank. As it is not possible to gauge how long maternal instincts will outweigh predatory ones, it is sensible not to leave the female with the fry for more than a few hours after release.

The nest is a shallow pit dug in or near a *Vallisneria* bed; the male displays to any passing female, and at breeding time becomes a striking metallic greenish blue with orange edgings to the unpaired fins, and the anal sometimes suffused with the same colour. The female, by contrast, is brownish above and silvery white below, and more striking for her form than for her colour. Subdued males resemble females in colouration, but are larger on an age for age basis.

Spawning follows the basic haplochromine pattern; the male and female take it in turns to nudge each other in the belly, with the female laying a few eggs at each pass, turning to pick them up in her mouth before laying the next small batch. It is not clear whether fertilisation takes place on the substrate, in the mouth or both in this species.

Incubation lasts for about 3 weeks; the fry are quite large enough to take first foods such as *Artemia* nauplii, Microworm, and tiny pond foods, and can soon be weaned onto prepared foods (cod roe, beef heart, crumbled flake, etc) of a similar size. It is not necessary to feed raw fish to small juveniles. They are omnivorous until, at a size of about 4 cm, they are large enough to stalk and seize prey.

The young are small silvery miniatures of their parents, already showing that remarkable "squared-off" head shape. With good feeding, and attention to water quality, they should reach breeding size in 9-12 months.

Because of their unpopularity you may have trouble finding Eye-biters, but any reputable Malawian stockist should be able to get you a pair to order. And if you are lucky enough to find any for sale, please don't write them off as "nasty" - you will be depriving yourself of a chance to study a very interesting and attractive fish. ■

■ Until recently *D. compressiceps* was included in *Haplochromis*, the catch-all genus used for many African mouthbrooders, and is still often known by its old name in the hobby. In 1989 Eccles & Trewavas erected a new genus, *Dimidiochromis* (the name means "divided in two" referring to the midlateral band) for this species and two others which are generally similar in form and colour. The two other species of *Dimidiochromis* are *D. strigatus* and *D. kiwinge*.

It is worth mentioning in passing that one species of "Happy" often sold as *kiwinge* is not that species at all, and belongs to another genus entirely.

■ There is a BCA information pamphlet on this species, price 50p (cheque/PO) + SAE from: BCA (PFK), 7 Delamere Avenue, Sale, Cheshire.

Paradise fish. Pic by Max Gibbs, The Goldfish Bowl, Oxford

Above, Golden Gouramis bottom-feeding. Pic by Noreen Tan.

Luck with Labyrinths

A pair of Gouramis or a male Siamese Fighting Fish will often complete a community tank containing fish from all over the world, but have you ever thought of a set-up purely to display an Anabantoid community? ANDREW SMITH shows us how.

The natural ranges of Anabantoids are South-East Asia (where most of the gouramis are found) and Africa.

The African Anabantoids include the Bushfish or Climbing Perches, genus *Ctenopoma*, which are not as readily available as their Asian cousins. While in some cases, they are as attractive as the Asian fish, they cannot really be recommended for the general community aquarium, as they may need special water quality and foods.

With the exception of perhaps *C. ansorgei*, which could be kept with a few calm species in a well planted tank and *C. fasciolatum*, or *C. weeksi*, (formerly *C. oxyrhinchus*) in a large aquarium of the same nature, *Ctenopoma* are best left to the species tank, or for those very large aquaria where fish combinations can be that little more daring. *Ctenopoma* are also, in some cases, predatory.

The Asian Gouramis are often found in heavily vegetated ditches or pools. Their range has been increased by streams and ditches being used to irrigate paddy fields. These areas are sometimes polluted and very poor in oxygen and thus a labyrinth fish is able to survive where a fish that relies purely upon gill respiration would perish.

Fishkeepers often try to recreate the natural habitat of the fish that they keep, however a polluted ditch tank with heaps of decaying vegetation, doesn't have the same appeal. We will choose plants as well as fish that are found in South-East Asia.

Community combinations

With the three ideas detailed here, keep in mind the guidelines with regard to stocking levels. Just because Anabantoids can breathe atmospheric air, it doesn't mean that they appreciate being squashed in together! A four foot tank can mean 48" x 15" x 12" to some or 48" x 18" x 18" to others, so whatever your choice, you can add or take away species as desired. Bear in mind that nearly all Anabantoids are territorial to a degree, so with the two larger set-ups, the tank can never be too big.

Moonlight Gouramis. Pic by Max Gibbs, The Goldfish Bowl, Oxford.

Our final set-up is for the really large tank.

Here the Kissing Gouramis can mix with the large Snakeskin Gourami, *Trichogaster pectoralis*, and a pair of Paradise Fish, complemented by bigger specimens from the above list.

Aggression

With many Anabantoids, the only aggression you are likely to witness, out of the breeding season, is a kind of hierarchy or pecking order situation.

At this point it may be worth saying that although a species may be described as peaceful, and a good community fish, there is always the possibility of a rogue fish getting into your tank and causing havoc.

Colisa and *Trichogaster* males (and females) will display with fins flared and erect, or approach each other from the side and beat water currents at each other by waggling their bodies. Some engage in Cichlid-like mouth dragging, where the mouths are locked together and both fish pull backward.

Trichopsis spp. often include the audible croaking sound coupled with rapid fanning of the pectoral fins in their disputes.

Confusing names

Imbellis translates as peaceful, but males are best not kept together. Also do not mix this species with *B. splendens* as aggression is a problem. Pugnax translates as warlike, but again this is something of a misnomer as they are relatively peaceful to each other, and to others - despite their size (4").

Pseudosphromenus will display and sometimes a short chase will ensue.

The Kissing Gourami lives up to its name and (supposedly) uses the kissing action as its show of strength, and in other rituals.

There are two species that are renowned for their aggression - the Paradise Fish, *Macropodus opercularis*, and the Siamese Fighting Fish, *Betta splendens*. Male Paradise Fish use the eye spot on the gill cover to give the impression of size and strength, and will often engage in chasing and nipping and tearing fins - even to the point of killing another Paradise fish when in spawning mood.

Above: Thick Lip Gourami
Right: Peaceful Betta
Pics by Max Gibbs, The Golden Bowl, Oxford.

In the large tank with plenty of hiding places, two males may be able to co-exist with each other, but they are best kept singly in species aquaria.

The Siamese Fighting Fish will live with other fish and rarely trouble them except when breeding. The male of this well known favourite has the drawback of being extremely aggressive towards other males of the same species.

Non-Anabantoids

Choose tankmates whose size is in relation to the Anabantoids stocked. For example, it would be folly to include a shoal of Silver Sharks in the small tank with the diminutive Sparkling Gourami.

A shoal of small Rasboras such as Harlequins, *Rasbora heteromorpha*, or Red-lines, *R. pauciperforata*, will provide a splash of colour and activity in the mid-water level, as would many of the small peaceful Characins - Neon Tetras, *Paracheirodon innesi*, Cardinal Tetras, *Cheirodon axelrodi* or members of the genera *Hemigrammus* or *Hyphessobrycon*.

For the substrate dwellers, we have the ever popular Corydoras catfish or a shoal of small loach, *Botia sidthimunki*, or *B. geto* for example.

In the larger tank, a shoal of *Rasbora borapetensis* looks particularly striking for the all Asian tank, as would a school of peaceful barbs. Some of the larger tetras will also fit the bill. Your loach selection could include the Pakistani Loach, *Botia lohachata*, Bengal Loach, *B. dario*, or the Skunk Loach, *B. horae*, as these varieties are the middle-sized members of the genus. Corydoras can still be included in this set up, in a shoal.

The biggest tank can house the larger community fish such as Clown Loach, *Botia macracantha*, or *Brochis* catfish and Congo Tetras, *Phenicogrammus interruptus*, as well as larger versions of the species previously described. **A few fish that you may be tempted to include, but are not really suitable are:**

- Chocolate Gourami, *Sphaerichthys osphromenoides*, a delicate mouthbrooding gourami that would simply waste away in a community tank. This fish requires very acidic water of an exceptional quality and live foods such as wingless fruit flies.
- The Combtail, *Belontia signata*, is an Anabantoid that sometimes makes appearances in aquatic shops. This fish is very aggressive toward other tank occupants. A pair in a very large tank with large and robust Cichlids will hold their own and could choose to take over a planted section for themselves.
- Just lately, there have been a large number of *Osphronemus goramy* juveniles appearing in aquatic outlets. Unless you are going to set up a large species tank with adequate filtration, try to resist the temptation to buy one of these attractive youngsters.
- Giant Danios are really far too active and greedy to include in a nice sedate Anabantoid community. Tiger Barbs and other fish that have a reputation for fin nipping will find the trailing finnage and long ventral fins too tempting. Check out the temperament of potential purchases to avoid disappointment. ■

■ FURTHER INFORMATION

If you are interested in Anabantoids, there is an Association dedicated specifically to them. Details on receipt of S.A.E. to: **Mr Tim Crown, Secretary, Anabantoid Association of Great Britain, 12 Pinefield Road, Barnby Dun, Doncaster, South Yorks. DN3 1QT.**

MICHAEL ROBSON told us how successful his simple set-up for Discus was – just how successful he reveals in this follow-up article.

A number of months ago I wrote an article about a simple set up for the keeping of Discus and their general care, trying to point out that anyone can keep Discus with the most modest of equipment, as long as healthy fish are purchased.

Since the initial article appeared, out of the 15 fish I purchased from Mr Hammond of Devon Discus (I bought another five fish because it went so well with the first ten) I have got two breeding pairs.

In this article I intend to outline a spawning that I witnessed, so if anyone reading this is offended by graphic sexual encounters they should place their hands over their eyes and read between their fingers.

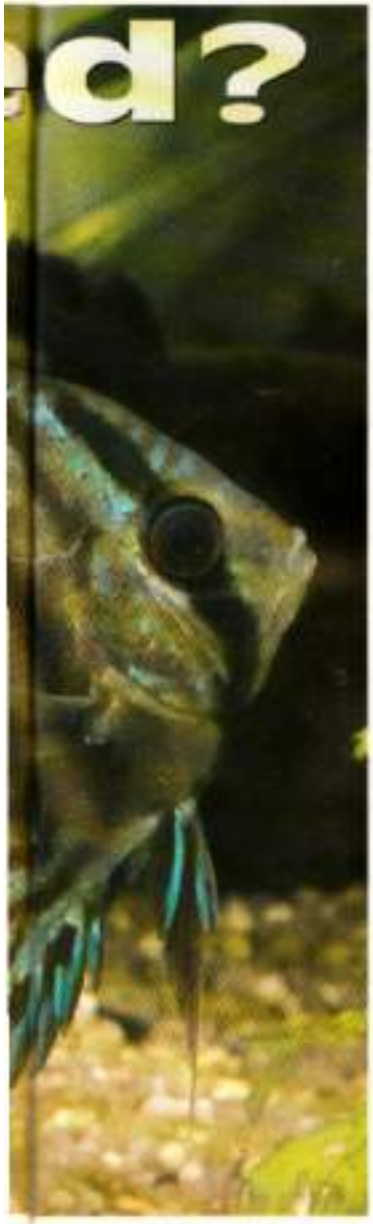
Simply bre

The key to success with Discus lies in purchasing healthy stock, according to Michael Robson. Pic: Hans Reinhard, Bruce Coleman Ltd

Feeding

Growth of all the fish had been very good but I decided that as five of the fish showed a liking for Tetra Doromin food sticks I would feed them exclusively frozen tubifex and bloodworm and the Doromin.

This proved a tremendous success with the fish because all I had to do was pick up a food stick, place it in the water and all the now large Discus would rush up and peck at both the stick and my fingers. They loved it - anyone who says that Discus are finicky and delicate feeders can't be feeding them the right stuff, or can't have completely healthy fish.



Water change

On Sunday evening I did a 25% water change, also removing detritus from the bare aquarium floor.

On Monday evening I could see that two fish had separated from the rest of the occupants. They had liked each others' company for a long while but hadn't actually separated themselves.

I had placed an inverted large terracotta flowerpot in the aquarium when the pair started sharing their time and they both now hung around this area. Late Monday night the female could be seen continually mouthing the prospective spawning site with the male hanging around in the background.

The female would occasionally go up to the male and nudge him and shimmy alongside him. On Tuesday evening it could be seen that the male was doing some mouthing and the female was doing dummy runs up the chosen site. The intensity of the shimmying had also grown.

Laying

A change of colour had come over the breeding pair with the head area of the fish going much lighter and the central part of the body and the dorsal fins going nearly jet black. As the intensity of the activity around the site increased, the breeding tubes of both fish could be seen, the female's being long and blunt, and the male's being shorter and pointed.

■ MICHAEL ROBSON's original article appeared in the June issue of PFK.

The female continued her trial runs and occasional mouthing in between, but eventually she started a run and deposited her eggs on the site upwards in rows. The male then swam over the eggs depositing his sperm. This lasted for about 90 minutes with about 150 eggs being laid.

Divider

Once this had finished both fish took up guarding and fanning of the clutch with their pectoral fins.

I should point out that once it became obvious that spawning was imminent a divider had been put in the tank, giving the breeding pair half the tank to themselves while still being able to see the fish in the other half - hopefully this would trigger the protective instincts of the parents so they would guard the clutch of eggs instead of consuming them.

Hatching

The pair continued fanning their clutch with their pectorals and after nearly three days the eggs hatched and the fry could be seen clinging to the site.

If any fry fell off they were picked up and spat back on the site; after a further three days the fry became free swimming, the parents then became very busy as the fry attempted independence, chasing them and bringing them back, but eventually the pair gave up and the fry discovered the sides of the parents, grazing of the mucus off each parent in turn (this is slime secreted by the parent bodies).

After a few days I fed the clutch newly-hatched brine shrimp.

As the fish grew they were fed proprietary foods which they took with gusto. The fry after three weeks were transferred to their own aquarium.

Profitable fry

This is the third breeding success I have had with these Discus purchases. I said in my first Discus article you have to trust the retailer when buying unseen and I can honestly say that my trust in Devon Discus was repaid with interest.

I now have enough fry to recoup a lot of my recent aquatics outlays with interest - and all using an aquarium set-up that anyone could manage. ■

After three days the eggs hatched and the fry could be seen clinging to the side of the flowerpot.

PFK PROJECTS

Rose to t

Reader BRIAN ROSE used to be a level-headed pondkeeper – but then he read *PFK*.

1 *Excavated footings to support the walls and liner. Reinforcing rods are visible. Centre rear is the armoured cable inside ½" hose, sleeved in 4" hose, 18" deep in the lawn.*

2 *Digging out the pond body.*

3 *Completed walls, rendered over chicken wire and 4" drain pipe see diagram 3.*

4 *Pond internals showing sweeping lines from rendering.*

5 *Applying Fibrenax.*

The challenge

I think the *PFK* editorial team has a lot to answer for! Some four years ago we moved to a bungalow that boasted a massive 4' x 3' x 1' pond. Being a devoted DIY enthusiast I set about making this a more pleasing feature. So far so good, but from here on things started to take a turn for the worse.

My wife bought me *PFK* month by month, continually feeding the mind with information on such things as filters, flow rates, surface area, UVCs, Nitrosomonas, Nitrobacter etc etc.

Digging begins

It became obvious that our pond was inadequate, so with great enthusiasm, if tinged with unwitting confusion and ignorance, we dug out our 12' x 6' x 3' 6" masterpiece. A submersible pump passed the water through an 8W Cyprio UV Clarifier to an external filter. Approximately 25 Goldfish, Comets, Shubunkins and Ghost Carp lived contentedly. Utopia was a reality.

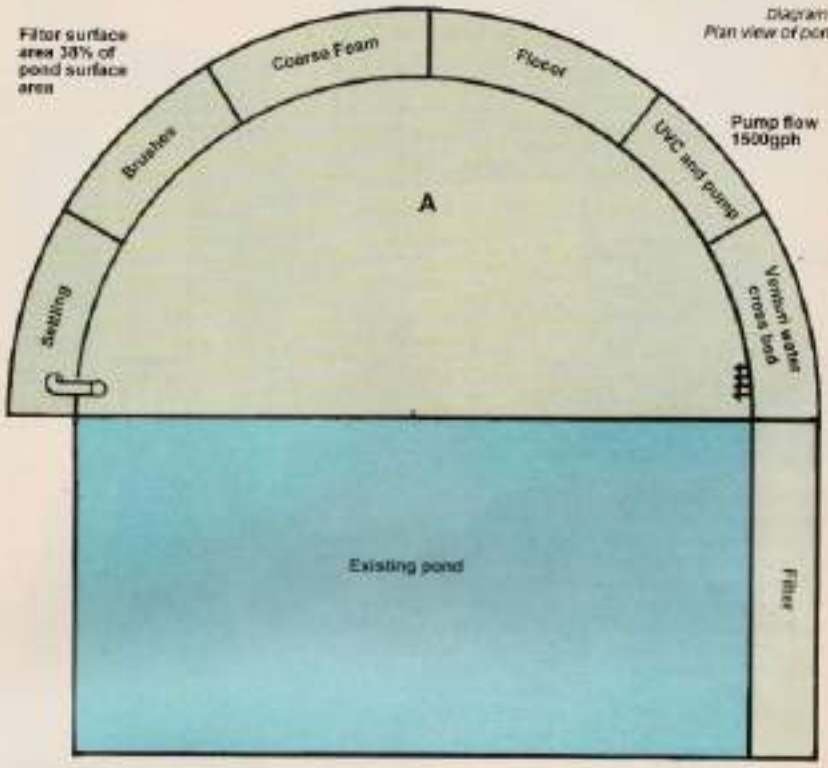
But no! We had not heeded Nick Fletcher's basis for calculating pond sizes - allow the largest area you think the garden can support and double it.

Within the next 18 issues of *PFK*, supplemented by the excellent Interpet Encyclopaedia of Koi, a video on "All you Need to Know", the Mk3 was conceived and designed.

Mark Three

Work started in August 1991 - marking out, digging, and laying the concrete foundation for the filter area, on which are built the pond walls.

Diagram 1: Plan view of pond



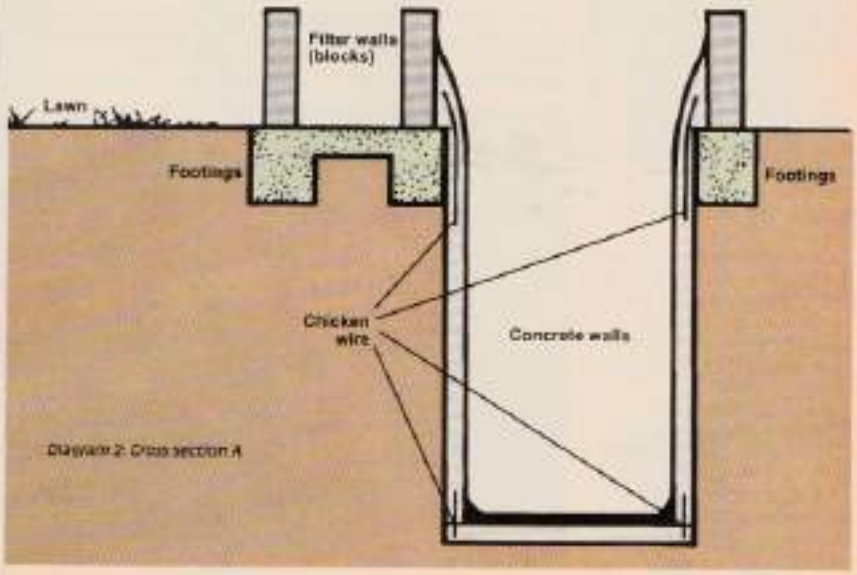


Diagram 2: Cross section A

Pond costs

Blocks, sand and cement	Hollybush supplies	£ 270
Cement, 4" pipe	Wickes	£ 57
Chicken wire	Great Mills	£ 34
Cement mixer hire	Jutsons	£ 51
Re-turfing raised lawn	Medway Supplies	£ 78
Rain fibres, G4, valves, pipes, UV	Koi Kraft	£ 308
Sand and ballast	Cobham Building	£ 52
Central heating pump, sundries	Chalk Plumbing	£ 35
Brushes and matting for filters	Koi Water Barn	£ 100
Paint	B & Q	£ 18
Timber decking, netting etc	Sparkes	£ 85
TOTAL		£1498

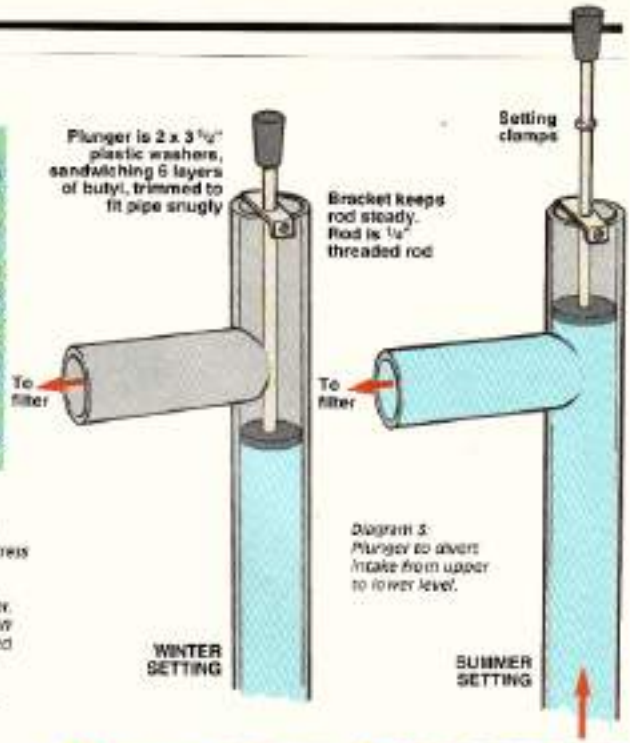


Diagram 3. Plunger to divert intake from upper to lower level.

6 Applying G4.

7 Venturi from pump at watercress chamber.

8 Pump chamber. Sized to take 15W UV, now clamped with 30W unit.

9 Feeding time.

My neighbour Charles should receive a mention here, as without his support and ideas (and pick and shovel work) the project would have taken much longer.

With the footings set, we then dug down 4' 6" through chalk and flint, and laid a 9" concrete floor.

Chicken wire was set vertically around the edge of this, so that when we poured the 6" walls, they were tied firmly to the floor.

Finally the walls were constructed, completing the pond body.

Rendering

The internal walls were rendered, smoothing any irregularities, corners etc; followed by a rendering of fibromix, and finally 3 coats of G4.

External walls above ground level had the ubiquitous chicken wire tensioned around the full surface area and rendered over. I am told this gives a substantial increase in strength.

To enable water to be drawn from the pond bottom in summer, and a higher level in winter (maintaining the thermal layer) yet at the same time minimise cost, a soil pipe and plunger arrangement was fabricated.

Fish

After nine weeks 30 Koi from 4"-18" were added. The first five weeks were for the water to mature, the rest due to circumstances beyond our control.

pH, ammonia and nitrite tests are regularly carried out, all being at very acceptable levels.

At the time of writing all inhabitants appear relaxed and content in their environment.

Incorporated into this design is the facility to upgrade the original pond to this specification. This would increase the capacity of the original to 3300 galls, giving a total of 6500 galls.

Keep up the good work, converting level-headed individuals to the all-consuming passion of Koi keeping. ■

Breeding and raising marine fish requires plenty of effort and dedication, but the rewards are great. LES HOLLIDAY looks at reproduction in the coral reefs and at some of the more successful breeding projects.

The ma

Ever since, as a young boy of eleven, I was first successful in spawning and rearing a clutch of fry from a pair of White Cloud Mountain Minnows, I have been fascinated by the whole subject of fish reproduction.

Not that breeding and rearing these hardy little freshwater minnows was a particularly difficult accomplishment, but my sense of achievement and the wonder of assisting in the miracle of creating new life fired me with a life-long passion for furthering this worthwhile aspect of our hobby. A whole breeding programme followed the minnows and by my mid-teens I had a fish house bursting at the seams. I was of course lucky to be treading a well-worn path, with lots of well documented research to fall back on, and there was little difficulty in finding experienced old hands at breeding freshwater tropicals down at the local fishkeeper's club to point me in the right direction.

It would be nice to report that I had been equally successful at breeding and rearing marine tropicals and that similar progress had been achieved in commercial marine fish breeding programmes as has occurred in the breeding and rearing of freshwater tropicals. Unfortunately considerably less is known about marine fish reproduction and the successful breeding of marine tropicals in captivity is still a relatively rare event.

I am perhaps a little overzealously understating the great deal of progress there has been since the early sixties when the first captive breeding successes occurred. The list of tropical marine species spawned and reared in home aquaria, public aquariums and commercial fish farms has expanded steadily over the years. Commercial breeders have been active over the past decade, particularly in the United States and more recently in Germany, Holland and Denmark. It is no longer unusual to be offered tank bred fish and the first commercially bred fish from British commercial fish breeding sources are now becoming available.

It is however now very plain, and a view shared by many people in the marine fish supply industry, that over the next ten years there must be a more concentrated effort toward encouraging and widening the scope for captive breeding programmes. Only by this means will the hobby and its suppliers continue to exist in the

Left: Fire Gobies illustrating courtship display.

Far right: Soldier/ Squirrel fish form aggregations and breed at night. Some fish are swimming upside down.

The Red Hind, *Epinephelus guttatus*, in common with other Groupers, begin life as females and later become males.

Above: British tank-bred Clowns *Amphiprion ocellaris*.

ting game

quality of the tank raised marine tropicals on offer. Captive bred Clownfish were very much in evidence with some very healthy looking *Amphiprion frenatus* and *A. ocellaris*. These were British bred stock and I was informed that *A. percula* and *A. melanopus* will also be available shortly from the same source. KKC import a good range of tank bred Clownfish species from further afield. These were some nice Percula Clowns from Denmark, and tank bred Clarkii Clowns of Pacific origin are brought in from the USA.

The commercial breeders in the United States have been very successful with Clownfish breeding programmes and have extended the range to around ten species including *Amphiprion frenatus*, *A. sebae*, *A. perideraion* and *Premnas biaculeatus*. Captive bred Cleaner Gobies (*Gobiosoma oceanops*) and *Hippocampus* species seahorses are also supplied from the States in commercial quantities with smaller numbers of Caribbean, *Pomacanthus* angelfish species.

Bring on the night

Encouraging fish to spawn requires a great deal of dedication to the care of the fish and maintenance of good water quality. Fish selected for breeding need to be in excellent physical condition and the right environmental conditions for spawning should prevail at all times.

Observations of fish spawning behaviour in the wild indicate that for some species there is a seasonal periodicity in reproductive behaviour and spawning can be triggered by changes in lunar cycle, length of day, water temperature and salinity.

During studies of conditioning and spawning marine fish in captivity it was also discovered that maintaining salinity levels lower than normal, at 28 parts per thousand, was beneficial in encouraging spawning and rearing of fry. This could be linked to salinity variations, natural environment due to seasonal changes or could possibly result from the conditioning effect of

face of changing attitudes towards the conservation of natural reef environments and the importation and sale of wild caught animals. And what a wonderful world this could be with the reef environments less likely to be over exploited and healthy, free from disease, captive raised fish available to the hobbyist with none of the feeding or acclimatisation to aquarium condition problems associated with wild caught subjects.

Successful breeding programmes

I visited KKC of Hull recently, a major importer of marines in the North and was amazed at the

increased oxygen saturation which lower salinity provides. Spawning often occurs just before darkness falls in the wild to give the eggs, especially if scattered and pelagically distributed, a better chance of survival. This arrangement does not correspond very effectively with the normal working day in the breeding station and many commercial breeders create artificial dusk-like conditions earlier in the day to stimulate spawning and allow eggs to be harvested during working hours.

This avoids leaving spawnings unattended for long periods with the risk of the parent fish eating them. Similar adjustments are made to the photo period to trigger the hatching of eggs of egg depositor species, such as Clownfish and damsels, which normally occure shortly after nightfall in the wild.

Food for small mouths

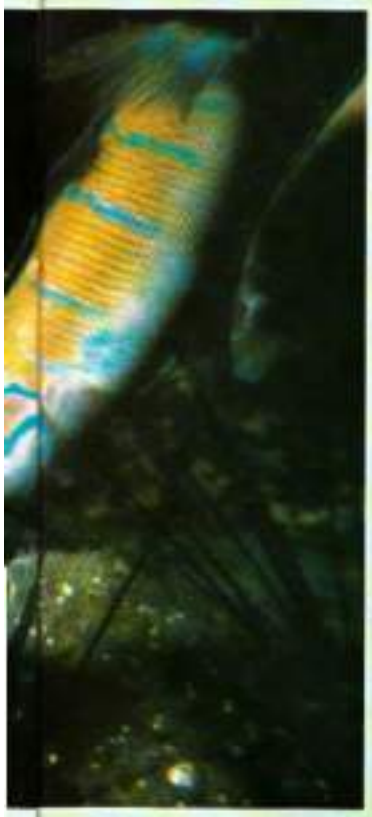
Feeding the tiny fry of tank bred marine fish has been perhaps the single most difficult problem to overcome for the breeder. Even newly hatched brine shrimp are too large to be acceptable as a first food to most marine fry and yet a constant supply of live food is essential to success.

Fortunately parallel development in the commercial hatcheries associated with edible fish species have come up with some good research in this area and live food production by various algae and rotifer culturing methods have been pioneered quite successfully. Aquarium fish breeding stations have adopted these methods and live cultures of Chlorella algae and the rotifer *Brunchionus plicatilis* are now commonly used as a first food followed by newly hatched *Artemia nauplii*. A further much greater hurdle is now presented as breeders tackle the rearing of even smaller fry as the range of breeding successes expands. The current work is concentrated on finding a food for fry which require live food only a fifth of the size of rotifers.

Spawning methods

These successes in commercial breeding are very exciting and have been hard earned. Unfortunately I cannot claim to have made any impact in this area as my involvement with captive breeding marine animals is confined to assisting at a mariculture station in the Caribbean raising Queen Conch (*Strombus gigas*). I have provided myself with a role of sorts however by linking reef fish reproduction studies to the marine park development work I conduct in various parts of the world. The more we can learn about reef fish reproductive behaviour in nature the greater the chances that conditions for encouraging spawning can be better simulated in captivity.

Marine fish have many unique reproductive behavioural patterns but also many similarities with their freshwater counterparts. They employ similar spawning methods in that there are egg scatterers, egg depositors, and mouthbrooders. Principal among the egg scatterers are Angel and



Estimate of marine fish spawned and raised in captivity

Family Group	Phylum	Spawning Mode	COMMERCIAL Spawned & Raised	PUBLIC AQUARIA Spawned	PUBLIC AQUARIA Spawned & Raised	HOBBYIST Spawned	HOBBYIST Spawned & Raised
Angelfish	*Centropyge*	ES		•			
Angelfish	*Holacanthus*	ES	•	•			
Angelfish	*Pomacanthus*	ES	•	•			
Batfish	*Chaetodipterus*	ES			•		
Butterflyfish	*Chaetodon*	ES	•	•		•	
Cardinals	*Sphaeramia*	MB		•		•	
Comet	*Calloplesiops*	ED	•	•			
Clowns	*Amphiprion*	ED	•		•		•
Clowns	*Premnas*	ED	•				
Croakers	*Equetus*	ES		•			
Damsels	*Abudefduf*	ED	•	•		•	
Damsels	*Dascyllus*	ED	•	•		•	
Firefish	*Nemateleotris*	ED				•	
Gobies	*Gobiosoma*	ED	•	•		•	
Gobies	*Gobiodon*	ED				•	
Hawkfish	*Oxycirrhites*	ED		•			
Jawfish	*Opistognathus*	MB	•	•		•	
Mandarins	*Synchiropus*	ES		•		•	
Parrotfish	*Scarus*	ES		•			
Sea Horse	*Hippocampus*	PB	•	•			•
Squirrelfish	*Holocentridae*	ES		•			
Wrasse	*Thalassoma*	ES		•			
Wrasse	*Pseudocheilinus*	ES		•		•	

KEY

ES	Egg Scatterer	MB	Mouth Brooder
ED	Egg Depositor	PB	Pouch Brooder

Butterflyfish, Wrasse, Parrotfish, Squirrel and Soldierfish and Spadefish. This group lay lighter-than-water eggs which are broadcast by currents and emerging larvae spend a short time as a part of the oceanic plankton.

The egg depositors are mainly territorial species which lay adhesive heavier-than-water eggs that are deposited in a nest site formed on a hard surface. Damselfish, including Clowns are the main members of this group which also includes Mandarin fish. Triggerfish are also egg depositors but lay their eggs in a nest in a hollow in the sand formed by the parents blowing the sand away to form the depression. A characteristic of egg depositors such as these is that the male often tends and protects the eggs, continuously keeping them free from sediment and oxygenated by fanning and maintaining a flow of water over the nest.

Mouthbrooders such as Cardinalfish and Jawfish incubate their eggs in their mouths although again only the male provides this service. Unlike many freshwater mouthbrooders, males of marine mouthbrooders do not extend parental care to protecting the emerging fry in their mouths.

There are no strictly marine livebearing aquarium species unless we consider sharks as aquarium subjects. Some freshwater Mollies can tolerate saline estuarial conditions but are not considered true marine species. Seahorses were once considered to be livebearing fish but this was a misconception brought about because the male seahorse has an abdominal brood pouch into which the female lays her eggs for incubation along the same lines as mouthbrooders.

Sex changes

The sexual behaviour of reef fish has many unique features and can be incredible at times. There are so many variations on the theme that scientists have had a field day devising long names to describe these. Take, for example, the Groupers (Serranidae). They are termed

Above left: Wrasses spawning – the male attracts females to feeding station to spawn.

Far left: Caribbean French Angels, bred in captivity.

Right: The Seahorse has been bred in aquaria and the fry raised.

Groupers, like this Coral Trout, have not been bred in captivity.

"protogynous hermaphrodites" meaning they begin maturity as females and later become males. Serranus species are also synchronously hermaphroditic, passing through a period when both ripe ova and sperm develop at the same time in the one sex organ. Spawning pairs of fish can during this period cross fertilize, each fish of the pair producing spawn fertilized by its partner. Closely related Anthias exhibit a further sexual behavioural pattern where within the huge shoals of these zooplankton feeding fish several males maintain large harems of females. If the male is removed from a group the most dominant female changes sex to take over the missing male's role.

Bring on the Supermales

Wrasses and closely related parrotfish take the female to male sex change a stage further. Many species undergo spectacular changes in colour and shape as they mature from juvenile to adult and on maturity male and female are usually quite dissimilar. Most of the males occur as a result of a male changing sex and these are known as 'supermales' being much larger and more handsome in pattern and colouration than their former female coloration.

There are also a small number of juveniles which mature into males without passing through the female phase. These 'natural' males are much smaller than supermales and maintain a similar appearance to mature females. This has advantages during spawning as the natural gains as a female to enter the territories of the supermale. Supermales jealously guard the females they attract to their breeding territories to spawn and furiously drive other supermales away. The natural males can easily be overlooked and gain access to spawn with the females. This is survival behaviour because two quite different reproductive strategies are displayed by a single species and two versions of the same species are apparently competing one with another. The main significance of this is that the inferior natural males are given the opportunity to short circuit the normal natural law of survival of the fittest by providing input into the genetic pot alongside the supermale which by natural survival laws should be entrusted with producing the next generation.

Armchair observations

My observations at first hand during underwater research dives on reefs have been supplemented by armchair observations of reproductive behaviour in my own aquariums. Presently I have a pair of Cardinalfish (*Sphaeramia nematoptera*) which have turned my reef aquarium into a breeding tank.

The pattern over the past six months has been for the pair to build up to a spawning over six weeks or so which culminates in the male incubating a mouthful of eggs for a period of around ten days. During this incubation the male refuses to feed and spends most of the time gently rolling the eggs around in its mouth. Between the eighth and tenth nights, the fry emerge during darkness and because I have no nursery quarters, unfortunately end up as a meal for the other fish and invertebrates.

I had similar success with a pair of Fire Gobies (*Nemateleotris magnifica*) in the same aquarium. The pre-spawning courtship behaviour of these tiny firefish was quite remarkable. The pair positioned themselves side by side with tails almost touching and with much flicking of dorsal fins, quivered their bodies and other fins in spectacular fashion.

A spawning site was prepared by clearing a depression in the coral sand between two large pieces of living rock. Both male and female (as with Cardinalfish) extended an ovipository tube prior to spawning and reproduction was performed during darkness. Next morning a clutch of tiny transparent elliptical shaped eggs were visible at the nest site which were left unguarded by the male. This behaviour reoccurred about six weeks later and on each occasion the eggs were left unprotected to be eaten by the other fish and invertebrates in the aquarium.

A pair of *Amphiprion ocellaris* Clowns I raised from small juveniles also attempted to breed in my 55 gallon community aquarium which additionally housed a Yellow Tang (*Zebrasoma flavescens*) a Flame Angel (*Centropyge loriculus*) and a rather boisterous Flame Hawkfish (*Neocirrhites armatus*). The Clowns spent a number of days cleaning a site below their host anemone using their tails to excavate the coral sand away from the rock below the foot of the anemone. They became very territorially aggressive and inflicted a lot of damage by attacking the Hawkfish which appeared to have more curiosity than commonsense.

The eggs were dark amber, elliptically shaped and adhesive and laid in a mass on the cleaned nest site under the protection of the anemone's tentacles. I could not raise any of the fry under these conditions and I had to be satisfied with observations of the spawning behaviour. A similar procedure occurred two or three times more and I was able to confirm a similar behavioural pattern on each occasion.

A worthwhile challenge

My experience shows that there is an opportunity for the hobbyist also to join in the worthwhile challenge to breed and raise marines. Cultures of rotifers and *algae* are now available together with grow on packs containing instructions and food. Frozen Spirulina has also been used with some success as a first food so one of the largest difficulties feeding the small fry has been resolved. Clownfish and Seahorses have already been raised successfully by hobbyists and the detailed observations and records of their findings have assisted commercial breeders.

Breeding marines requires dedication but the rewards are equal to the effort and I hope that there will be many of you willing to meet the challenge. ■

Caribbean Banded Butterflyfish

Young fis

KIT TIP

The Thermometer

How does it work?

A thermometer either goes into the tank or sticks on the outside, and gives a reading of the temperature of the water.

What extra equipment do I need?

None to check the temperature, but you'll need a heater and thermostat to control it. For coldwater fish just keep an eye on the temperature and make sure it does not get too high.

How do I use it?

With traditional thermometers a coloured liquid in a thin tube expands and contracts, moving up and down against a scale. Read the temperature where the top of the liquid comes on the scale.

This type floats in the water, or can be fixed in place with the sucker usually supplied.

Some thermometers use a needle to point at the scale.

A more modern design uses LCD panels which change colour. Each one represents a different temperature, and the one that changes colour shows the tank's temperature. This type sticks on to the outside of the tank.

Sophisticated electronic thermometers are available which use a temperature sensor in the tank, and a "black box" with a digital display of the temperature.

The scale may be in °C or °F, so get one that shows the scale you are familiar with. Some show both scales.

Good features

Even a cheap thermometer can be very accurate if it is well made.

A thermometer allows you to keep a check on your heating system's efficiency, and spot any trouble before it causes a real problem.

Are there any drawbacks?

If sunlight falls on LCD thermometers you may get a false reading. If so position the thermometer on the side of the tank instead of the front.

Underwater Safari

The Water Boatman, Notonecta glauca

In this month's safari we focus on the Water Boatman

The Water Boatman, or Backswimmer, as it is sometimes called, is one of the more well-known water insects, because it's often caught up in nets used to trap live food in ponds.

It takes its air supply into the water with it, in the form of a bubble. This causes it to drift with its belly in the air and as it swims on its back.

The Water Boatman prefers to stay at the water surface where it lies in wait for its prey, mainly consisting of insects and young fish which it detects using vibration. It then seizes the unfortunate victim with its front legs and stabs it to death before sucking out the insides. If disturbed, it can swim with great speed down through the water before drifting back up to the top again once danger has passed.

Pic. by Les Stocker.

Something ELSE

Planaria are small flatworms of the class *Turbellaria*. In the aquarium they tend to remain hidden, living among the gravel, but they may occasionally be seen on the front or sides of the glass. They have a covering of cilia which they use to move around and also to guide food towards them.

They generally occur in tanks where the fish are overfed and once established they can be difficult to get rid of. You can syphon off any which you see, but you'll have to do this an awful lot to have much effect on the problem.

If it's feasible, you could add a Gourami or two to your tank, as they will eat the worms. Cutting down on the amount of food you give your fish will certainly help keep the Planaria in check.

Although they look unsightly, Planaria are harmless to adult fish but they may attack and kill small fry, acting as parasites which can be seen hanging from the young fish. If you are breeding your fish and are worried about Planaria, you might find it better to use a separate breeding tank and clean any gravel and equipment thoroughly with a proper aquarium disinfectant before you use it. - And don't overdo the feeding!

DID YOU KNOW?

- The Indian Glassfish, *Chanda ranga*, is caught in large numbers by India and Burma for use as fertiliser.
- In the wild, during the breeding season, the Mudskipper, *Periophthalmus chrysospilos*, displays his brilliantly golden chin and throat by doing "press-ups" to attract passing females.
- One of the species of Pacific Salmon, the Chinook, may travel up to 2,250 miles up rivers in order to spawn.

- The nocturnal Flashlight fish, such as *Photoblepharon and Anamalops*, have small pouches in their cheeks containing bioluminescent algae, which glow with an intense light. They use these pouchlights to illuminate the plankton they feed on, so they can find it more easily. They also have the ability to blink these lights on and off, by drawing up a shade to cover them. It's thought they may also be used as a type of signal to other Flashlight fish and may help males and females find each other for breeding!

Quick tip

Worn algae magnets can be brought back to life by replacing the abrasive with Velcro.

shkeeper

Quick tip

Plain coloured paper from a stationer's makes a cheap but effective backdrop for your tank. Try blues, greens or black.

WIN! ONE OF THREE WHISPER AIR PUMPS

This month we're giving away three Whisper Air Pumps as prizes. For the winner there's a Whisper 400 which will pump 180 litres per hour. The second and third prize winners will receive a Whisper 300 (120 litres per hour) and a Whisper 200 (90 litres per hour) respectively.

All you have to do to enter this month's competition (providing you are aged seventeen or under) is find the ten hidden pieces of fishkeeping equipment in the wordsearch grid. We've been really generous this month and given you the first letter of each word to help you out.

The words may read forwards, backwards, vertically, horizontally or diagonally. Mark them on the grid and when you think you have found all ten, send the whole thing, with the coupon to: **Young Fishkeeper Wordsearch Competition, Bretton Court, Bretton, Peterborough PE3 8DZ.**

Entries must reach us by the closing date which is **October 14.** All the correct entries will go into a box and the first three drawn after that date will each win an air pump. You must be aged 17 or under to enter.

Photocopies of the wordsearch grid and entry coupon are acceptable if you'd rather not cut your magazine.

F	A	J	P	C	A	B	R	S	P	I	L
L	K	S	Y	P	H	O	N	T	U	B	E
U	P	M	U	O	P	H	L	A	R	C	A
O	O	P	L	P	M	U	P	R	I	A	M
R	W	L	P	S	F	C	O	U	B	B	T
E	E	P	K	H	I	A	L	Y	S	L	T
S	R	T	A	T	S	R	E	T	A	E	H
C	H	E	L	N	O	H	S	R	U	T	L
E	E	R	G	I	T	E	S	T	K	I	T
N	A	B	I	S	F	E	N	D	J	D	O
T	D	N	E	T	D	F	P	R	G	Y	K
L	R	E	T	E	M	O	M	R	E	H	T

A _ _ _ _ _ _ _

F _ _ _ _ _ _

H _ _ _ _ _ _ _ _ _

T _ _ _ _ _ _

P _ _ _ _ _ _ _ _

T _ _ _ _ _ _ _ _ _ _

C _ _ _ _ _ _ _ _

S _ _ _ _ _ _ _ _

F _ _ _ _ _ _ _ _ _ _

N _ _

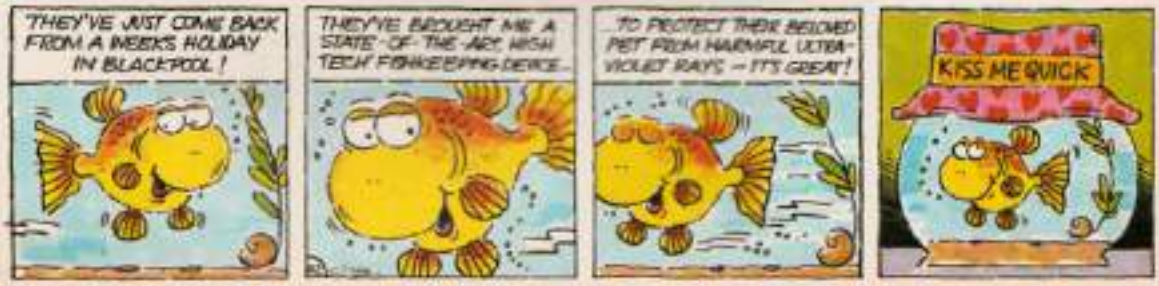
ALL WINNERS
The winners of the July competition were Helen Summers, aged 14, from Cornwall and E. A. Beech, aged 16, from Chesterfield. The winners of the August competition were Trevor Forbes, aged 15, from Dumfries, Scotland and Andrew Spurrage, also aged 15, from Bristol.

Name ..... **Age** .....

Address .....

.....

Floyd — by fran



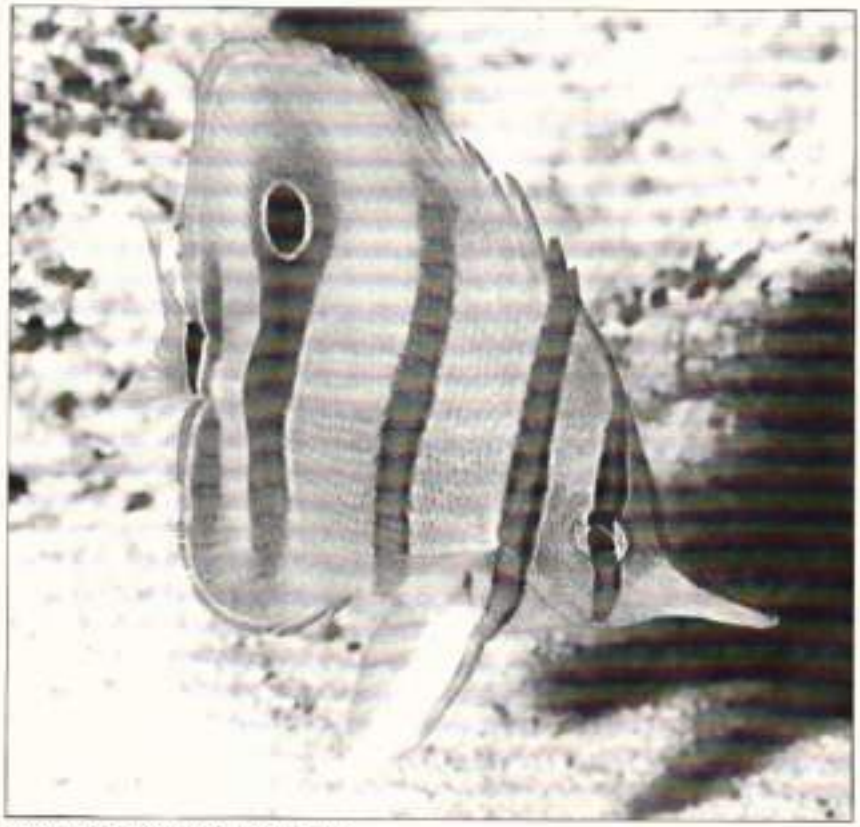
Despite using the equipment outlined last month, sooner or later you will be faced with a sick fish.

First you will notice that it is off its food. Then its tankmates start to bully and badger it, nature's way of dealing with the sick and weak. To save it from further stress it needs to be moved to another tank, unless all the fish are ill and treated in situ.

A secondary tank for isolating and treating needs to be large enough to hold all your stock. Not, perhaps, as large as your main tank, as hopefully the fish will be in it for no more than a month, for which time the more usual marine stocking levels are acceptable. However, feeding should be reduced.

In theory the water quality should be as good as your main tank, but in practice it won't be, because of the treatments you add. When using the hospital tank keep the lighting low and avoid any outside cause of further stress.

Quarantine new fish in this tank reducing the likelihood of disease appearing. When not inhabited, all treatment residues should be removed and the tank kept ready for use.



Copperband Butterflyfish, Chelmon rostratus.

MY WAY
-to the final frontier

JOHN CRIPPS would like to "boldly go" where no fishkeeper has gone before as he rounds off his two part article on keeping marine Angels and Butterflies with some advanced fishkeeping tactics.

The perfect environment

By their very nature all Butterflies and most Angels are very sensitive to the environmental conditions in your system.

■ Water quality

What looks like disease is often a water quality problem. Symptoms of poor conditions can give the impression that a fish is suffering from white spot or gill flukes. A water change with the slightest difference in temperature or s.g. may do the same.

Various metals appearing in coral sand and gravel is one factor; your tap water may not be all it's cracked up to be either. Do you deionise it, or use a reverse osmosis unit?
Avoid large water changes as these fluctuate the water chemistry to the detriment of the fish. Change no more than 5% a fortnight - with low stocking rates and denitrification, the need is not so important.

■ Air quality

Have you noticed weather forecasts lately where the air quality is described as poor? How much of that (or tobacco smoke, aerosols, carpet fresheners, perfume, cooking fumes) is pumped into your system? Protein skimmers, trickle filters, and aeration can draw in these pollutants and mix them into solution for the fish to breathe.

■ Chemical pollution

Have you used any copper-based treatments? Months afterwards copper can be released by coral and coral sand back into your system. Your test kit may not give a reading but the fish will know it is there.
Whenever you put your hands in ▶

◀ the tank make sure they are free of contaminants like soap, nicotine, oil or disinfectant. Check that activated carbon is not overdue for replacement.

■ Temperatures

Occasionally fish appear in retailers tanks that are not suited to the normal temperature range of 75-78°F. While species like the Copper Band Butterfly, *Chelmon rostratus*, appreciate 78-80°F others, like the Talma Butterfly, *Chelmonops truncatus*, prefer lower temperatures - 68°-70°F. Bear this in mind when creating communities.

■ Early warning

Keep an eye on green algae. Should conditions be deteriorating it will start to die off, warning you of the problem.

Though environmental factors can give the impression of disease, some conditions, such as Lymphocystis, cloudy eyes, body rot, fin rot, anorexia and haemorrhage, may be directly attributable to faulty conditions. Any environmental problem that is left unchecked will stress the fish and lower their resistance to disease. Then you need to treat a full-blown infection, which could lead to death.

Test your aquarium water regularly, and correct any problems immediately, but slowly.

Establishing pairs and shoals

It is a great pity that bonded pairs of fish are taken off the reef and split up. Butterflies normally swim in pairs or shoals, whereas Angels have a more solitary arrangement, the males protecting territories in which live one or two females.

Duplicating these arrangements in the aquarium can be achieved. For starters you will need a second tank butted up against your main show tank. The inhabitants of both can see one another clearly.

Buy two juvenile fish of the same species and place one in each tank. If one is smaller than the other, place it into your show tank. Eventually the larger will be moved - never introduce a smaller specimen into the home of a larger one.

The maintenance and feeding procedures should be the same for both tanks, as should the water quality. Now sit back and observe.

Any aggression the two feel towards each other can be taken out on the panes of glass. Eventually - perhaps months later - they will accept or at least ignore each other.

Destroying fish

Whether to destroy a fish is a problem all fishkeepers encounter. Once a decision has been taken, you must be sure the method used is as quick and painless as possible. For those who prefer, a vet can put it down by injection.

There are two ways of carrying out the destruction yourself:

a) by hitting it with (or against) something heavy and hard.

b) by massive shock.

The first method I will leave to the reader's imagination. The second requires a bucket of ice cold freshwater. Any Butterfly or Angel close to death will die almost at once on hitting this water.

When your regrettable task is over either put the fish, in a polythene bag, in the dustbin or bury it in your garden.

If you have any doubts regarding your ability to carry out a quick and painless death seek expert advice.

Now is the time to introduce the larger to the smaller, watching them very closely. There may be some threats, but if this is all leave them alone. If they become more aggressive, separate them again and try a month or two later.

Assuming you do get two together without any problems, and want to establish a shoal of Butterflies (no large Angels will take this) keep repeating this process until the shoal is built up. Do some research beforehand, making quite sure that the species you are trying is naturally shoaling.

With large Angels the same method of attempting to pair juveniles can be tried, but the risks are far greater. Keep a second tank going in case a fight breaks out.

If you have the patience, the rewards are something to behold. A year or two later you could have a pair of adult Angels, ten inches long, cruising up and down your tank, while a shoal of five or six brightly-coloured Butterflies darts through your coral decorations.

One or two species of Butterflies and Angels are more aggressive than most, especially members of the *Holacanthus* group (King Angel, Queen Angel, Rock Beauty etc); and White Faced, Four Eyed, and Chevroned Butterflies (*Chaetodon auriga*, *C. capistratus* and *C. trifascialis*).

Any pairing attempt needs to be treated with the utmost patience and care. At the first sign of trouble always go back to square one.

Captive breeding - the final frontier?

To "boldly go" where no fishkeeper has gone before! Some have tried and failed, others pulled it off once and never succeeded again, while those with Common Clowns and Seahorses seem unstoppable. For keepers of Butterflies and Angels captive breeding really is the final frontier.

The small amount of published information is hardly encouraging. Most experimentation, as is to be expected, has been done in the United States, and the best on offer is some reports of egg-laying and viable fry, which, for reasons not disclosed, failed to reach any appreciable size.

The size of the aquarium needs to be in excess of 150 gallons (675 litres) and, obviously, only stocked with the mate and female of the species you are trying to breed. Auxiliary tanks in which to raise the young will be a must - parent fish are not unknown to eat their offspring. Disturbance to the main tank should be non-existent, except for feeding.

One reads about things like a full moon, specific gravity and temperature changes encouraging spawning, but I have not found them to work.

The nearest I have got to a fishkeeping first was a couple of years ago. It was evening, the lighting was down to one tube, and I noticed an adult pair of Emperors nudging each other and grunting sweet nothings. To be honest I took little notice. I had seen them do this before. The next time I looked they had laid, a milky cloud dispersing round the tank. Before I could collect my thoughts the eggs had been sucked up into the external filters.

I should imagine the problems of raising fry, with their special feeding requirements, would prove to be a headache - but well worth the trouble.

Perhaps you have had better luck. If you have, the readers of *Practical Fishkeeping* would be interested to know.

Conservation and fishkeeping

The days of 'easy come, easy go' are gone from marine fishkeeping. If they hadn't there would be justification for a ban on the import and sale of many fish.

In these articles I have argued that no species of Butterfly or Angel is impossible to keep, given the right environment and food. But some governments are very good at passing the buck onto minorities. Because of mankind's greed, coral reefs are under threat. If fish numbers

Main picture: Queen Angel, Holacanthus ciliaris
Inset: King Angel, Holacanthus passer
Both pics by Max Gibbs, The Colchirn Bowl, Devon

Opposite: Four-eyed Butterfly, C. capistratus

dwindle and reefs slowly die, who might be a scapegoat? Marine fishkeepers and their hobby.

Assuming the scientists are right, a lot of the species we take for granted now won't just be unobtainable, they'll be extinct. Fishkeepers of the future may find themselves fulfilling a role that zoos currently undertake, the captive breeding of endangered species from existing stock.

Fishkeepers and businesses with a responsible and caring attitude to fish and their environment have nothing to be ashamed of, but those who will not (or cannot) learn from the mistakes of the past, but continue to abuse marines for large profits, will sooner or later place this hobby into a legal straight-jacket in which we all will be restrained.

Conclusions

From the outset, keeping Butterflies and Angels is time-consuming, expensive and difficult, but if the fishkeeper is prepared for this, the results can be highly rewarding. There will always be failures but don't be put off. If it is a fault on your part learn from the mistake - even after 25 years I still drop clangers, and I am still learning.

May your Angel and Butterfly keeping be trouble-free. ■

Marine Answers

Did my Sea Apple kill my fish?

LETTER OF THE MONTH

David Gill, of Hull, wins an Interpet test kit for his Letter of the Month.

Q I have a 46 gallon fish/invert system. A couple of days ago I noticed that the Sea Apple I have had for about six months grew very elongated. A few minutes later it spawned, producing thousands of eggs and a milky fluid.

This occurred at about 12.30 a.m. and even though the water had gone slightly milky, everything seemed all right.

At 7 a.m. all the fish were dead, but the inverts, including soft corals, starfish, shrimps and anemones were fine.

Do you think the eggs will hatch, as I have been told that Sea Apples produce both eggs and sperm?

Am right in thinking that the spawning caused a severe imbalance in the system which resulted in the deaths of the fish?

Sea Apples have the ability to evacuate their internal organs if threatened enough. Picture: Michael Edwards.

A Although not a common occurrence, Sea Apples and Sea Cucumbers are known to evacuate their internal organs when severely threatened to divert predators. Most parts of the Sea Apple are toxic and would-be predators either die or think twice next time.

In your case, however, I do not think the death of your fish is due to this scenario. It is much more likely that the eggs produced were toxic and the fish, having consumed a number, succumbed to the poison. As the invertebrates would have been unlikely to be interested in this potential source of food, it makes sense that they would remain unscathed.

It would be interesting to know if any other readers have experienced this sort of problem - or any other problems with toxicity as far as Sea Apples are concerned.

Prickly problem?

Q We are setting up a 48" x 15" x 12" tank for a Porcupine Fish, using undergravel filtration, an external power filter with carbon, and a protein skimmer.

Would this be suitable for a Porcupine Fish?

Will one 42" tube be sufficient?

What should we feed the Porcupine Fish?

What other, colourful fish could we keep with him?

• Mr and Mrs Hart, Hinchin

Porcupine Puffers will get along fine in a fish-only community set-up. Picture: Ian Took, Biofotos.

A Your tank is ideal for a fish-only set-up.

Your Porcupine Puffer will get on with any small fish that won't annoy him. This could include Dwarf Angels, Clownfish, Blennies and Gobies.

Avoid fin-nipping species, such as Damsels.

The Porcupine will eat most marine foods, including frozen mysis, squid, cockle, mussel, etc. Make sure the pieces are not too big.

How deep?

Please could you tell me the depth of tank required for keeping a flatfish?

I am also interested in the Weedy Sea Dragon, *Phyllopteryx taeniolatus* and the Leafy Sea Dragon, *Phycodorus equus*. Would these be suitable for a Sea Horse set-up with live corals?

Cathy Avery, Oxford

Flatfish will require as deep a tank as possible - 15" would suffice for smaller specimens, but as they grow 24"+ would be advisable for them to reach their full adult potential. These fish are at their most colourful when young, but change to a rather large, dull fish as they mature.

The Weedy and Leafy Sea Dragons are not available very often, but if you are lucky enough to obtain a specimen, treat them in the same way as you would Sea Horses, with plenty of macro-algae to hide among and lots of live food.

Small guest is harmless

I recently purchased a piece of living rock and noticed that there is a small crab living inside. It is only about 5mm long, and is grey with white bands on its legs. At the moment it only eats algae and causes no bother. Will this continue, or will it grow large and create a nuisance?

Also on the rock is another addition which I cannot identify in any of my books. It is small, white and has very long tentacles which protrude from one end. There are some eight or ten of these. They are all transparent and seem to be feeding off the substrate.

• M. Phythian, Coventry.

There are literally hundreds of species of crabs and it would be impossible to identify this one for certain without making thorough investigations. However, it does sound as if your specimen is a small variety which should cause no harm whatsoever.

The animal with the long sticky legs is a Comb Jellyfish. It captures food particles on its legs and then draws them into its hidden body. It can be fed on tiny pieces of frozen brine shrimp.

On the small side

Q **I have a 30" x 12" x 15" high 20-gallon tank, which I would like to set up as a mainly invertebrate tank.**

Can you tell me whether the proposed collection of invertebrates and fish would be suitable for my set-up? One Boxing Shrimp, one Common Prawn, one Clown Shrimp, one small crab, two Tubeworms, two Clown Anemone Fish.

Are there any anemones that are fairly easy to keep that would be suitable with my collection of invertebrates as I would like an anemone for the Clowafish.

• Andrew Hale, West Midlands

A A 30" tank is a bit on the small side for keeping marines. The lack of volume of water (only 15 gallons nett) makes it very unstable.

However, you could keep the shrimps mentioned and a few Tubeworms. Forget the Clowafish and go for Damsels instead. Anemones will not do well in this size of tank either.

Anemones and corals will not cope with the fluctuating temperatures of a small tank.

High nitrate

Q **Despite 20% water changes every 14 days, my nitrate level is between 25 and 50 mg/l. I have tried a Nitrex box, and activated carbon, to no avail. How can I reduce the nitrate?**

I treat my tap water with a Nitragno filter, I do not overfeed, and my fish look well and active.

• E.G. Evans, Peterborough

A Your nitrate levels are not excessively high for a fish-only tank, and many people have a similar problem with no adverse effects on the fish. Of course, it would be preferable to reduce the level, so why not try a Sera Denitrator? This tends to be more efficient, especially in larger tanks. I would also continue the carbon filtration.

TIP OF THE MONTH

The following tip, from Peter Morris, Curator of Marine Algae, at Kew Gardens, may come as a blessed relief to those suffering from problems with flatworms.

Most of our tanks at Kew Gardens suffered from a plague of brown flatworms and we just used to syphon them off. By coincidence we had to treat a fish in one of the tanks with Myxazin. The course was over ten days, but after a week we noticed that the flatworms had completely vanished. All the other affected tanks were treated with this bactericide and with the same result - all the flatworms disappeared and we are now free of them. Whether this works for all makes of bactericide is hard to say, because we only tried Myxazin.

It would be interesting to know how other readers get on if they decide to try this. Myxazin, in the recommended doses, is totally safe for use with both fish and invertebrates. **ND**

Large Hermit Crabs can be destructive with coral inverts, so choose carefully.

Adding cannister filters

Q **I have an 8' x 2' x 3' tank set-up, which is split into two tanks, each with undergravels powered by two Aquaclear 802s and a trickle filter. I intend running both as mixed fish and invert tanks. Would adding two external power filters be beneficial, and if so what medium?**

What type of protein skimmer should I use: one external or two internals? If internals then what air pump would be powerful enough but quiet? There are also two Hermit Crabs in each of the tanks – are they safe with other inverts?

• Terry Richardson, Essex.

A Adding a canister filter to each tank would be beneficial. Pack them with filter floss and a good quality marine-grade activated carbon. I would also be inclined to fit an external Sander protein skimmer to each set-up if finances allow. If not, two internal models would probably suit.

Smaller Hermit Crabs are usually fine with coral invertebrates but the large specimens of two inches or more may be quite destructive. Feed them well to avoid destruction through hunger.

A double dose of Dakin In-Depth will be in the November issue

NICK DAKIN is your expert on the saltwater scene

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

We regret that queries sent without a stamped, addressed envelope will not receive a reply.

■ **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

Coldwater Answers

Is my goldfish egg-bound?

Q **I have a three year old goldfish in a 30 x 12 x 12" tank with two small Shubunkins. About two weeks ago I noticed the goldfish (which is 3" long) start to thicken up. I wondered if it was "pregnant" as I certainly don't overfeed the fish. However, after a week the fish was looking more swollen and obviously was unwell – hanging in the corner of the tank all day – but still showing signs of hunger at feeding time. Its faeces were thin and cotton-like and I did wonder if the fish might be constipated, so I refrained from feeding for a few days and in this time it has improved. It is still looking swollen – slightly more on one side than the other. Could the fish be egg-bound?**
• Pat Lynden, Herts.

Female goldfish which haven't spawned can reabsorb any eggs which they may be carrying during periods without food or when under stress. Pic: Trevor McDonald.

A It is possible for fish to develop what is known as abdominal dropsy, where only the abdominal cavity fills with fluid but the scales are not raised as the muscle tissue is unaffected. This type of dropsy can be caused by some organ malfunction or by an infectious agent. In the case of the latter there are usually other symptoms such as inflammation around the vent and a general reddening of the body. You state that the swelling appears to be slightly more one-sided and it is possible that the fish is suffering from an internal tumour that is pressing on the gut and leading to other health related problems.

It is very uncommon for female fish to become egg-bound in the absence of males. Once the eggs begin to mature, they will be shed regardless of whether there is a male present. It is also unlikely for the eggs to "go bad" as this implies some bacterial contamination and this will not occur unless the fish has some general systemic bacterial infection. It is not unusual for female fish that have not spawned to reabsorb the eggs during periods of stress or prolonged starvation. **BB**

It's not uncommon for new ponds to suffer from "green water". Occasionally the problem resolves itself as the pond matures.

Cure for algae blooms

Q **I am writing in the hope of some help. I have recently created a three tier pond with waterfalls and a pump plus a large filter, I have oxygenating plants, mussels and fish in the pond, but over the last two weeks the water has turned green and cloudy. I have tried various treatments, but they have had no effect. Please could you give me some advice?**
• J. Harper, Cheshire

A It is quite common for new ponds to suffer from microscopic algal blooms, leading to a condition known as "green water". Most of the chemical treatments for this problem exploit the use of dyes which occlude the essential light required for these microscopic plants to grow. Sometimes as a pond system matures the algae die back, leaving the pond clear – and this will certainly happen in the winter months as these algae are affected by the cold.

Shallow ponds, that is of three feet depth or less are often affected from spring onwards, as they warm extremely quickly, which encourages the algae to bloom.

The alternative to suffering algae blooms is to fit an ultra-violet light system onto the pond. You will need some form of weatherproof housing for the electrics and to plumb in the unit. The manufacturers of these units recommend the bulb is changed every six months. **BB**

■ From gold to silver

I am rather concerned about my goldfish which I have had for three years. He has changed his colour over the last month from gold to silver. I have been giving him colour enhancing food, but surely this would not have brought about such a dramatic change?
T. Chattell, Cambs.

It is very common for goldfish to lose their colour as they get older and your goldfish's problem arises from a natural aging process and not through any disease. It is unlikely the fish food would have had anything to do with it. Just look on your goldfish as being more distinguished. **BB**

■ Doing porridge

My fish go crazy over porridge. Will it be harmful to continue feeding them this food?
Howard Bromley, Exeter.

Porridge is high in fibre, and will meet many of the fish's dietary requirements. They will supplement their diet with flies and grubs during the summer months. **BB**

■ Fish trapping

Our 1500 gallon pond was originally just for Koi, with a few Goldfish and Tench, but it has become well-planted. The Tench and Goldfish have bred, and are becoming overcrowded. The problem is catching some of the smaller Goldfish, - without disturbing the pond. Have you come across any kind of fish trap?
Mick and Neil Barrett, Essex

A minnow trap can be made from a weetle jar, with a funnel inserted into the neck, and held in place by the screw-top lid.

The lid is cut away in the centre, and the nozzle end of the funnel is trimmed to allow quite big fish to enter. Drop some bread or other bait into the jar, and possibly some stones to weigh it down. Tie string round the neck and lower it into the pond.

The little fish swim in, but cannot find their way out again. You can only use it once a day, as the fish get wise! **BB**

Filtration by zeolite

Q **Would it not be possible to remove the ammonia from my Koi pond simply by means of zeolite, which would therefore make a biological filter redundant? The ammonia would not, therefore, be converted to nitrite and on to nitrate - which might also cut down my blanketweed problem. The ammonia could be kept in separate containers and the flow switched between these while the zeolite was being recharged. If this is feasible, is it possible to give an indication of how much would be required to remove the ammonia from thirty five fish measuring between 12-15" in length?**
•A. Hanland, Rugby

A I have to confess to not being a great lover of zeolite as it never seems to be particularly effective in removing ammonia. As someone who advocates the use of cooking salt to reduce the toxicity of ammonia, zeolite in a filtration system is usually an added complication. The problem of trying to utilise zeolite as the sole filtration medium is that the ammonia is only adsorbed onto the mineral and will therefore reach saturation, at which point ammonia will occur in the pondwater and ultimately all the zeolite will be colonised by bacteria and biological filtration will take place. In the light of the system you are advocating you will need to monitor the water quality very closely to make sure no ammonia accumulates. All in all, I would imagine it to be more hard work than removing the blanket weed!

Recharging zeolite is a bit like recharging batteries and each time the mineral rock becomes slightly less effective. I certainly know of at least one pond system on which zeolite was used as the sole filtration system and it was not particularly effective in removing the ammonia. The system now functions purely biologically.

Not least of all with zeolite is the phenomenal cost of the substance as a filtration medium. **BB**

Chlorine-free water

Q **I recently had a small goldfish pond installed. The water was taken straight from the tap and not left to stand; the fish were dumped in regardless. Will they be all right? Also, I have to go into hospital for a week or two shortly. Do you have any advice on how I should feed my pondfish while I am away?**
•M. Perrin, Sussex

A There are a number of products on the market, such as "Tap-Safe", produced by Tetra, which will neutralise the harmful effects of chlorine which is present in drinking water. On the whole, goldfish are very tough little animals and they seem able to survive in conditions which no other species of fish could live in - and in view of the fact that your fish are feeding and seem healthy, I think you have no problems with them.

On the whole, pondfish can usually survive periods without food as they will feed on flies and insect larvae which are in abundance through the summer. **BB**

Spot of bother

Q **I have a goldfish which recently developed a white growth, protruding from under a scale. It was suggested that it might be a tumour but a few days later it fell off, leaving a bare patch. About a week afterwards I noticed the fish looked swollen with about half a dozen scales protruding and what appeared to be the start of another growth - but this one seemed to noticeably ooze from the scale, eventually breaking off. The fish then lost its balance and began to gasp for air, making distinct rowing actions. What would have caused this and how can I prevent it happening again?**
•L. Cross, Leicester

A Sometimes fish do get local infections beneath the scale which could be described as similar to a human spot, although it is quite difficult to determine what the cause of these spots were without actually seeing the fish. Possibly the problem of the fish losing its balance may have been unrelated to the appearance of the pimples, but the swimbladder had become infected or damaged, leading to the distinct rowing action you describe and an inability to hold a particular station in the water. This problem is quite common among fancy goldfish. **BB**

If you are unsure whether your filtration is adequate for your fish, regular monitoring of ammonia and nitrite will keep you well informed of its effectiveness.

Stocking levels

Q **My 3' tank uses a Whisper 550 on twin uplifts. I have two 3" Green Tench, and five London Shubunkins. I would like to add a Gold Tench. Will this be enough, or could I keep any more fish?**
•Paul Hill, Manchester

A For a 3' tank you are reaching an optimum stocking density, bearing in mind that the fish you already have are going to grow.

If you stock with more fish they may be stressed through overcrowding, and their health may deteriorate.

It is a good habit to monitor the water quality for ammonia and nitrite. This way you can be sure the filtration is adequate for the number and size of the fish. **BB**

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.

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

COLDWATER ANSWERS

General queries; Dr David Ford

Koi or pond queries; Nick Fletcher or Bernice Brewster

Getting tanked up

We take a look at the market for tanks, hoods and cabinets.

Above: Tropiquarium
Left: One of the Aquariums, Cabinets and Hoods range.

It goes without saying that tanks are the one **essential** piece of fishkeeping equipment. Glass aquaria are by far the most common form of tank, with acrylic as an increasingly common but still minor material.

Clear plastic is adequate for small goldfish or fry-rearing tanks but scratches easily and lacks strength.

Other materials such as wood, fibreglass and even concrete remain the concern of the giant public aquaria or the do-it-yourself tank builder.

A simple small all-glass tank joined with the correct amount of silicone and built with the correct thickness of glass should need no extra braces of glass or plastic. Larger tanks usually are braced, and increasingly a plastic frame is used to do this job.

Even the smaller modern tanks tend to utilise either a plastic frame or a decorative trim for styling purposes - and the addition of this plastic frame can strengthen the overall tank and/or make polystyrene tile supports redundant under the tank. But always use polystyrene cushioning unless the tank is labelled otherwise.

It's fair to say that 6 to 10mm glass is the minimum thickness to look for on smaller tanks, rising to 20mm on the larger, and thicker still on big tanks for tankbusters and the like.

Hoods

Hoods are an odd area of the hobby, as only in a few cases do they seem to be designed to do the job that the modern hobby requires. What the modern hobbiest wants on all but the smallest tanks is a support for more than one starter unit **and** an air pump, space (and fittings) for two or even three light tubes (for planted and marine tanks), easy access for feeding (even when a condensation tray is used) and more to the point a built-in condensation tray to protect the electrics. What he more often gets - and not cheaply either - is a flimsy plastic and/or aluminium lid, frequently without even a feeding door and often with design features that make it impossible to accomodate more than one tube, feed wires from the back or fit an external filter. (The Hagen Marina canopy featured fulfills many of these requirements but will only accept single tubes).

Of course the special tanks and cabinets featured do not in general suffer from these problems - but why should the man with the three foot tank on his sideboard be hobbled in this fashion?

Stands and cabinets

Even the manufacturers of tubular steel stands would not claim that they are things of beauty. But neat, tidy, and functional they certainly are and available in a huge range of sizes. Remember that few pieces of MFI's finest are designed to accept the weight of a fish tank - tank stands are.

The modern cabinet however, even in its simplest form, is usually good-looking and functional. Better still, many cabinets now make attractive pieces of furniture fit to please the most house-proud home maker, with styles to match most types of furniture and decor.

In most cases the hoods and cabinets are designed to accept whatever form of lighting and filtration (except, perhaps over tank trickle filters) that the fishkeeper may require.

THE RANGE

Contacting all the major manufacturers produced a wide and varied range of tanks and allied equipment. The major features and prices are listed on our table (though you will often find the products at much lower prices) and include a range of tanks for everything from small community fish to tankbusters.

A distinction must be made between those that supply simple unadorned tanks and the manufacturers of systemised tanks with in-built filtration etc., not all of whom are represented here.

Hockney

Hockney produce a series of systemised units, the Clearview Aquaria, with a black finish and black cabinets, featuring a black integrated filter units. These run on two systems - reverse flow and reverse flow bypass. Water is pre-filtered and surface skimmed and a number of other features can be built in including nitrate filter, carbon filter and protein skimmer - the prices shown do not include electrics or pumps.

The cabinets are basic hollow units - all that is necessary when the main filtration is contained within the tank itself.

• Hockney Engineers Ltd., Unit 7, Mabgate Mill, Mabgate, Leeds LS9 7DZ
Tel: (0532 455061

Gem Horizon tanks

Aquariums, Cabinets & Hoods

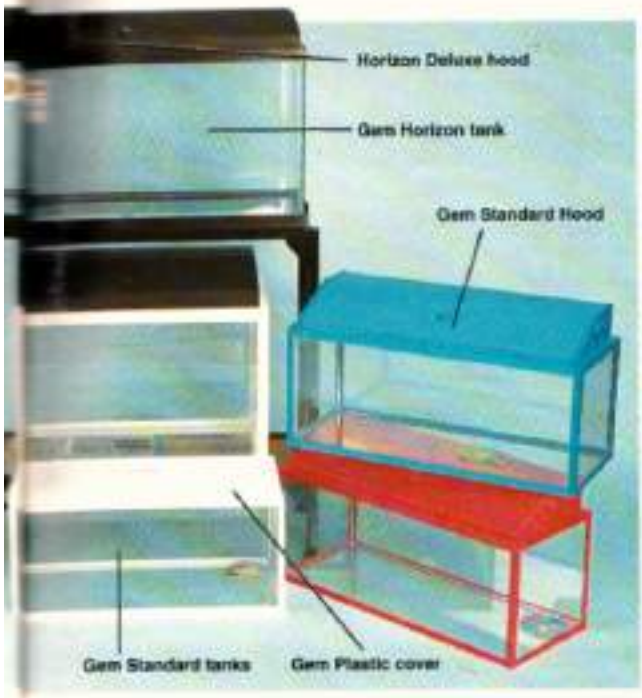
This company supply tanks, and cabinets and hoods to match in six real wood veneers or textured melamine. They can supply hoods on their own, economy units which frame top and bottom of the tank, and fully-fledged cabinet units, in plain or "Georgian" style. A complete

Left: Hockney rectangular and corner tanks.

Above: John Allan tanks.

Top right: Hagen Marina hood.

Far right: Aquariums, Cabinets and Hoods' Economy model; right, Georgian unit.



cabinet set-up includes sliding cover glass and polystyrene.

As each cabinet is individually made, small adjustments in style or size will usually be catered for free of charge.

The wood veneer tanks are protected by three coats of sealant.

•Aquaria, Cabinets and Hoods, 47 Maxwell Gardens, Orpington, Kent BR6 9QR Tel: 0689 32792

Aquareef Aquarium Systems

Aquareef systems are available in a very wide range of sizes and in eight finishes - six "woods", black, and white. Fitted behind a panel at one end of the tank is an integrated filtration system which includes pumps, protein skimmer, heater, and nitrate filter. The hood incorporates reflectors, tubes and starters.

•Aquareef Aquarium Systems, Matlock Waterlife Centre, Nottingham Road, Tansley, Matlock, Derbyshire DE4 5FR Tel: 0629 580500

John Allan

This Suffolk-based company have been building tanks for thirty years and their present range mainly consists of a huge choice of plastic framed and/or beaded glass tanks. Recent innovation has seen the addition of red and blue frames and hoods to their tanks, the majority of which require no polystyrene base.

They supply the tubular steel Horizon stands which are suitable for almost any commercially built rectangular tank up to 8' long. The Gem Panarision hoods are one of the better designs on the market offering very good access to the tanks and moveable lighting. They produce a number of different styles of cabinets to match their tanks and two specials - a corner type unit, the Delta - and the six-sided Panorama.

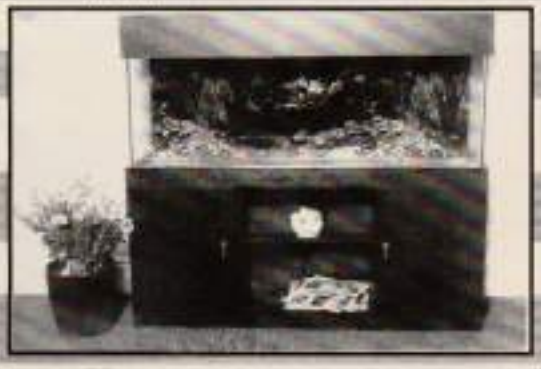
•John Allan Aquariums Ltd., Eastern Way Industrial Estate, Bury St Edmunds, Suffolk IP32 7AB Tel: 0284 755051

Hagen

Hagen supply a "systemised" plastic tank - the Tropiquarium which includes a compartment for a Fluval filter and Thermal heater. They also supply fishkeeping kits (based on undergravel filtration) in the glass Marina tanks which have plastic frames and do not require a polystyrene base. Their Marina canopies are one of the better designs on the market with their fully enclosed and integrated light units, and knock out rear access slots, but will accept only one tube and go up to four foot only. Time tested equipment.

•Rolf C. Hagen (UK) Ltd., California Drive, Whitwood Industrial Estate, Castleford WF10 5QH. Tel: 0977 556622

TANKS, CABINETS,

Manufacturers /Supplier	Tanks	Cabinets	Hoods	Sizes in inches
AQUAREEF	14 sizes from 12lt to 60lt (and special sizes to order)	In oak (3), rosewood, teak, mahogany, white and black	To match	31½ x 15¾ x 15¾ to 78¾ x 23¾ x 19¾
AQUARIUMS, CABINETS AND HOODS (TOPLINE)	65 models (and special sizes to order)	In wood veneer (economy, standard and Georgian) or melamine (standard or Georgian) Mahogany, teak, walnut, pine, oak and black ash	To match	36 x 20 x 12 to 84 x 24 x 24 (wood veneer) or 72 x 24 x 24 (melamine)
HAGEN	Thalquarium-33		Integral	52cm x 26cm x 36cm
	Complete Aquarist (4 models)		Marina canopy	20 x 10 x 12 to 48 x 12 x 15
	Marina aquaria (4 models)		Marina canopy	24 x 12 x 15 to 48 x 12 x 15
	N/A		Marina canopies (6 models)	16 x 8 to 48 x 12
JOHN ALLAN	Gem Standard 11lt to 34lt (6 models)		N/A	12 x 8 x 8 to
	Gem Heavy Duty 53lt to 110lt (8 models)		N/A	24 x 12 x 12 to 39 x 12 x 15
	Gem Horizon 18lt to 261lt (20 models)		N/A	16 x 8 x 9 to 48 x 15 x 24
	Gem Panavision 200ltr		To match	30 x 12 x 18 to 72 x 16½ x 21
	Jewel Aquaria(8 models)		N/A	36 x 12 x 24 to 72 x 18 x 24
	The Delta 180 (five sided)	Oak, walnut or black total height 47"	Integral	Overall size 39 x 20 x 21 (Plan views 27, 27, (backs) 8, 27, 8 (front) 25 front to back
	The Panorama 100 or 200 litres (six sided)	As above	Integral	Overall size 39 x 16½ x 21
			Gem plastic cover(4 sizes) in white, red, blue	16 x 8 to 24 x 10
			Gem standa..J (6 size)Hood in white, red, or blue aluminium	12 x 8 to 24 x 12
			Gem Deluxe Hoods (4 models) Black or white embossed vinyl over aluminium	24 x 12 to 39 x 12
			Horizon Deluxe hoods (7 models) Black, red and blue for deluxe tanks	24 x 12 to 48 x 15
			Horizon Super hoods (4 models) Sealed black plastic housing	24 x 12 to 48 x 12 (15w to 40w)
			Multikit hoods (14 models) in walnut, black or oak	24 x 12 to 72 x 24
	N/A	Horizon tubular steel stands (26 models)	N/A	All 30" high - 24 x 12 to 96 x 24
		Regal Aquarium cabinets	N/A	All 23" high - 24 x 12 to 72 x 15 (other widths to order)
		Rustic Cabinets	N/A	All 24" high - 96 x 15 to 72 x 15 (other widths to order)
HOCKNEY	Clearview Aquaria (rectangular -66 models)	Available	Integral	From 28 x 22 x 12 to 72 x 26 x24
	Clearview Aquaria (cubic - 14 models)	As above	Integral	22 x 22 x 22 to 30 x 30 x 30
	Clearview Aquaria (corner - 6 models)	As above	Integral	22 x 18 x 22 to 27 x 26 x 27

Pictures clockwise from top left: Small standard unit from A. C. & H., larger tank from same company; John Allen Panavision set up; A. C. & H. corner unit; A. C. & H. melamine unit.

STANDS & HOODS

Tank features	Hood features	Stand features	R.R.Prices
Complete filtration and heating (see copy)	Match cabinet (see copy)	Cabinet with sliding doors	From £399.95 plus £100 for cabinet to £1395 plus £350
6mm or 10mm glass according to size	Integral	Queen Anne legs and leaded lights optional extras	From £158.63 to £1,022.25
Integral filtration and heater	Integral lighting		£126.89
Comes with a complete set of equipment	Integral lighting		£116.95 to £248.79
Standard Marina tank	Integral lighting		£59.99 to £119.99
	Integral lighting		£28.99 to £71.99
Full frame in white plastic	N/A		£9.07 to £14.06 or less
As above	N/A		£23.40 to £38.14 or less
Top and bottom frame in black, red, or blue	N/A		£12.91 to £166.20 or less
Bottom frame: walnut, oak or black finish	Waterproof lamp unit		£107.33 to £322 or less
10mm glass full framed or panoramas finished in gold	N/A		£176.25 to £317.25 or less
Five sides	Holds 2 x 20 watt tubes	Two doors at front	£502.31 or less
Six sides or 51 x 16½ x 21	As above	As above	£478.56 and £521.70 or less
N/A	Simple hood with hole for feeding, lifting off		£2.29 to £3.31 or less
N/A	Suitable for bull bulbs 15 to 40watts; no moveable lid		£5.59 to £9.41 or less
	Tube clips fitted; opening lid and starter unit shelf; white vinyl interior		£19.56 to £27.49
	As above		£15.58 to £43.17 or less
	Takes one tube only		£34.89 to £50.05 or less
	Front and back lids hinged for raising and removal; sliding waterproof light fitting		£59.92 to £236.17 or less
	N/A	Black finish (other colours to order) tubular steel, adjustable feet, shelf available; larger sizes have six legs, smaller sizes (to 48 x 15) self assembly	£32.18 to £158.82 or less
	N/A	Teak with shelf and one or two doors according to size	£90.02 to £167.45 or less
	N/A	Walnut or oak two, three, or four doors according to size	£199.86 to £367.75
Available as room divider or standard units: without filter; with reverse flow filter; with reverse flow bypass filter and with filter in various positions	Integral with sliding lid	Black finish hollow units	No filter - £188.20 to £1533.30; reverse flow £311.60 to £1793.70; r.f. bypass £463.60 to £1978.30. Stands £114.20 to £253.20
Filter systems as above	As above	As above	£180.30 to £968.40; reverse flow £279.60 to £1143.30; reverse flow cont ac £465.90 and £1234.90; r.f. bypass £517.40 to £1305.90. Stands £133.10 to £197.60
Filter systems as above	As above	As above	£188.70 to £40.40; reverse flow £316.60 to £757.20; r.f. bypass £364 to £837.60. Stands £137.20 to £166.50

Everything you wanted to know about...

KOI

Koi keeping has advanced in leaps and bounds over the past decade, both in terms of the quality and variety of fish available to the hobbyist and in the plethora of technical wizardry coming to our assistance and making our pleasure less labour-intensive.

Ten years have seen the advent of pool ozonisers and the more universally accepted ultra-violet sterilisers - the latter having survived initial fears that they would make our fish less disease-resistant to become, primarily, a sure-fire remedy for green water.

Filter matting, foam and brushes; reinforced fibre for tougher concrete render mixes; mains water purifiers; digital thermometers and pH meters; not to mention new Koi varieties and a huge explosion in dealers, to give us more choice of where to go for our fish and Koi-related equipment.

That's the bright side of the coin. But it hasn't all been rosy. Ten years have seen a steady decline in the quality of water from our taps, so that we now cannot guarantee it will be safe to keep fish in without further treatment by ourselves. From being viewed as a cheap, almost free and limitless commodity, water has become a precious resource for which we are paying accordingly. This is especially apparent to those of us with metered water, or who now endure almost ritual annual hosepipe bans.

Of the world's water content of 1,380 million cubic kilometres, only about 2.4 per cent is freshwater (thanks to Heiko Bleher's 'Aqua Geographica' for that chilling statistic). By the year 2000, demand will appreciably outstrip naturally replenished supply. What price, then, water for non-essential use, especially since Koi-keeping has always endured the unjustified tag of being a rich man's, an elitist, hobby? Will public opinion view us in the same vein as those who water golf courses in the Arizona deserts?

With this in mind, NICK FLETCHER concludes our series on Koi-keeping with a futuristic look at how the hobby might develop into the middle of the next century and beyond.

Cloned Koi? Viral filters? Feeding by osmosis? Mortgaged water? We hope it's all far-fetched, but can we be sure.....

Koi shows were banned in 1994 when the government outlawed the use of mains water for recreational purposes.

Welcome to my humble home. I trust that time travel has not left you suffering too much from century lag.

My last visitor from another era was a chap who won all the major prizes at, let's see, the 1994 BKKS National. He was one of the first to be successfully revived from the cryogenic experiment, but after 50 years of being frozen stiff, I think the culture-shock of life in the Year 2666 was too much for him. He suffered a melt-down.

You are familiar with the BKKS National, of course. It was held at a place called Billing Aquadrome in the Northants sector, and 1994 was the last show of its kind, before the Government outlawed all use of mains water for recreational purposes.

The decision was recognised as a vote-loser and reversed, of course, a bit like the infamous Poll Tax and membership of the then European Community. But by this time, most enlightened Koi keepers had come to see that carting their fish around to be gawped at was really not in the spirit of the hobby; besides, Billing relied on caravans for its income, and those vehicles were proscribed in 1996.

Never mind, now we have such good transporter-link communication, every Koi-keeper on the Register of Employable Persons can visit one another at will, and in an instant. You look pale and perplexed - sit down. May I offer you a drink, before we go and see the fish? This is a very good vintage: 1994 Evian Water.

Here they are: my Koi pools. You didn't expect them to be out of doors, did you? No, this building - I think you called them 'Eco-Domes' in the 20th Century - is the only structure under which water may be given over to non-essential use.

The principle is simple. My 150,000 litres were saved for under a credit scheme. I believe you used to buy property that way. Those were hard times, but they got me started with my first pool. ▶

I can remember the day the water arrived in a hydro-tanker under armed escort, and the unpleasant scenes when the driver lost 100 litres or so transferring it to the dome through the airlock. He was immediately sentenced to six months community breathing.

You see, breathing gives off water vapour, which can be condensed and re-cycled.

Come with me through the airlock - sorry to have to ask you to remove your clothes - and you'll see what I mean. The atmosphere in here is a little humid, but then, you are effectively in a gigantic still.

The roof of the dome is chilled by heat-exchangers and specially contoured, so that all the water droplets that form are channeled down into a central reservoir that feeds the pools. Yes, I thought you'd mention that, indelicate though it is. Liquid bodily waste is distilled, too, in a separate, smaller dome.

But there is little enough of that, since everyone on the Register of Employable Persons has had their metabolism adjusted so that their bodies require only one litre of liquid a day, and most of that is not excreted. Never mind, your contribution of water-vapour is much appreciated. I trust you will breathe hard as you view my Koi.

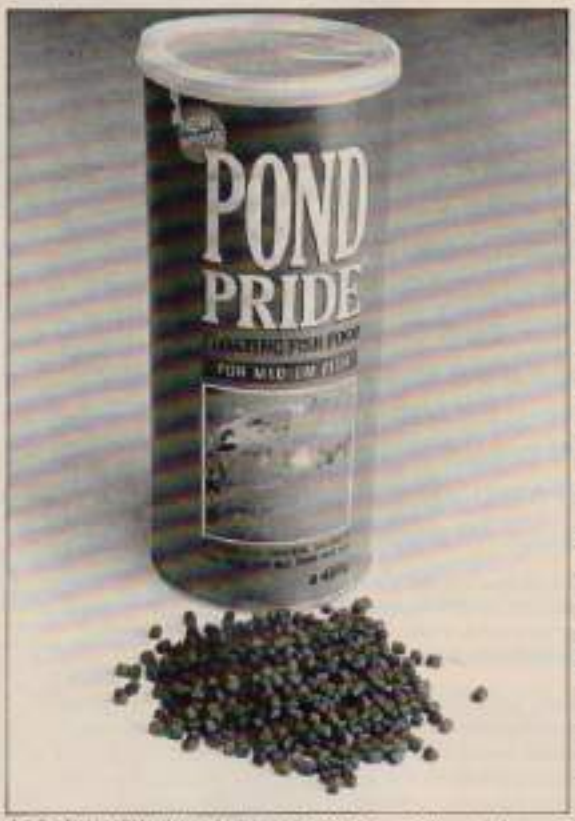
This is my archive pool, and some of the fish in here are 70 years old or more. In fact, this Koi used to belong to my previous visitor. It was seeing it again that finished the poor old boy off, but the fish is now swimming in the 80 per cent water content of his body, so they are re-united in one sense. Waste water not, want not, that's my motto.

These 20th Century Koi are unusual in many ways. Some are actually fertile - though of course, we keep the sexes apart. And some bear the scars of the diseases that used to afflict pet fish in that era. Can you imagine, people actually used to buy Koi for large sums of money, and then lose them to primitive bacterial and viral infections?

Look at the patterning on this 1995 Kohaku. Primitive is it not? The Hi comes down over one eye, the Sumi marking is asymmetrical, and I do believe I can see a Shiro marking. Yes, as you so rightly say, a black spot, but since the appointment of Nakamori-San as our World Leader, we prefer the Japanese terminology. Sumi, please. Some things don't change.

The pool has some wonderful examples of the old Koi varieties by trailing fins and tail. I think it's next on the re-cycling list.

Now to my main pool. I'm sorry that the bigger Koi aren't bigger - the largest is a metre and a half but then they are only three year-old fish.



A tub of koi pellets, dating back to the 1990's. Some of these artefacts of the disposable packaging are eminently collectable.

This is a Yamamoshiki spawned, I believe, in 1998. It won several prizes, but look how pale and brownish the Hi is.

That was always a problem with metallic Koi until a mutation arose following the global misunderstanding of 2013.

That fish not only displayed true colours, but glowed in the dark. Selective breeding reduced the rather vulgar fluorescence.

Here's another strange 20th Century relic - a long-finned Koi. There was a brief fad for these but, after the chief show official of Zen Nippon Arinkai committed Hara Kiri in 1998, rather than admit them to the judging benches, they have gone out of fashion.

Look at the great ugly thing, wallowing around encumbered

This is THE Kohaku. This is the Sanke. This is the Showa. Here's the Kumonryu. Why do I use the definite article? Look at the hologram, yes, up there behind you.

In the year 2037, the World Recreational Committee (Koi) decided that a standard of perfection in Nishikigoi breeding had been reached, beyond which it was impossible to venture without regressing. The hologram is running through the last-ever judging ceremony, when every single fish was different to its fellows. What acrimony it caused among Koi-keepers, awarding prizes to the so-called 'best' in each variety. After that show, these winning fish were taken to a laboratory in Kyoto and cloned.

That's why my Sanke is identical to every other Sanke, and the definitive fish. There is still a challenge in growing the largest possible Koi: careful, don't go too near the edge of that pool, live food is very much a luxury to fish these days.

You ask about the price of Koi? Obviously, the old-fashioned breeding farms are a thing of the past - I shudder when I think how wasteful they were of natural and human resources.

(That reminds me, I promised my female culture-partner that we would watch a home-gram called *"Bonsai Dixie"*).

Cloning Koi reduced all the uncertainty of obtaining perfect fish, and it was amazingly inexpensive.

So, in order to retain the exclusivity of the hobby, the World Government gave Kyoto a monopoly in ornamental fish-culture. Only that laboratory may teleport young Koi to hobbyists, and production is strictly controlled.

My Koi each cost me the equivalent of a week's wages. That's £10 in your money. Oh, sorry, I forgot to mention the world inflation which, towards the end, reached 1,000 per cent a week; the currency was devalued, of course.

My horlogue tells me it's nearly feeding time. I believe 20th Century Koi-keepers used to actually give their fish nourishment by mouth, with all the associated problems of waste products.

This is what we do now: watch. No, the fish are not dying. The pressure pad I have just touched activated the release of a concentrated but fully bio-degradable anaesthetic into the water, which renders the Koi unconscious and slows their heart-rate to almost zero.

Now, more chemicals are added which alter the osmotic balance, so that nutrients may be absorbed direct from the water through the fish's bodies. These are now flowing down that tube and into the pool.

What are they? I wish I knew. There are three main manufacturers of this food: one in what used to be Unified Germany, another in the Unified Yorkshire/Lancashire sector of our own country, and one in Japan.

Each manufacturer claims to have discovered the best growth hormones but (here I must temporarily disconnect the audio-log) I don't think there's much difference between their products.

The fish are coming around again. It's a shame they do not connect feeding time with their owner, but we can't have everything.

Of course, there are still dissolved pollutants in the water which derive from fish respiration, and these are broken down with the help of my little friends.

Let me show you my viral filter: that's it, the small compartment by your foot. In the old days (you'll know all about those), primitive Nitrosomonas and Nitrobacter bacteria performed this function.

But they were heavily oxygen-dependant, populations varied in an outdoor environment, and Koi-keepers spent more time worrying about their filters than they did observing their fish. Also, there were harmful bacteria present in pond water, and these caused ulceration. The situation got particularly bad when the Government ill-advisedly lifted the restrictions on antibiotic medication in 1997, for fish gradually lost all immunity.

No immunity still for our Koi, but no bugs, either.

We came through an airlock, but there was more to it than that. Don't worry, before you leave I will give you a culture to replace your dead gut bacteria. The breakthrough in viral filtration came as a result of intensive research to combat HIV (happily, successful).

As scientists learned more about rapidly-mutating viruses, those simple yet most potentially lethal of organisms, they discovered that some would latch on to nitrogen molecules, and destroy them. We stabilised these and initially used them to quell

Can you imagine, people actually used to buy Koi for large sums of money and then lose them to primitive bacteria and viral infections! Pic. Eric Crichton; Bruce Coleman Ltd.

insurrections in rebel countries hostile to the World Government, by rationalising their food crops. Now the benefits have been passed down to the fishkeeper - come now, don't look so pale.

I see you are interested in the materials used to construct my pools. Your own Koi ponds, I understand, were made of fibreglass, with plastic solvent-welded pipework, although some hobbyists of your era were still using flexible liners. First, you had to dig a hole, which was a heavy manual task we would neither relish nor be capable of.

Excavations, for want of a better word, are now carried out by means of a selective and programmable anti-matter device. The dimensions of the hole are keyed into the computer, the key pressed and the soil instantly ceases to be.

The polymer which which the resulting cavity is lined has a negative friction co-efficient, which reduces the work-load on the solar-powered pumps used to circulate the water.

Before you go, you must see my Koi-keeping museum: I pride myself on being something of an historian. You first through the airlock, please.

Look, tubs of Koi pellets dating back to 1990. Note the beautiful workmanship on the ring-pull. Some of these artefacts of the disposable packaging are SO eminently collectable.

Here's some open-cell foam, one of the many products that ceased to be produced when fossil fuel reserves finally ran out.

And look at the claims for this other carbon-based product, known as an 'external filter'. Ugly thing, isn't it?

Here's a real gem - a 1992 issue of Practical Fishkeeping. I exchanged it for a 2½ metre Ai-Goromo, and reckon I got a bargain. Tell me, who **was** Old Fish'inger?

Well, time to go. Of course, when you return to your own century you will remember none of this, but I am at liberty to give you a small gift. Here are three litres of certified pure water.

What's that, you'd rather have a Koi? Sorry, I was forgetting, that not possible.

Step into the module. Close your eyes. Farewell, time-traveller, nice meeting you and all that.

★★★★★★★★★★★★

Now, where was I? Oh yes, must give old Zillon a call and ask if he can do anything about my green pond..... ■

Pond excavations are carried out by a programmable anti matter device. The dimensions of the hole are keyed in and the soil instantly ceases to be. Pic. Michael Edwards

Practical Pondsman NICK FLETCHER enjoys his annual trip to Billing for the major BKKS event of the year, then comes back down to earth as he considers two of the commonest questions he receives. Plus filter foam, and a new pond.

Practical Pond

Small fry have their day at Billing

One Koi notable summed up to me the dilemma of staging summer shows.

"I won't subject my fish to two days in warm water whose dissolved oxygen content can be so low as to badly stress them. "What's more, in October or November, Koi themselves are in much better trim, with their colours well-defined."

Fine. But would the public turn up in the numbers they did for the seventeenth BKKS National Open Show at Billing Aquadrome on August 15/16? Perhaps (I speak having attended the last half-dozen) the increased willingness of top Koi-keepers to entrust their charges into the competent hands of BKKS officials and helpers at a more suitable time of year (for the fish) would help keep attendances up, as there would be more to see.

And there would be the bonus, assuming the show stayed at Billing, of not having one's ears blasted out by the fun fair, or the ever-present whiff of frying onions spoiling what is supposed to be a tribute to a tranquil hobby.

Simply the best – Joe Mitrington's show stopping Kindai Showa.

This year's show committee had to take the brave decision to revert to English-style judging, to reassure exhibitors that their fish would not come away with disease transmitted from contact in vats with other hobbyists' Koi. This method of judging is unsatisfactory for several reasons: each exhibitor has a vat to his or herself, and the Koi stay put for the duration. This consumes more water than Japanese style, the judges cannot see fish in contention swimming side by side, and reaching a decision inevitably takes a long time, what with leaping it from vat to vat with only a mental picture or perhaps a polaroid snap as guidance.

"Why aren't mine like that?". Admiration and a little envy, BKKS-style.

Pedigree bacteria?

What caused the parnoia in the first place? Apparently, bacterial problems that did not respond to the usual medications. The symptoms ranged from a fin rot-like condition to full-blooded ulceration, and fish were being affected even in ponds where no new introductions had been made for several years. Inevitably, there was scare talk of 'mystery bugs', or bacteria that had developed a resistance to antibiotics.

The truth is less dramatic. According to a veterinary surgeon I spoke to at the show, Aeromonas bacteria (notably *A. salmonicida* and *A. hydrophila*) can be compared to dogs and cats! In other words, within the blanket classification are various 'breeds', though they all share the same Latin name.

And various strains of bacteria react (or otherwise) in different ways to common medication. So, even if the owner of infected fish correctly deduces that *A. hydrophila* is at the root of the problem, he may find that what cured his neighbour's Koi will not work for him.

The only sure-fire way of diagnosing bacterial infections sufficiently accurately to be confident of successful treatment is to send skin swabs to a vet specialising in matters aquatic.

Water quality

Water quality at the Billing show was given the usual careful attention, BKKS council member Dennis Godfrey being in charge of 70,000-odd gallons of Northampton's best, several days before the weekend.

First, every drop passed through purifiers supplied by Purity on Tap, to remove dissolved chlorine, chloramines, heavy metals and protozoa. Then it was left to stand in vats supplied by King Koi Ko, before the smaller show vats were filled on the Tuesday.

Internal filters with zeolite and ammonia-absorbing pads were installed, and Dennis made his ceaseless rounds checking on pH (ideally 7.5), ammonia (ideally, nil) and temperature which, on the show days, was a bearable 15°C.

Water quality at the BKKS National was tested along by units from Purity on tap.

Winners

The Man they Have to Beat, Joe Wilmington, was yet again top gun at Billing: he carried off the Grand Champion and Best Mature Champion awards, both with a Kindai Showa, and added Best Showa, Hikari Utsuri and Kawarimono, all in Size 6.

But there is hope for the little guys, too. Seventeen-year-old Leeds lad Mark Smith joined the BKKS as recently as June, but was helping enthusiastically with the collation of results. Spice was added because he had some fish of his own in the running, bought from PWL Fish Industries of Warrington.

"I have to keep them indoors in tanks," he explained. "I live in such a rough area that any fish outside would disappear in the night." Mark was later jumping up and down, having picked up Best Kawarimono, Size 1. Well done, that man.

Dealing from the bottom?

Although the dealers did not have their own section in the competition, they were more than evident in the marquees around the perimeter of the exhibition area.

Yes, they do inject much-needed funds into the enterprise, and some of them support the show in other ways. But the impression I gained was of a price war on dry goods and some rather cynical fish-selling techniques summed up by the phrase 'Special Show Price'. Special to whom?

Small beginnings: Mark Smith with his size one entries, one of which won Best Kawarimono in its size category.

Chameleon goldfish

"My apparently healthy goldfish have gone pale in the pond. Can you tell me why? They feed well and do not appear in distress, so what's wrong?"

Both goldfish and Koi are derived from wild fish whose natural colour is a dark bronze, shading down to a light belly: the best defence against attack from above (birds and cats) or below (predatory fish and mammals).

Domestic colour varieties arose, spontaneously, through mutation and were then 'bred', as far as possible, by selective breeding. Most young goldfish begin life as little brown fish, attaining their adult hues in anything from a few weeks to a few months.

The change is not uniform, and some growing fish are black and orange, the black gradually disappearing to gold.

Still others never change, and such brown goldfish look remarkably like crucian carp, the giveaway being a concave dorsal fin (in crucians it is always slightly convex).

Light is one factor that influences depth of colour. A friend of mine who used to breed goldfish in indoor vats remarked how pale they were, but as soon as they went outside, they brightened up.

In certain varieties of Koi, temperature can dictate intensity of colour. Kumonryu (black and white Doitsu fish) can revert to all white in warm ponds, while the Matsukawa-bake is said to reverse its black and white markings from summer to winter.

Diet is yet another possible influence. I recently bought two small Sanke from the same batch and dealer's vat, both being very bright fish on purchase.

One I kept myself, the other I gave to my mother in Norwich, who has a pond containing predominantly goldfish. She is convinced her fish 'prefer' a very cheap, crumb-based food and, when I last saw her Koi it appeared to have lost most of its red and black markings.

It hadn't, of course: the pigment cells were still there, but the Koi's diet contained no colour-enhancers to bring them out. So I would recommend a spirulina (Mexican algae-enhanced) food as the first course of action in cases of pale fish.

Shrimp-meal is another colour food, but the danger is that it will enhance reds but also turn the white areas on fish a delicate pink. Don't confuse this with symptoms of stress, where small capillary blood-vessels in the skin rupture to give a similar ruddy effect.

I don't doubt that water chemistry also plays its part, and even the background colour (of the pond wall or liner).

Fish kept in a black or dark-green pool are recognised as showing off their colours to the best advantage. I fish several waters for carp. In one, the fish are buttery yellow, with bright orange caudal fins. In another, they are silvery and, in the third, verging on black. All are healthy.

The final possibility has something to do with age. Mum's pond contains arguably two of the oldest goldfish in Britain (27 years minimum), and they are shadows of their former selves, in colour, if not in girth!

Soiled pond - or green bad scene?

"I have heard that adding a layer of garden soil to the bottom of a wildlife pond is the best and quickest way of encouraging plants to take a hold, and of seeding the nitrifying bacteria if a filter is fitted."

A current fad in pondkeeping, this, and based on sound scientific principles. Soil has its own population of bacteria that manufacture nitrogen, and there are probably as many useful bugs in a handful of loam as there are in any of the proprietary cultures.

Trouble is, there's a lot more besides, and there's no quality control with good, honest muck. Has the soil been treated with phosphate-based fertiliser, or suffered a fallout, however mild, from sprayed pesticide? Does it contain fragments of mortar from building work? Is there excessive humus (decayed organic matter?)

Even if you are sure your soil is relatively safe, there will always be some of its finer constituents in suspension especially if, as so often happens, the original intention is to have no fish but fish - "just one or two" - mysteriously appear.

Soil will clog foam pre-filters, and make life difficult as and when a major clean-out of the pond becomes necessary (in nature, every small enclosed body of water gradually fills with fallen leaves and debris which breaks down into silt; this accumulates in the margins, which are then colonised by plant life, so that both the depth and the perimeter measurement progressively lessen).

You can see the process at work on the Norfolk Broads, where 'alder carr' takes over open water.

So even your 'greenest' (in the ecological sense) pond needs a helping hand from you. Good water management depends on the ability to perform water changes and spring-cleans, and added soil is counter-productive to these. Besides which, rampant water plants are far more easily managed in separate containers than when allowed to spread.

The very conditions that rooted aquatics relish - still, black mud - are also heaven for anaerobic bacteria, which is why you get a nasty niff when dividing your water lilies in early spring.

Dole-pond

As a cure for redundancy blues, and strongly urged on by his missus, my pal Steve decided to build a garden pool. A week saw a corner of his garden transformed into a very acceptable water feature, without too much of a drain on his budget.

And, while his pond is like thousands of others up and down the country, he made sure little details were right: this makes all the difference between success and failure.

Marking out.

These can be summed up quite simply:

1) Sufficient central depth for a few small goldfish (two feet) and wide, level marginal planting shelves.

2) Assuring the excavation was level (this is the only useful advice I can claim to have passed on, as it was rooted in bitter experience).

3) Liberal application of builder's sand prior to laying in the reinforced PVC liner.

4) Use of half-submerged rocks to a) soften the rearward profile b) provide access for frogs and toads which, as Steve lives adjacent to a reclaimed gravel pit, are prolific and c) provide planting pockets for aquatics preferring damp, not wet, feet.

5) Taking out a shallow shelf all round the perimeter so that, when the crazy paving was laid, it was flush with or just below the surrounding lawn. Friends were embarrassingly generous with aquatic plants both floating and rooted, but Steve decided a small fountain pump with pre-filter would help the water quality.

Here, he ran into a problem: when he bought the cheapest pump in the shop, not only did it pack up within a day, but when fitted with its foam intake cartridge it lost all stability and floated to the top.

The defective pump was replaced by a slightly more powerful model (250gph) of a different make, but still there was the tendency to float up. This was cured by tying on a heavy piece of slate.

Excavated and lined.

In the hot weather, the water predictably turned green. "I added an algicide, and the water went brown, instead," said Steve, who then made the common mistake of part-draining the pool and topping up from the tap.

If you're going to use an algaekiller, either start **before** the water turns soupy, or part-drain, top-up and then add the contents of the bottle. The brown colour was caused simply by dead algal cells.

An interesting phenomenon was that, even without a breath of wind, all the floating plants accumulated at one end of the pool - this without the fountain pump on. The only explanation I can venture is that even in a shallow pool, a thermal gradient builds up which sets in motion slow underwater currents.

Aside from those small hitches, the pool is doing fine: a pre-formed cascade returns water down the raised bed formed from some of the excavated soil, and a retaining wall separates this bed from a concrete path, so that even in wet weather, Sheila will have access to do the weeding (says Steve). So impressed was

The completed pond.

Liner in place.

his Mum that she promptly put in an order for a garden pond of her own, and for this Steve is breaking all records: less than three hours to dig it out and construct the base of a rockery (this time held in place by a wall of log ends) is going some!

He plans to get it finished before rejoining the workforce but, for his sake, I hope he doesn't get a clear run at it...

Three factors of foam

Samples of filter material arrived the other day with a note: "Bath sponges are packaging only".

Very thoughtful and, as it happened, an unnecessary warning - but it does highlight the fact that there is foam...and there is foam. The stuff of interest to pondkeepers is made of POLYETHER.

The similar looking POLYESTER uses minute quantities of arsenic-based compounds in manufacture, not enough to pose a threat to humans, but quite capable of bumping off your fish.

Then there is the structure of the foam to consider. Closed and open-cell foam look much alike and, when you blow through a small sample, there seems to be a free passage of air through both.

But reticulated (open-cell) foam features the destruction of the cell, or pore, windows, allowing water to pass freely through: a loofah, if you like, as opposed to a honeycomb.

Having got the composition and structure of the foam right, the third factor to influence choice is grade. This is expressed in pores per inch (PPI) and, as a rough guide, very coarse foam is 10, coarse 20, medium 35 and fine 45 PPI.

If you are fitting a foam pre-filter to a pump, the very coarsest grade will extend the periods between rinses, always provided the largest particles let through the foam can pass through the pump's impeller.

Progressively finer grades filter more efficiently, but block faster. I'm indebted for this information to John Oakley, of Foam Conversion (UK) Ltd, who can not only supply foam of the right type at keen prices, but tailor-make sheets and blocks to the instructions of the DIY filter fan.

Anything, that is, which falls within the parameters of 3 x 1 x 0.6 metre blocks, which is the size imported from the United States. The foam can be cut flat, or into the popular 'egg-box' type of sheeting that gives a higher specific surface area for nitrifying bacteria. Or it can be made up into cartridges.

All John's foam is colour-coded: royal blue for fine, beige for medium, black and blue-green for the coarser grades.

He claims these non-natural colours make it easier to spot when the foam needs cleaning of (for example) single-celled algae or blanketweed.

In my experience, foam soon lets you know when it needs a clean anyway: it blocks. But then's not worth quibbling about.

If you'd like to know more, **Foam Conversion (UK) Ltd** is at **118 St Michaels Avenue, Houghton Regis, Dunstable, Beds LU5 5DH. Tel:0582 867580 or 081-594 7388.**