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practical fishkeeping
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Choose the right pond pump
PLUS:
Frontosas; Brochis; Sea stars; marine butterflyfish
8 tips for success with your corals
First aid for your fish
What to do in an emergency

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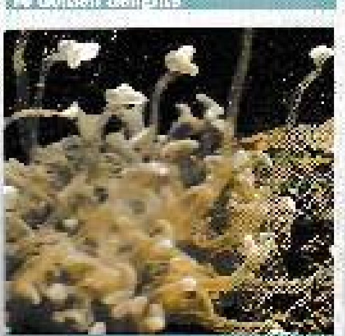

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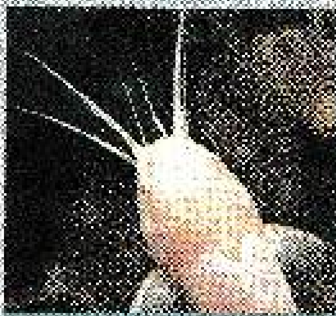

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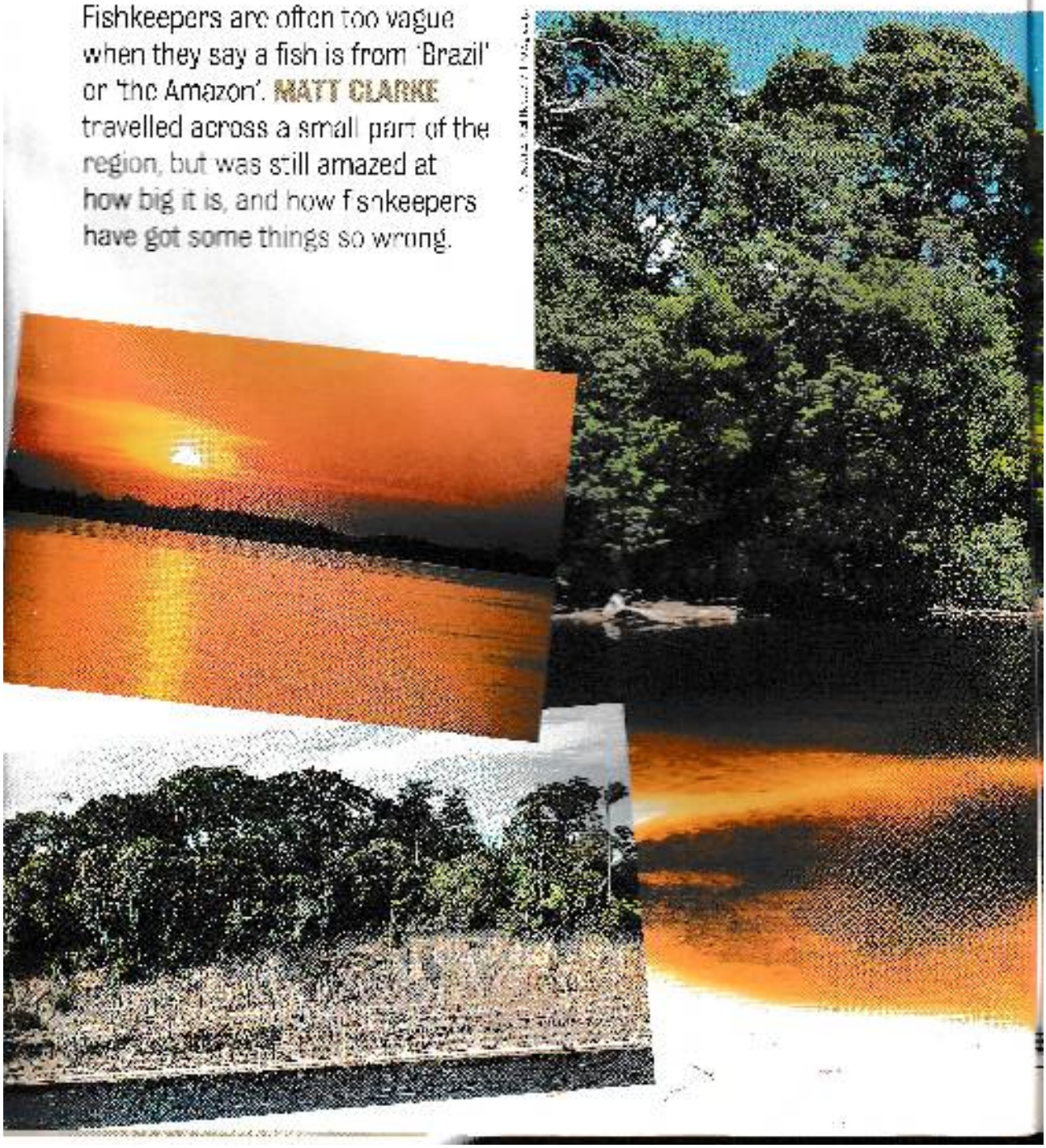
Take me to the

Fishkeepers are often too vague when they say a fish is from 'Brazil' or 'the Amazon'. **MATT CLARKE** travelled across a small part of the region, but was still amazed at how big it is, and how fishkeepers have got some things so wrong.



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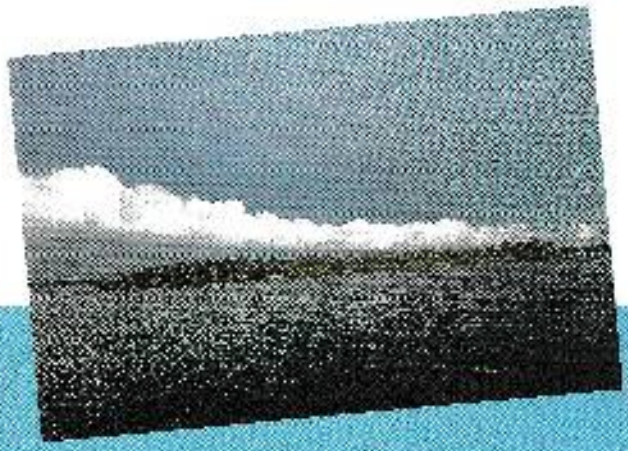


MAIN PICTURE: The Rio Negro makes the English Channel look like a mere stream.

BELOW: Large backwaters form on the downstream side of sandbanks.

Almost without exception, everyone I know who's been to the Amazon said the sheer size of the place left the most lasting impression on them. Having just returned, I can see exactly why they said that.

Upon arriving in Sao Paulo, on the southeast coast of Brazil after a 5000 mile flight from London, we had to take a 1600-mile connecting flight to Manaus, the capital of Amazonas. For me, this internal flight really summed up quite how big the region is — and how so many fish keepers get it wrong when they say a fish is from Brazil or from the Amazon basin. We'd only flown over a small chunk of Brazil, yet had travelled the equivalent of the distance between London and Moscow!

Going up the Negro

We sailed a few hundred miles up the Rio Negro, the largest of the Amazon's many tributaries. This massive river flows from Colombia to Manaus, the capital of the Amazonas, where it joins the Rio Solimoes to form the Amazon proper. Even though it's merely a tributary, it's still seriously big. We went up it for three or four days and only saw a fraction of it. It was so wide in places that we could barely see the sides, and it is so deep that large ships can navigate it.

The Rio Negro churns out three times as much water as the Mississippi and covers an area that's around 1700km long. It flows through some of the most undisturbed rainforest on earth — just 2-3% is occupied or used for agriculture, so signs of human activity aren't common. And it's absolutely teeming with fish! In fact, there are more freshwater fish species in the Amazon basin than anywhere else on earth.

Blackwater

The Rio Negro is a typical blackwater river (hence the name). The water is the colour of tea, with a low [illegible] mineral content [illegible]. The very [illegible] waters, which [illegible] via [illegible] called [illegible], have minimal hardness and a pH of 3.5-4.5, but at certain times of the year this can drop as low as just pH 2.0. These extreme conditions make it an inhospitable place for aquatic insects, so there are fewer insects and less plankton, than in many other Amazonian rivers. This leads to big differences in the density and species richness of fish populations.

To see what sorts of fish live in the various habitats of the Rio Negro, we spent a couple of weeks fishing with hand nets, seines and fishing rods — and were seldom disappointed.

Life in the main river

There are well over 2500 different fish species in the Amazon basin, and 85% of these are what taxonomists call ostariophysans. This group of related fish is made up of about 43% characoids (such as tetras, piranhas, [illegible] and [illegible]), 39% siluroids, or catfishes, and around 3% gymnotoids, or knifefishes. All these groups have undergone some quite marked radiations, and there are hundreds of different species of similar-looking characins (over 1,000 characins), catfishes and knifefishes, all evolved to fit into very specific niches.

The other 15% are made up of a huge range of weird and wonderful fish including cichlids, stingrays, killifishes, lungfishes, eels and arowanas. Among these are a few groups of fish such as rays, herrings and anchovies, needlefishes,

[illegible] and flatfishes that have descended from marine fish families.

[illegible] the Amazon doesn't have [illegible] more fish [illegible] freshwater fish species in the whole of the UK.

Mobile homes

The fish [illegible] to adapt to some enormous changes in their environment. In the course of a single year, they might live in a variety of habitats ranging from the main river to creeks, flooded forest or enclosed lakes or pools [illegible].

We were visiting the river when its levels were at their lowest, and some of the backwater [illegible] had been cut off from the main river. Within a few weeks of our leaving, the rains would come and flood the river again. [illegible] some of the larger species, such as [illegible], migrate [illegible] to spawn. Their offspring are then [illegible] areas of forest by rising floodwaters.

Most of the small fishes will disappear into the forest where they feed on plankton, [illegible] and [illegible] from the forest. Some will get trapped in lakes and pools, and here, the fish populations are quite different to those of the main river. It's an amazing ecosystem and emphasises that you can't really have a 'typical' Amazon aquarium. There are too many diverse habitats, each with their own fish communities, and each changes from one season to the next.

The main river habitats

The shallows

Found on the margins of the main river, the shallows are open and sandy and have hardly any features, such as rocks or bogwood to change the underwater landscape. [illegible] are their aquatic plants.

Here, small [illegible] including [illegible] and various species of *Hyphessobrycon* are most abundant. They swim around in small shoals, [illegible] on the water surface [illegible] small groups of young [illegible].

[illegible] turned out larger cichlids, including [illegible] and *Hypselecara temporalis*, and [illegible] such as [illegible] were being caught by anglers.

We also photographed a [illegible] species different to any we'd seen in the trade before. It looked like [illegible] by some people, but has a much more pronounced hump on the head.

Stingrays were also common in the metre-deep [illegible]. Their [illegible] marks in the sand were

visible in the shallows, and I caught one [illegible] fairly large one, about 50cm across, with a stunning dark, [illegible] pattern.

Surface

The [illegible] many surface-dwelling fishes can't be seen [illegible] but a [illegible] below the surface, [illegible] of the genus [illegible] were common, especially in the shallow water adjacent to the shoreline. We only saw these [illegible] – they just

ABOVE: Toothy [illegible] were [illegible] in the [illegible] waters.

News

The latest events in the fishkeeping world and dates for your diary.

On the PFK website this month...

Reader recommended shop [illegible]

Reader reviews [illegible]

Shop directory [illegible]

www.practicalfishkeeping.co.uk

Half the world's coral reefs face destruction

A leading scientist has said that half of the world's coral reefs could be damaged or destroyed by the end of the century.

Dr Richard Aronson, from the Dauphin Island Sea Laboratory, has been working on the effect of global warming on reefs. He said that Caribbean reefs have looked like hell and that worldwide change was occurring.

About 25% of the world's reefs have already been wiped out or extensively damaged by warming, overexploitation and disease, he said.

Dr Joan Kleypas from the National Center for Atmospheric Research, one of the report's co-authors, said that though the reefs had adjusted to gradual warming, the rate of change was now unprecedented.

"[illegible] coral communities will be pulled apart," she said. "They're not going to function well as coral reefs any more."

Higher water temperatures have also produced bleaching, where coral has lost the algae that live symbiotically within it. With CO_2 building up in the atmosphere, more of it dissolves into the oceans, making the water more acidic, reducing carbonate levels available to corals.

Atmospheric CO_2 levels were about 280ppm in 1880. In 2000, they had increased to 367ppm and by 2050 are expected to reach 440-570ppm.

The loss of reefs [illegible] people depend on them as a food source and because of the way they prevent erosion of shorelines.

A WWF report has also warned that global warming could devastate Australia's Great Barrier Reef in the next 50 years.

The report suggests that [illegible] global warming levels do not rise by more than 2°C over the next century.

The Scotsman has reported that the reef will become the largest protected marine reserve in the world when a ban on fishing in a third of it comes into effect this year. The area to be protected will leap from 5200 sq miles to [illegible] miles.

The move is likely to be a boost to the tourism [illegible] the reef is worth A$4.3 billion ([illegible] billion) each year, exceeding the recreation and commercial fishing industries that are permitted in the area.

Meanwhile, researchers at the US Geological Survey [illegible] coral reefs off the Florida coast and in the Caribbean are being killed by micro-organisms that live in giant dust clouds that blow off the African desert and are carried across the Atlantic.

The Washington Post reported how Gene Shinn noted that [illegible] droughts in Africa produced enormous dust clouds. A later [illegible] African dust [illegible] (Sources: [illegible] Guide.com, The Scotsman, Washington Post.)

> Fish fact: Research has shown that guppies are capable of

GM danios used in motor neurone research

UK Basking shark survey launched by Wildlife Trusts

Cold heart cure

Diary dates

News in brief

FISH FOSSIL DISCOVERED:

AUTHOR BOBBED FIGHT AGAINST DISNEY:

BECKHAM BUYS GOLDFISH:

ROMAN COIN DISCOVERY:

GFI GETS NEW SECRETARY-GENERAL:

The people's poll

Do you think GM fish should be sold in the UK?

Marketed under the name of Glofish, glow-in-the-dark Zebra danios have taken America by storm, though the state of California has banned their sale.

[illegible]

The [illegible] have it – [illegible] 58% of you voted against the sale of GM fish in the UK compared to 35 who voted yes. Many of you argued that there was no need for any transgenic fish in light of the wide variety of fish already available. Others dismissed the practice as disgusting and inhumane.

Dave Benson is setting up as an aquatic retailer and has no intention of stocking dyed or GM fishes. "I can't make a living stocking quality fishes without gimmicks, [illegible] it's simply not worth [illegible]. Any retailer who stocks these fishes simply because there's a demand is not behaving responsibly, and is setting a strong [illegible] precedent."

A few of you wondered about the repercussions.

Andy Robson wrote: "By creating GM fish, we have lowered their status to that of an ornament [illegible] and then can only be bad for the hobby."

Without relevant background, Jim Becker provided much food for thought regarding the health of these fish. "I work [illegible] as a researcher in plant genetics where green fluorescent protein (GFP) is used a lot as a gene marker. There is good evidence that GFP is slightly toxic to the cells it's present in.

"In effect, GloFish are like dyed fish in that their unnatural colour [illegible] makes them unwell. This is a possible explanation for their smaller size and poor reproduction. For this reason, I am against the fish being sold in [illegible]."

"Are these fish any worse than mutant fish whose health is compromised, such as Celestials or Balloon mollies?"

Russell Davis argues "that evolution allows animals to evolve naturally in tune with the surroundings of the local environment. [illegible] It has worked out perfectly well for millions of years... who are we to meddle when we don't know what the consequences could be?" He points out how many native plants and animals are declining [illegible] population [illegible].

"Although Zebra danios are tropical fish and [illegible] survive in the colder temperatures here, [illegible] despite popular belief."

But [illegible] asked: "Would these people be happy to see GM fish on sale if modifications could be made to correct or cure [illegible] diseases?"

"One could say that the [illegible] is genetically modified – although the [illegible] has been to selectively breed for certain features rather than to analyse the DNA and find the genes which control [illegible]."

"As with any science, it is not the technique which is bad or good, but the application of that technique."

Rachel Jones agrees that as far as research is concerned, having GM fish is [illegible]. "Many want to think that genetic engineering will provide science with the chance to explore and develop new areas. This could ultimately be of benefit to humans.

"However, to then go on to use this technology to essentially make a hobby more 'entertaining' is something that should be avoided," she states.

[illegible] thought was expressed by [illegible]: "These fish were developed to be used for detecting water quality [illegible] etc. and [illegible] legislation [illegible] development, and yes, they should not be sold in aquatic shops.

"I do, however, believe that [illegible] for the GM fish will be [illegible] available as pets [illegible]."

[illegible] wrote: "[illegible] OK for research, but to sell [illegible], no way would I buy one. It's awful that people are tricked into buying these fish."

[illegible] makes a plea: "[illegible] science [illegible] has spoiled it badly for [illegible]. Genetics is still a relatively young science in terms of [illegible]."

[illegible] two possible reasons why readers [illegible] against GM fish. [illegible]

Next month's poll

How far would you travel to buy a fish? What is the furthest you've ever travelled?

Visit our website to tell [illegible] fishkeeping [illegible]

What you thought

Yes [illegible]

No [illegible]

Maybe 5%

www.practicalfishkeeping.co.uk/thepeoplespoll

Time travellers

They were the subject of articles back in the 1930s, the height of popularity in the 1960s, and still captivating fishkeepers today. **John Rundle** looks at the Golden medaka.

It's amazing how some things stand the test of time. I was flipping through a magazine from 1938 when I came across an article on how to breed the Golden medaka. And then it struck me how this fish has stood the tests of time because it is still available for sale today! When I first started breeding fish back in the early 1980s, it was very popular. Today, though, it has dropped somewhat on the popularity ladder.

What's in a name?

The so-called Golden medaka is actually a variety developed by fishkeepers, whereas the original wild form is a bland olive with a silvery-white belly. Yet both have the scientific name of *Oryzias latipes* and the common name of Japanese medaka.

All the species in the genus are collectively known as ricefish. Other fish in the genus include *O. javanicus*, *O. marmoratus*, *O. [illegible]*, *O. melastigma*, *O. minutillus*, *O. nigrimas* and *O. [illegible]*, though most are not often seen in the hobby.

Back in the early 1980s, the *Oryzias* were classed as killifish in the subfamily Cyprinodontinae. Since then there have been a few taxonomic discussions in various scientific papers as to where *Oryzias* should really go. Today they are not technically classed as killifish and are now in the order Beloniformes, family Adrianichthyidae. This makes them closely related to the needlefish and halfbeaks.

All this leads to confusion for fishkeepers as the fish are sometimes still referred to as killifish and can even be found in a book on livebearing fish.

Keeping the medaka

Males and females are coloured almost the same. Females have a smooth edge to the dorsal and anal fins. Males have elongated rays to the dorsal and broader anal fins that taper to a point than the females.

The golden aquarium strain is not difficult to keep, but it is worth looking at the wild medaka's living conditions. Their natural range is Japan, Korea, China and Vietnam. Here they live in slow moving streams that have a pH range of 7.0-8.0 and medium hard water at 5-19°dH. Where I live the water is very soft, so I keep a small net bag of Calcium Plus in the tank.

They like a temperature range of 18-24°C (64-75°F). At these temperatures, it is easy to see how tanks with the Golden medaka can simply be kept in a centrally heated room. However, I suggest that the tank is heated to 24°C as they prefer to breed in warmer water.

These are a peaceful fish that like to be kept in groups, making them ideal for a well planted community tank. As for tank mates, make sure they are also peaceful and not too large. The Golden medaka will grow to about 3.5cm/1 1/2".

An unusual breeder

This little fish has one of the most unusual breeding strategies. In the wild, they only breed in spring and summer, but I have had fish that have not lost this trait even in the controlled captive tank situation.

The first stage of the breeding method is quite conventional for egg-laying fish. They usually mate in the early morning or at twilight when the male chases the female and the two come together in a 'S' shape and simultaneously eject milt and eggs.

But whereas one would expect the fertilised eggs to be scattered, instead they stick to the female's genital opening by means of sticky filaments, which arise from the egg membrane! The eggs look like a miniature bunch of tiny clear grapes, which the female carries for two to ten hours. The eggs are eventually brushed off as the female passes by or through plants. The eggs hatch in eight to ten days.

Breeding set-up

I tend to use quite a small tank, 38 x 20 x 30cm/15" x 8" x 12". Kept as a bare tank, there is no gravel substrate. I use a small sponge filter or box-type filter and plants – Java fern, *Microsorium pteropus*, and Java moss, *Vesicularia dubyana*. I put sufficient plants to provide a secluded atmosphere as this is where the eggs will end up, though the female seems to prefer the Java moss. I have at times introduced wool-spawning mops. Again, I add a small net of Calcium Plus to help harden my soft water.

I have used anything from one to four pairs of fish for breeding. Every five days, I harvest the eggs by removing the Java moss and putting it in a separate tank. Be warned that this is a prolific breeder, so make sure that you only attempt to raise the numbers that you can easily hold in your tank systems. I have read that egg laying can be delayed by lowering the water temperature.

The young fry are able to take newly hatched brineshrimp nauplii as their first food. As they grow, they will take dry foods to match their size.

Although not as popular as it once used to be, the Golden medaka still has that 'X' factor about it. I bet that in another 60 years' time, it will have travelled well and still be captivating fishkeepers.

How many eggs?

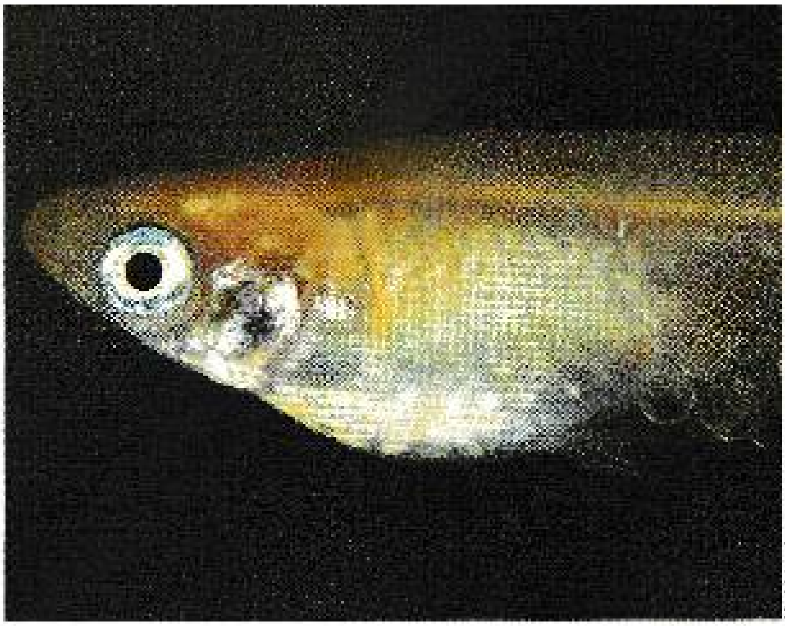
Each spawning can [illegible] 20-30 eggs, though [illegible] 12-[illegible] in each [illegible] [illegible] produce as many as [illegible] [illegible] the size of the female, with 1000 to [illegible] [illegible].

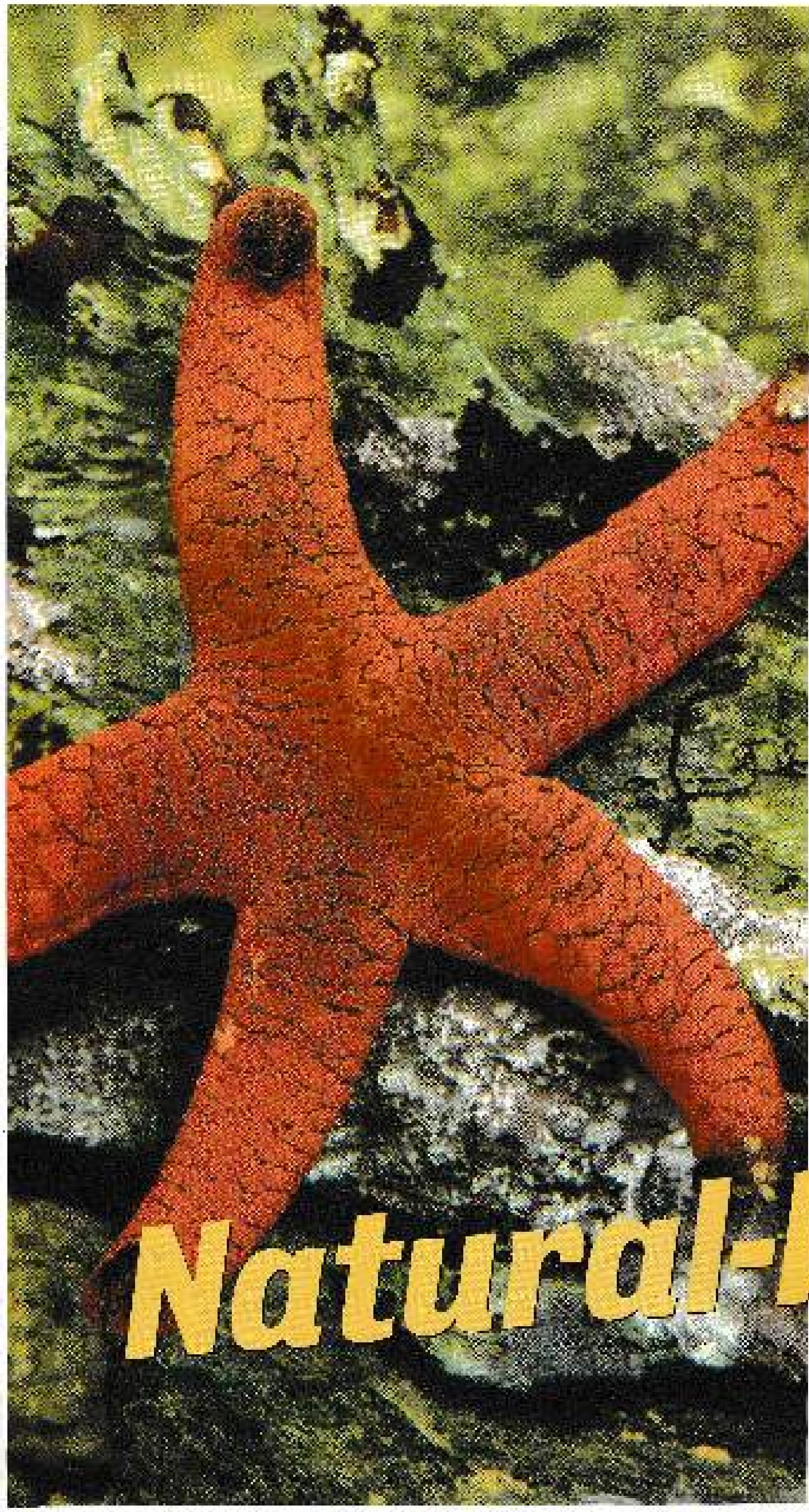
[illegible]

[illegible] research, showing [illegible].

LEFT: The Golden medaka is perfect for well-planted community tanks.

BELOW: A female carrying her eggs.





Natural-born

Imagine a checklist for the marine fishkeeping hobby – most people start with fish, progress to corals and then animals such as clams for their beauty or even crabs or shrimps. And the list goes on.

But what about echinoderms? These are marine animals such as starfishes and sea urchins, all of which are characterised by having a calcareous construction. Many of these are not only beautiful, but they also perform beneficial tasks such as eating waste or sifting through the substrate creating aerobic conditions. Others help keep the rocks clean so that corals may grow on them. Still others eat plankton and other material floating in the water.

Yes, they can be considered the garbage collectors of the reef. But some have developed predatory habits so as a result, be careful when adding new animals because once in, they are difficult to remove.

How do they work?

In the hobby, there are five classes of animals that are kept. These include Holothuroidea or sea cucumbers, Echinoidea, sea urchins; Crinoidea, the feather stars; Ophiuroidea, the brittle and serpent starfish; and Asteroidea, starfish.

All of these animals possess radial symmetry around a central disc with a unique vascular system based on water. The radial symmetry is based on a five-part system – there is a central structure around which each animal can be divided into five equal parts. This is clearly seen in starfish, brittle stars and serpent starfish where the five arms (or a multiple thereof) are arranged around a central disk. This symmetry is not as apparent in sea urchins or sea cucumbers, but when these animals are looked at closely or dissected, one can see that their bodies too are arranged on a symmetrical basis.

These animals do not have anything close to a central nervous system, only a simple combination of chemo and tactile receptors. As a result, they do not have eyes or other means for dealing with complex stimuli. However, they can differentiate between light and dark and have a keen sense of chemoreception as indicated by their relatively rapid movement when food is introduced into a tank.

They are also unique in having a water-based vascular system. This highly specialised system not only allows them to transport food and water along the outside of their bodies, but also allows for nutrients and gases to be moved as well.

It has evolved such that it allows these animals to move by changing the pressure of the water present in their tube feet.

Yet the system is unique in that the water within is not self-contained, which may partly account for why these animals are so sensitive to rapid changes in water chemistry, and may go into osmotic shock when the salinity or ions are changed rapidly. This system is controlled by a sieve plate, the madreporite, which is the dark coloured structure on the upper surface of most sea stars.

These animals also have pedicellaria, which are external jaw-like structures located on the ends of arms but also along the body of sea stars. These are primarily defensive in nature and help keep the animal from being settled on by the multitude of larvae that are always looking for a settlement site.

The external skeleton of most of these animals is quite formidable. It is usually quite thick, hard and contains spines, poison or toxic mucus or a combination of these. Yet they also have other means of defending themselves.

For instance, the sea cucumber (and some other members) are able to eject some of its internal organs, namely the digestive tract and a massive amount of tubules containing holothurin, when it feels threatened or stressed. This compound dramatically reduces the surface tension of the water and appears to inhibit the ability of fish to take in oxygen, so they rapidly die. It is really an attempt to trap the offending party in the filaments where it will suffocate, while the cucumber moves away to regenerate a new digestive system.

This compound is present in all of the sea cucumbers of the genus *Holothuria*, which contains most of the species commonly kept in aquaria. The close cousins of the sea cucumber, the sea apple, possess a similar toxin and can kill all the fish in a tank if it is disturbed. Potential owners should be aware of this.

Because of the relative ease with which these animals regenerate, this becomes part of their defence package. For example, when an animal such as a sea star is caught by an arm, it just drops it off and moves away. The unwary attacker is left with a wriggling arm and the animal can escape and regrow a new one. Some cucumbers and sea stars can even form new animals by splitting into two.

Sea stars

These easily recognisable animals live in all oceans. In the Indo-Pacific alone, there are over 200 species of sea stars in 60 genera, and in all of the oceans, there are over 1800 species. And despite five being the most common number of arms, they can have more than this, even up to 50! These animals include the cushion stars, horned sea stars and pincushion stars.

Sea stars have distinct upper and lower surfaces. The mouth is located on the underside along with a distinct cleft through which food is

moved to the mouth. These are referred to as the oral disk. Some sea stars do not have a separate opening for wastes, and so their mouths serve a dual purpose for consumption and waste removal.

Most of the sea stars are specialised feeders, but many can become omnivorous should the need arise. Watch for detritivores or the algae eaters, which are members of the genera *Linckia* and *Fromia*. They seldom bother corals, but need to be kept in a well-established tank with lots of microfauna and microalgae.

Several predatory starfish should not be kept. The most notorious of these is the Crown of thorns that has attacked portions of the Great Barrier Reef in recent years.

A more problematic animal is the small star of the genus *Asterina*. This tiny star is usually no bigger than 2.5cm/1" across and has two colour varieties. The white or grey variety is usually a harmless algae eater that consumes microalgae from the glass and live rock.

However, there is another similar star that is mottled red, pink or green that feeds aggressively on stony and, in some instances, soft corals. This pest is a frequent

LEFT: *Fromia elegans*

ABOVE: Don't keep sea cucumbers in tanks containing powerheads - the results can be disastrous for the cucumber - and the rest of your livestock! Pic shows *Stichodus* sp.

cleaners...

You've got the fish, the corals and the crab. What next? **Mike Paletta** suggests looking at Sea stars and other echinoderms, many of which are not only beautiful, but provide a useful cleaning service into the bargain...

[illegible] on the [illegible] live rock and corals and can grow rapidly, decimating many ornamentals in a [illegible] system. [illegible] should be looked for on all new coral and live rock and [illegible] removed.

Sea stars can be omnivorous or specialised feeders, so research them well to determine their requirements.

Brittle and Serpent starfish

Similar in appearance are the brittle and serpent stars. However, there are some major morphological differences. For one, these animals do not have the groove on the underside of their arms, while their tube feet only serve a sensory function and are not involved in locomotion or the movement of food to the oral disk. Their arms are longer and more flexible [illegible] central disk and their madreporite is located on the opposite side from that of the sea stars.

These animals also possess sensory organs that sense light and allow them to remain hidden in the dark. This allows them to avoid predation.

Almost all these stars have five arms, with only a few species having more. The arms have spines and muscles that allow them to move in virtually any direction more easily than their tube-footed cousins.

This mobility also lets them pull themselves into virtually any space. And as long as their central disk is not too big, they can fit into the smallest of crevices. These arms also allow them to [illegible] any.

Don't keep large Brittle stars with small, slow-moving fish.

They do play an important role in tank maintenance by being very active detritivores, consuming any food or waste material that comes their way. Most will not become predatory as long as adequate food is provided.

Sea cucumbers

Like the brittle stars, sea cucumbers mostly remove detritus from the substrate. More importantly, they plough through the sand like a small earthworm, pulling the substrate through their digestive bodies. This enables them to remove waste organic matter. While they may look ugly [illegible], most tanks would be poorer without them.

They are mostly detritus feeders and have evolved such that different species live in different niches and environments. Some live in muddy or silty areas while others live on rocks or similar substrates. The most interesting are those that live within live rock and graze through the rock for food.

And no matter which substrate they live in, they all produce faecal pellets after sifting through the substrate. These pellets are made up of substrate. They rapidly break down and turn back into the substrate from which they were made.

Like most of the other echinoderms, sea cucumbers have good regenerative powers. All that is necessary to get two cucumbers is to divide the animal in half. Even more interesting is how some cucumbers reproduce by division.

In a couple of species, this division manifests in the animal developing a small secondary animal at its side. This grows slowly and after a few weeks looks like a mini version of the parent. Eventually it breaks off to become a fully developed cucumber.

These animals also reproduce in the normal fashion, with eggs and sperm being released into the open water. The larvae are free-swimming before developing into juveniles and crawling on the substrate.

All cucumbers can poison a tank by ejecting their digestive tract and releasing a toxin. Extreme care should be taken when keeping them.

If caught in a powerhead, the stressed animal will expel this poison and kill everything in the tank. It is best to keep them in a separate tank free from powerheads and other areas where they could get caught [illegible].

cucumbers are peaceful and perform a very necessary task in the tank.

Sea urchins

Sea urchins have an extensive network of spines and armour. This armour is comprised of calcareous plates or skeletal ossicles. The spines are attached to the plates and move as the plates move.

Most species are herbivores, but some are detritivores or scavengers, and a few are predatory, feeding on corals and other sessile invertebrates.

Sea urchins feed on virtually all types of algae, including calcareous algae – so if you want this form of algae, you may need to limit the number of urchins so it can grow.

There are over 800 species of sea urchin which can vary greatly in terms of their appearance. They can range in size from less than an inch to over a foot and can be different shapes, sizes or colours. Yet they all start from a relatively round skeletal structure known as a corona.

Most urchins have two distinct types of spines: large primary spines and smaller secondary spines. Both are moveable from a socket that sits on the corona, and this complete structure is similar to a ball and socket joint. Surrounding the socket is a sheath that covers the joints and gives the spines their flexibility.

The corona also has pores from which tube feet extend that allow the urchins to move around. Using their spines and tube feet enables them to wedge themselves into tight spaces from which they are difficult to remove.

As if spines aren't enough, some species also produce poison injected through their spines. For the most part these poisonous urchins should not be kept in reef tanks.

Always provide enough food – urchins seem to eat constantly and are indiscriminate in terms of what they eat – they will rapidly consume all algae they come across including desirable coralline algae. Once that's finished, they head for any coral, sessile invertebrates. As a rule of thumb, keep only one for every 227-340 l/50-75 gal. More can be added if a tank becomes overgrown with algae, but these should be removed once the algae is under control.

Urchins may also knock over anything that is not solidly in place, so take this into account before they are added to a tank.

Feather stars

Feather stars are delicate not only in terms of appearance, but also in terms of keeping them. For the most part, they're extremely difficult to keep in the long term and are really only for experienced hobbyists.

They are the most primitive of the echinoderms. The opening for their mouth and anus are one and the same, and is found on the upper part of their body. This configuration allows them to move the food, which they capture with their feathery arms, directly to their mouths, and to expel waste into the strong current away from them.

They have small feet called cirri, which they use to attach to the reef. They then expand their arms like a net in which to catch plankton and other foods as it passes across them. Their names gives them the look of flowers or feathers in a breeze.

Inadequate strong surge and food may be why they fail in captivity. On the reef, large amounts of particulate matter constantly move past them. Replicating this in a tank is difficult for the large amount of food is allowed to float around, conditions can rapidly deteriorate.

Signs that these animals are failing are when they rapidly drop portions of their arms. On the reef this is a natural defence mechanism and the arms grow back, but not so in the tank. Eventually all the arms fall off, and without the means of capturing food, it starves to death.

Even when in larger reef, these animals will eventually fail. Avoid keeping them at all costs.

LEFT TO RIGHT: ***Diadema setosum; Holothuria*** **sea cucumber; delicate and difficult feathurstar.**

Not just Corydoras

Mention Callichthyidae and most people will think of *Corydoras*. But as **Chris Ralph** explains, there's far more to this fascinating catfish family...

Armoured catfish are found throughout South America, including the mighty Amazon and its many tributaries. Yet family members are also found in the rivers of Trinidad, opposite Venezuela in the Atlantic Ocean. This apparent anomaly may be due to the fact that, as freshwater enters the Atlantic from Venezuela, it does not mix immediately with the saltwater and forms a wide float on top, like a conveyor belt, carrying with it the catfish.

[illegible]

Protective armour

When examined closely, one can see that rows of overlapping bony plates encase the catfish, much like armour plating. Yet within the family is a diverse range of colours and patterning which can make identification confusing.

The genera consisting of *Aspidoras*, *Brochis* and *Corydoras* are part of the subfamily Corydoradinae.

Most, if not all, callichthyids prefer a planted tank with plenty of hiding places among decor such as bogwood and rocks.

Substrate is crucial to their well-being. If you are using gravel, ensure that it is fine, smooth and rounded as sharp pieces can damage their barbels.

Cuts or abrasions usually result in the fish suffering from a bacterial infection, and in severe cases, this can be fatal.

Temperature is usually in the region of 22-25°C (72-77°F), although higher temperatures may be tolerated by some species, with a pH of 6.5-7.2. Hardness can be between 5 and 20°GH.

These fascinating catfish have a mixed and varied diet of sinking granular foods (most of which are high in protein, so feed sparingly to avoid polluting the aquarium water), good quality flake food, algae or vanilla wafers such as those manufactured by Tetra, catfish tablets such as by Aquarian and Tetra, frozen or live bloodworm, Daphnia, Tubifex, whiteworm, grindal worm and chopped earthworms.

All in the family

Common name: False Brochis
Scientific name: *Aspidoras* [illegible]
Origin: Brazil, [illegible]
Size: [illegible]
Body: Slender, with Corydoras-like shape. [illegible] *Corydoras*.
Colour: Head and body are light brown/tan. Dorsal surface of the head with black pigment, the remainder of the head and body with black pigment forming blotches. The blotches form bands from the dorsal region to the caudal peduncle.
Notes: *Aspidoras* [illegible] with *Corydoras* [illegible] and [illegible] with which it shares its [illegible] *Aspidoras* was referred to as False Corydoras as [illegible] being more slender with an elongated [illegible] not tolerant of poor water quality.

Common name: False Corydoras
Scientific name: *Aspidoras pauciradiatus*
Origin: Brazil, Rio Araguaia basin
Size: [illegible]
Body: Slender with Corydoras-like shape. The head is longer than in *Corydoras*.
Colour: Pale tan with small black spots on the head and body. The body spots tend to be in rows. There is a large black blotch at the base of the dorsal fin. The pectoral and ventral fins are [illegible] spines [illegible] band and the caudal fin has rows of narrow black bars.
Notes: *Aspidoras pauciradiatus* is commonly imported. Originally described as *Corydoras* because of its body shape. *A. pauciradiatus* does not [illegible] pH levels. Males are more slender than females. They feed on small invertebrates in the wild.

ABOVE AND LEFT: They [illegible] look like *Corydoras* but [illegible] and *Brochis*. They can reach [illegible] or more depending on the species and they make fascinating additions to the community aquarium.

All in the family (continued)

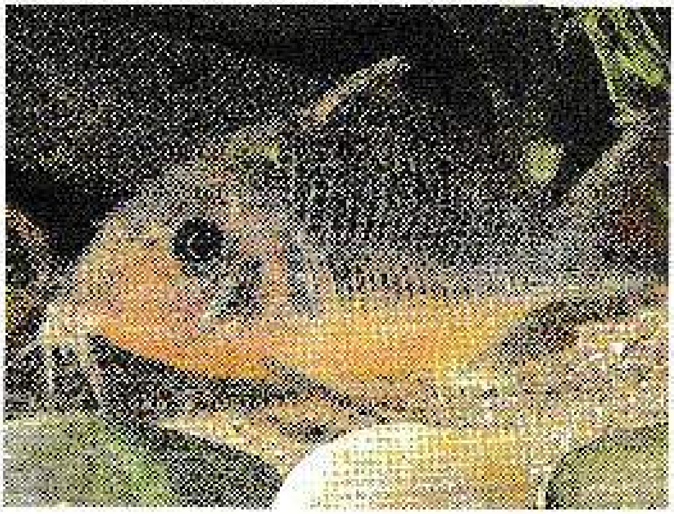
Common name: [illegible]
Scientific name: [illegible]
Origin: [illegible]
Size: [illegible]
Body: [illegible]
Colour: [illegible]
Notes: [illegible]

Common name: [illegible]
Scientific name: [illegible]
Origin: [illegible]
Size: [illegible]
Body: [illegible]
Colour: [illegible]
Notes: [illegible]

Common name: [illegible]
Scientific name: [illegible]
Origin: [illegible]
Size: [illegible]
Body: [illegible]
Colour: [illegible]
Notes: [illegible]

BELOW LEFT: [illegible] depending on species.

RIGHT: *Brochis splendens.*



How the three Brochis species compare

Brochis britskii

[illegible]

Brochis multiradiatus

[illegible]

Brochis splendens

[illegible]

Note: [illegible]

Mix & match

Mail-order plant collections are the perfect way to fill a tank and experiment with varieties you wouldn't normally, says **Peter Bradley.**

BELOW: Remove dead or yellowing leaves from plants when they arrive.

Those I have tried of plant collections (available through mail-order companies) deserve a prize. They are such a cheap way of filling out a tank and also give you the chance to try plants that you would not normally have considered. In this way you can find out quite economically which plants are suitable for your water conditions and your fish.

For instance, the South American Ancistrus catfish will happily eat all South American plants, especially Echinodorus, and [illegible] specimen. [illegible] own right. But give them Java fern, the African Anubias or Hygrophila from Asia and they turn their noses up. Common stem plants are also ignored, unless the fish are really, really hungry.

There are, of course, exceptions to the rule. Black and brown hybrid Ancistrus from Eastern Europe have an annoying habit of rasping all day long on Anubias, which is eventually left with badly rasped holes.

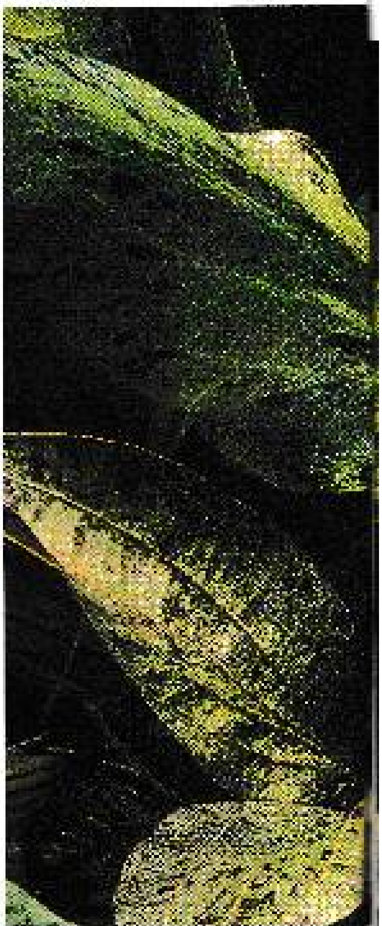
It was through another collection that I discovered that the Rosy tetra, a rather boisterous fish which seems to enjoy tearing up plants, absolutely hates Amazon swords. But avoid [illegible] as this is [illegible] fish. They also like fine, grass-like plants, as [illegible] fish.

Should you have voracious herbivores, the best bet is to choose fast-growing plants such as the [illegible] species, Mexican oaks. These plants can grow up to [illegible] a day, and so won't suffer if fish chomp through a few inches.

Which plant for where

Through plant collections, I have been forced to re-examine certain plants that I once ignored, and I have to admit that I now find these to be real gems.

Take the Cabomba. Being a true aquatic plant, it spends its whole life underwater and has been available to the trade [illegible]. However, I found it always [illegible] and so gave up on it. An [illegible] labelled Cabomba [illegible] it was Cabomba aquatica rather than C. caroliniana. C. aquatica never



liked my hand, aka into water, whereas the other thrives and its pinnate leaves turn a lovely orange-brown as it grows towards the light.

Then there is *Egeria densa*. The best way to describe this plant is as a tropical version of *Elodea*.

Sagittaria is another wonderful and undemanding plant that I would never have chosen myself had it not come part of a collection. I am waiting to see if it survives my hard London tapwater as it only likes soft to medium-hard water – but you never know.

[illegible] is a plant I could not get my head around – and once again I was forced to give it a go. I find this plant incredibly difficult to grow under water, probably because although most varieties are tolerant of most water conditions, they do require bright light.

However, once I put them on a south-facing windowsill under an inverted goldfish bowl, they produced lovely, single, purple flowers and suddenly became a doddle to maintain. Maybe it just doesn't like being drowned!

When it arrives...

I immediately unpack a collection the moment it arrives as the plants need to float in water to recover fully from the delivery. If stem plants are left on the surface for a few days, they will develop roots, ensuring a better chance of success. Any damaged leaves are removed.

I also do a preliminary sorting into foreground, mid ground and background plants – and those that I do not have a clue what they are!

Plants with a good root system, such as on the Amazon swords, are trimmed by half as ironically, this stimulates root development.

Don't be surprised to find plants changing their appearance after a while in the aquarium. Most collectors include plants grown in the Far East, where the practice is to grow them out of water. As such, their stems are stronger and the leaves shorter and rounder. They also get CO_2 from the air.

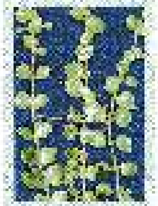
Once underwater, they become feathery and have to flop around to extract the precious CO_2 wherever they can find it. Examples are [illegible] stems, *Hygrophila difformis* and *Rotala rotundifolia*.

Regrettably, plant collections sometimes include terrestrial plants. However, these make nice houseplants.

Many include African and Asian ferns, as well as plants that need bright light and shade. What an absolute perfect opportunity for novices to experiment! Especially if there are also classic crypts, Amazon swords and the like.

Finally, if given the option, include a bulb and a floating plant collection. Remember, nothing ventured, nothing gained. You also cannot argue about the exceptional value such collections provide.

GREEN LINE AQUATIC PLANTS



PLANT OF THE MONTH

Lysimachia nummularia
Order code [illegible] [illegible]

ANDY GREEN'S TIP OF THE MONTH

[illegible]

GIVEAWAY

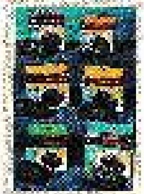
[illegible] Send your name and address to **Plants (May), PFK, Bretton Court, Bretton, Peterborough PE3 8DZ** [illegible]

GREEN LINE
Tel: [illegible]
Fax: [illegible]

Ask the Experts

Got a query or a fishkeeping problem? PFK's expert team of fishkeepers is on hand to help.

PRACTICAL LETTER OF THE MONTH



[illegible]

Tips on the perfect fish-house

I am planning to build a 2.4 x 2.4 x 2.1m/8' x 8' x 7' fish-house, insulating between the panels and covering the space with plasterboard. The base and roof will be insulated. Could I add a skylight to make use of natural light, and what is the most practical way to space-heat the building?

I intend to breed Malawi cichlids. Would a centralised filtration system be best, or am I safer filtering each tank individually to avoid the spread of disease?

PHIL MILLER, [illegible]

I fitted the fish-room in [illegible] with a skylight, but even with [illegible] polycarbonate sheet, a significant amount of heat was still lost. This area also seemed prone to condensation.

If you must have a skylight I would cut [illegible] so you can regulate the amount of light entering the building.

I use a small fan heater to space heat the fish-room. This is safe and does not require special ventilation as it does not give off fumes.

While I'm a fan of centralised systems, I feel that individually filtered aquariums are better for breeding projects. You can run dozens of foam filters, such as [illegible] 2000, on a large air pump such as used in [illegible]. This cuts down on initial expenses and running costs. And foam filters do [illegible].

A centralised system will require a power[illegible] pump and [illegible] steriliser, which uses up a lot of electricity. In addition, all aquariums will need to be drilled.

JASON SCOTT

Corydoras like their hiding places...

Suitable plants for Corydoras

What are the best plants for a *Corydoras* set-up, and is it right that they also appreciate beech leaves and branches?

P. GUEST, CAMBUSLANG

I would recommend the following plants: [illegible]

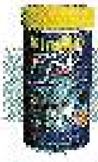
Corydoras prefer tanks with hiding places among wood, whether this be bogwood [illegible] or beech wood which [illegible] collect myself and soak.

[illegible] leaves in their [illegible].

They [illegible] them and allow them to dry naturally [illegible] in the oven.

You might then have to [illegible] them to get them to sink.

CHRIS SALEH



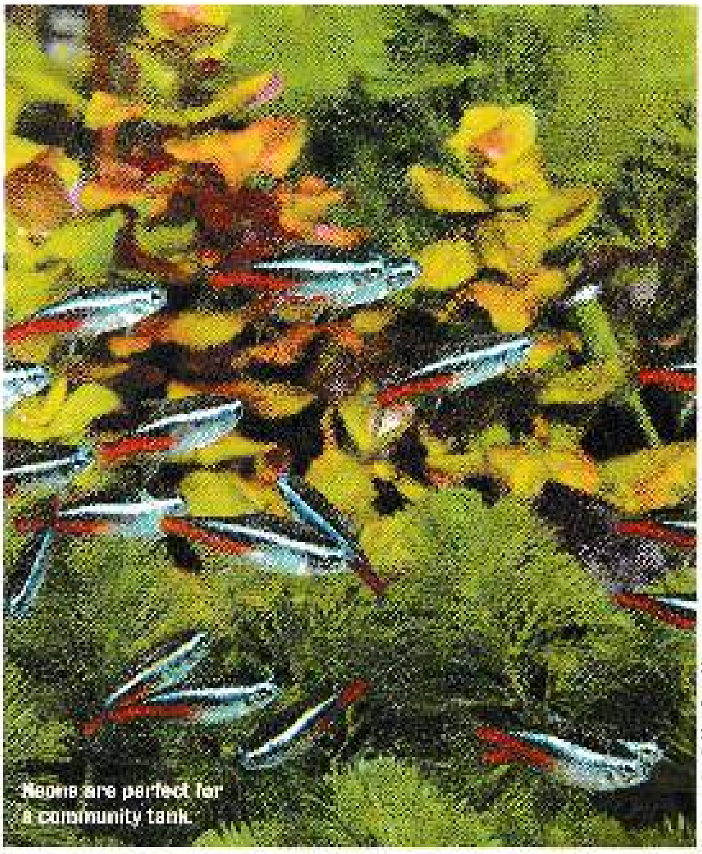
Sponsored by Tetra – experts in fish health

All pillars of the community

Q I am setting up a 101cm/40" tank and want to keep 10 Neon tetras, three Glass catfish, two *Otocinclus affinis*, a Golden sucking loach, seven White mollies, eight platies and a Silver shark. Are they compatible?
DANIEL WHITE, VIA EMAIL

A All the fish you list are community species so will mix well. All accept flake foods, and decent water quality is fine.

The top 10 community fishes are Neons, *Paracheirodon innesi*; Cardinal tetras, *P. axelrodi*; Angels, *Pterophyllum scalare*; Guppies, *Poecilia reticulata*; mollies, *Poecilia* sp. – but not the Black molly, which is really a brackish water fish; Platies, *Xiphophorus maculatus*; Swordtails, *X. helleri*; Zebra danio, *Danio rerio*; Dwarf gourami, *Colisa lalia* and *Corydoras* catfish.
DAVID FORD



Neons are perfect for a community tank.

The price tag may decide

Q I am setting up a 78.5 x 50 x 40cm/31" x 20" x 16" aquarium, to be stocked with livebearers and *Corydoras*. Could I also keep either a Zebra peckoltia or a Whiptail catfish? If so, which would you recommend?
JESS GILLINGHAM, SURBITON

A Either of the above are suitable. Whiptails, sometimes referred to as *Rineloricaria*, are inexpensive, at £6-15 each, and are quite happy kept in pairs or small groups. They appreciate a mixed diet of algae wafers, sinking pellets, granular foods and flake, as well as frozen bloodworm and vegetables such as courgette or cucumber slices.

The Zebra peckoltia, *Hypancistrus zebra*, is a member of the same family and comes from the Rio Xingu in Brazil. Over the years it has been overfished and although captive breeding projects are underway, I recently saw some for sale at £75 each. They require meaty foods such as frozen bloodworm, chopped mussels and prawns.
CHRIS RALPH

Whiptails like a mixed diet.

YOUR TROPICAL EXPERTS

[illegible] questions@practicalfishkeeping.co.uk [illegible]

PLANTS: PETER HISCOCK [illegible]

HEALTH: Dr PETER BURGESS [illegible]

[illegible]

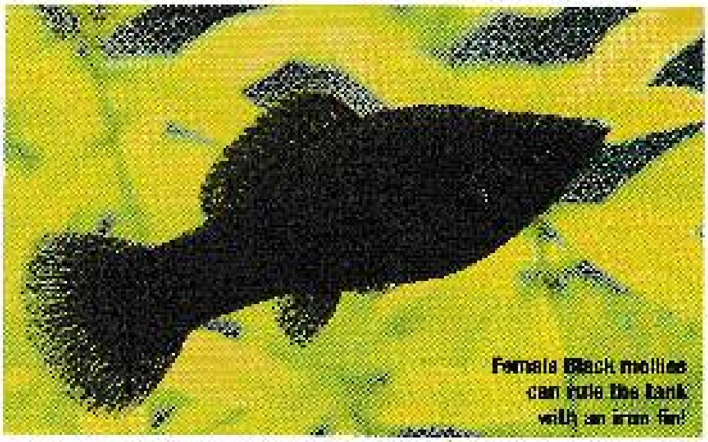
Walk before you try to run

My school fish-keeping club has been given £200, and we would like to breed fish and sell them on to our local pet store. We are looking at *Apistogramma*, Discus, Cucumber plecs, Killifish, some of the rarer *Corydoras*, *Otocinclus* and Wood shrimps. We have access to a de-ioniser or my own RO unit, and several 90-120cm/3-4ft tanks. What do you think?

[illegible]

[illegible]

Good golly, Miss Molly!



Female Black mollies can rule the tank with an iron fin!

I have a large Black molly which always chases a Buenos Aires tetra. Is this evidence of territorial behaviour?

DAVID SHOWELL, VIA EMAIL

The Black molly is probably a female, which in all likelihood will be pregnant and sees other fishes as a threat to her impending brood.

A large female Black molly can [illegible] of community fishes. [illegible] could just be a personality [illegible] as different as people, with their own likes and dislikes. All you can do is separate the victim and aggressor as you certainly won't change them.

DAVID FORD

How to breed Dwarf gouramis

I have a 60 x 30 x 30cm/24" x 12" x 12" planted aquarium containing a pair of Dwarf gouramis and a Clown loach. The fish are fed a varied diet of live and prepared foods, but I can't get the gouramis to breed. Can you help?

CHRISTIAN DYTE, BRISTOL

The gouramis may spawn of their own accord, but keeping the fry away from the loach will be a problem. It is best to remove it.

This is how I would set up the breeding tank: plenty of floating and rooted plants, in a temperature [illegible], which needs raising to trigger spawning, [illegible] aim for a pH of 6.5 and not bother with an active filter to begin with. Feed plenty of live food, and if there are no signs of courtship, separate the pair for a week or two.

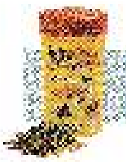
When spawning is about to occur, the male [illegible] bits of plants and incorporates them into a bubblenest, which appears like a dome at the surface.

The female, which should be gravid, joins him underneath the nest and shows her willingness to spawn by nudging his side. He will curl his body around her and they will embrace for a few seconds. This is a sort of feeling-out process and can continue for a while. The actual egg-laying [illegible] takes place when the fish turn, so the female is below and under the nest. The eggs are glass-clear and float up into the bubbles. Any that are scattered are collected into the nest by the male.

The eggs hatch after a day or so, when you can either take the nest out and rear the fry alone or leave them with the parents. The tiny fry need a liquid fry food, followed by baby brineshrimp, Cyclops or TetraMin for Egglayers. You need to perform lots of small water changes or the tank will foul quickly.

You will find a great variation in fry size and have many deaths, but nonetheless this is fascinating fish to breed.

ANDREW SMITH



Betta thinks it's a catfish

Q **My Siamese fighter has developed a taste for the catfish pellets I feed to my *Corydoras* and will not touch flake food. Each pellet is small enough to fit into his mouth, and he picks them up and spits them out several times before swallowing them with an odd movement of the head. Is it likely they may choke him, and are there other foods I could try him on so that the catfish get their fair share?**
KEV GARDNER, CHERTSEY

A It is rare for a *Betta* to choke on dry food, even when it's as large as a catfish pellet. I have known them to take bits of live earthworm intended for my mouthbrooders, swimming around for ages before finally swallowing. Is there any way you can break the pellets up in case he grabs them?

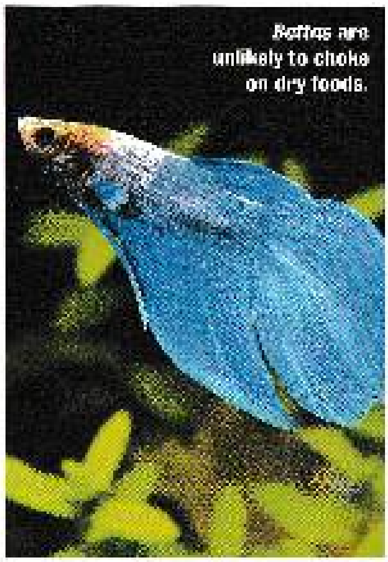
I don't know of any hard and fast way of getting him to take flake.

One thing that has worked for me, though, is that when a timid fish sees all the others in the tank taking flake, it will often come out and have some itself. If you could position a tank next to the one containing your *Betta* and feed the occupants flake, it just might work.

Try and vary the diet by adding live foods such as *Daphnia* and *Artemia*, something he can chase and which will stay alive long enough for you to get the pellet food down to your *Corys*.

A *Betta's* diet in the wild would consist of lots of insects and other small animals.

Many of the prepared dried foods are high in protein, so without knowing exactly which pellets you are using I would imagine that they would not be doing your fish any harm.


Bettas are unlikely to choke on dry foods.

FACTFILE


The Black widow tolerates a wide range of water conditions.

Common name: Black widow tetra
Scientific name: *Gymnocorymbus ternetzi*
Size: 5cm/2"
Origin: South America: Paraguay, Bolivia and Rio Guapore.
Aquarium: 60cm/24" and over. Tolerates a wide range of water conditions but prefers soft, slightly acidic water in the range pH 6.5-7.0. A planted tank with plenty of open swimming space is best for this species.
Diet: Omnivorous. It's easy to feed and readily accepts flake, frozen and live foods.
Breeding: The female is slightly rounder than the male. This species scatters its eggs among fine-leaved plants. No parental care is exhibited.
Notes: There are now several different varieties of this fish, including albino and long-finned forms. Can be nippy with longer finned fish - keeping them in a shoal will help reduce the likelihood of this happening.

It's white, and it's not right

Q **Two weeks after setting up my aquarium, I noticed some strange white algae on my Mopani wood. I scrub it off, but it keeps coming back. How can I get rid of it?**
M. VITO, LONDON

A The growths are either harmless fungi or slime moulds. The wood probably still contains nutrients that these organisms are feeding on, just as a dead tree in the forest becomes colonised by fungi.

You could try soaking the Mopani wood in a clean, soap-free bucket of hand hot water to help the nutrients leach out.

Leave it in the bucket of cool water for a few days before returning it to the tank. If the fungi or moulds return, they should eventually disappear.
PETER BURGESS

Frequently asked questions on...

fish identification

Matt Clarke concludes his series of fish identification for experts by explaining why morphology is studied and how you can use it to identify your fish.

What is morphology?
Morphology is the study of form and structure. It's a very diverse subject and can look at anything from the shape of teeth on the pharyngeal bone to the distance from the tip of the nose to the end of the tail. Since it's so broad, it can also be immensely complicated, but thankfully fishkeepers really only need to know the basics of taking measurements to get by.

Combined with a knowledge of meristics (see PFK, April 2004) and access to the right information, you should be able to improve your chances of identifying a range of rare fishes.

Why is it studied?
Closely related fish species differ in the presence of various features, their structure and size in relation to other body parts. Taxonomists need to detail these features and their relative sizes when they describe a new species and when they attempt to resolve the evolutionary family tree (phylogeny) of a group.

Those fish that are derived from the same common ancestor and share a common feature (called a synapomorphy) are considered more closely related to each other than other ancestral species which lack the feature. As a result, they'll be grouped together in the phylogeny and, in a broad sense, might form a genus or species complex.

Are bones and muscles studied?
Yes. The study of bones is called osteology and the study of muscles is called myology. Both areas are very important for certain groups of fish. Work on identifying and describing cichlids, for example, often involves painstaking work on the bones and teeth of the mouth. It's not feasible for a fishkeeper to study these as the subject is too complex, particularly on the muscular side of things, but you'll often see these referenced in descriptions and classifications.

Osteology and myology involve lots of serious work. I did a research degree in the fish section of The Natural History Museum studying the osteology and myology of the pelvic girdle region of pseudochromid reef fishes with the aim of investigating how the fishes were related to each other. This involved literally hundreds of dissections and microscopic examinations of pickled fishes, and special transparent specimens which had been stained to make their bones and cartilage visible.

Which aspects of morphology can be studied by a fishkeeper?
Measurements of the form and features of a fish are within the grasp of most fish experts. They are usually made on dead fishes, so you'll have a tough job trying to get them from fish in your tank, although you may get fairly close using a series of photographs of the same specimen. A good fish in a photo tank is the ideal thing to use.

Most scientists use scientific callipers or sometimes needle-point dividers to make measurements, although you can use a ruler for an approximation.

There are lots of different measurements that are widely used in all groups of fish, but some, such as the lengths of barbels and the like, are specific to certain orders.

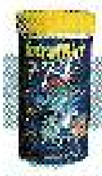
The main measurements used are on the picture of the fish opposite.

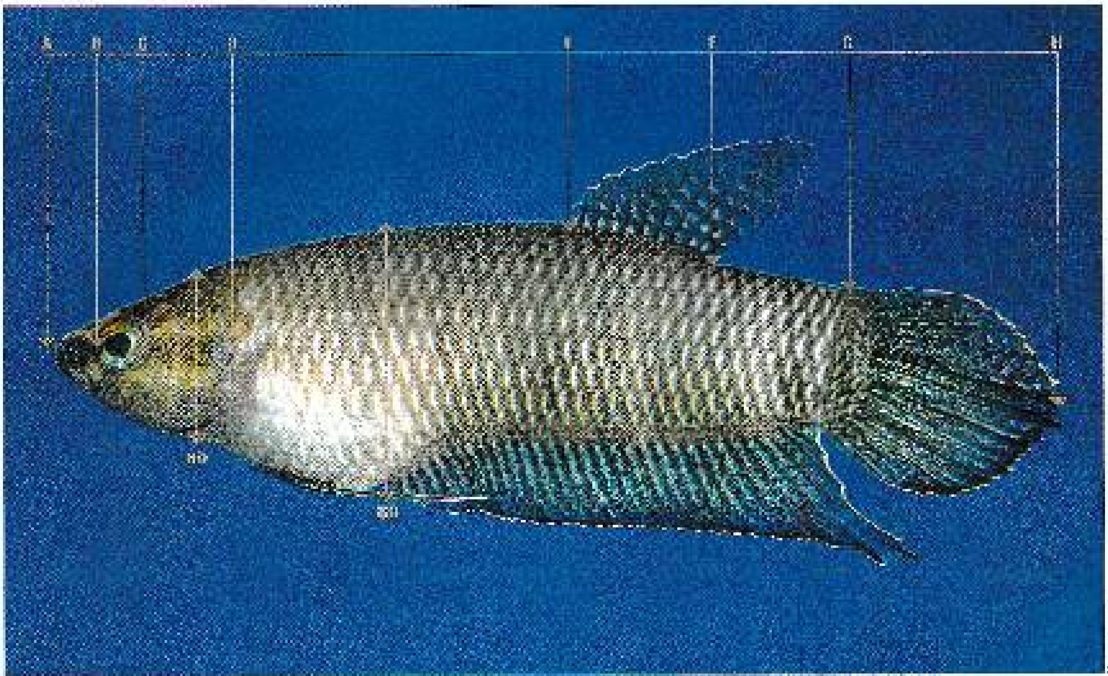
How can I make it easier to ID a rare fish?
Ask your dealer where the fish came from. If you can pinpoint the origin of the fish, you should be able to rule out some similar-looking species. Bear in mind, though, that only the larger stores import their own fish directly, and most of the smaller shops will buy them from wholesalers who often know little more than their country of origin.

The other snag is if you're looking at fish exported from, say, Brazil, the area from a single airport covers can be an enormous geographic area of several thousand miles squared. In this case, the country of origin may not narrow it down much.

The fish I have identified differs from the norm. What should I call the fish?
If the fish looks atypical, then you should put cf. or aff. in the name you give to the fish (eg *Crenicichla* cf. *regani* or *Neolamprologus* aff. *multifasciatus*). These Latin abbreviations, which stand for conform and species affinis, basically state that the fish looks very much like this one, but may, or may not, be identical.

Many species have lots of intraspecific variation, so members of the same species can give different morphological measurements and have different meristics. As a result, just as things like fin rays will be shown as a range (say 12-15 dorsal fin rays), you'll often see measurements given in the same way (ie head length is 1/3 of total length).





Common measurements

A-H Total length (TL) The maximum distance from the snout to the end of the tail. This includes long, extended rays, as in gars and halfbeaks, and long, trailing tail filaments, such as those of many [illegible].

A-G Standard length (SL) The distance from the tip of the snout to the end of the vertebral column, not including the tail. Since we can't usually see the end of the vertebral column, you'd normally measure up to the flexure point of the caudal peduncle. However, this doesn't always line up with where the scales stop and the caudal rays start.

BD Body depth (BD) The distance from the highest point of the dorsal surface to the ventral surface in a straight vertical line.

A-D Head length (HL) The distance from the tip of the snout to the posterior-most part of the opercular membrane including any fleshy [illegible].

HD Head depth (HD) Sometimes called head height or head at occiput. This measurement goes from the top of the head vertically to the bottom of the head or breast.

B-C Eye diameter (ED) The distance between the margins of the eye socket and the cornea.

A-B Pre-orbital (PreO) Widely used in scientific studies, this is a measure of the front of the head.

C-D Post-orbital (PostO) The region behind the eye to the end of the operculum.

A-E Predorsal length A straight measurement from the tip of the snout to the first ray of the dorsal.

F-G Postdorsal length A straight line measurement from the base of the posterior of the dorsal fin to the flexure line of the caudal peduncle or end of vertebral column.

Why is it important to define the geographic race of a species?
An example of the importance of this has cropped up very recently. For donkey's years, all of the slightly different forms of C. frontosa have been lumped into a single species – C. frontosa. However, recently a second species has been described – C. gibberosa (Takahashi & Nakaya, 2003), although some see this as controversial. This species, which includes the Zaire blue and other southern forms, has also been kept and bred by fishkeepers, some of whom have spotted subtle differences in its behaviour and reproduction.

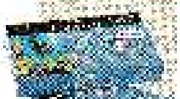
Sadly, for those who chose not to define the specific race they were talking or writing about, all of this information has been essentially lost through mixing it up with that of C. frontosa.

If the supplier tells you the name of the race, take a note of it and pass it on if you provide information, or fry, to other fishkeepers. In this way, you'll preserve the knowledge of the species if it's ever split.

More information
It's all very well to identify a fish from a book, magazine and get stuck on the terminology. Try the glossary at Fishbase.org, which includes [illegible] majority of the common terms. It also provides measurements and [illegible] range of species.
www.fishbase.org

Tetra

CICHLID LETTER OF THE MONTH



Have I just been lucky?

I started a Tanganyikan tank with three *Neolamprologus leleupi*, which soon looked a bit sad – paler yellow and blue eyes turning blacker. I did a few partial water changes and two of them survived, one of which is dominant, keeping new introductions in their place.

Next I bought three 4cm/1.5" *N. brichardi*, which give the dominant *N. leleupi* plenty to do, taking the pressure off his partner. Finally, I bought a pair of *Julidochromis regani* and a trio of *Altolamprologus compressiceps*. The male Julie was soon put in his place and the female found safety by hiding upside-down near the surface.

The *compressiceps* seem submissive, so I sectioned off their corner of the tank for a while, and they now seem healthy and cope well with their boisterous companions.

Is there any way of telling the sex of *N. leleupi*, and at what age do sexual differences start showing in *N. brichardi*? Given that the male and female *J. regani* seem to get on well, are they likely to remain compatible? Have I been lucky in what I've done so far?

JEREMY STACKMAN, VIA EMAIL

That dark, glassy-eyed look is typical of [illegible] colouring, and Tanganyikans are very sensitive to these problems – don't do this again!

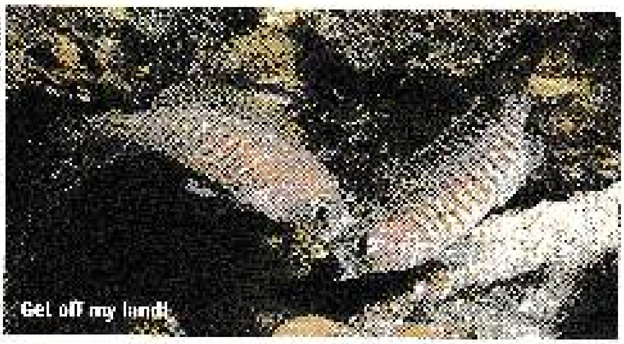
N. leleupi are not easy to sex. Eventually, males are larger and develop a slight humped look to the head, but otherwise it is guesswork. It is probably a good sign that you have an obvious male and female, but the [illegible] other is still alive, so [illegible] very gently [illegible].

Neolamprologus brichardi can be sexed quite reliably at about 3cm/1.25" – at this size, the fin extensions haven't developed, but the light edgings to the unpaired fins are much bolder in the males and look longer. After that it becomes nigh impossible until the fish are fully grown, when males are larger and have longer fin extensions.

Don't expect the *leleupi* to be easy: they seem to be fairly [illegible] to spawn, living solitary lives otherwise. The *brichardi* should be little or no trouble.

The *Altolamprologus* are unlikely to start anything, either among themselves or with other fish, but be warned, when breeding, the male turns territorial and may harm your Altos. Also, they are fry predators.

Julies are unpredictable: try to keep disturbance to a minimum as they are noted for getting upset at change and going through a divorce that is fatal to one partner.



Get off my land!

Problems with moving house

I have a 120 x 38 x 38cm/48" x 15" x 15" tank in the process of maturing, into which I wish to transfer the occupants of two 60cm/24" Tanganyikan tanks. These comprise a pair of *Neolamprologus brichardi*, which live and spawn in their own tank, plus two *N. leleupi* and two *Julidochromis ornatus*. I should like to add a few more *ornatus*, some shell-dwellers and a few *Tropheus* sp. Is this plan workable?

L D LOVELL, VIA EMAIL

By all means combine these fish, but be prepared to end up with just one pair, as it is unlikely that the first pair that spawns will dominate the others. If the *brichardi* and *leleupi* have carved out territories, it becomes even less likely.

Yes, you can have some shell-dwellers on the open sand in front of and between rockpiles, but one or two pairs of these territorial fishes should be your limit – unless you go for *Neolamprologus multifasciatus*, which forms close colonies [illegible].

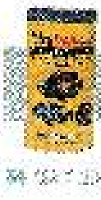
The *Tropheus* are not a good idea. I have kept *N. brichardi* and *Tropheus duboisi* in a 120 x 45 x 45cm/48" x 18" x 18" tank, but there were just two pairs of the former and the *duboisi* were usually more peaceful than the others.

The extra tank width and depth are significant. The *brichardi* lived at the front, the *duboisi* at the back and off the bottom. But you have a smaller tank and more aggressive species than I did – and you plan to add more.

One way you might get away with a few *duboisi* is to establish your substrate-spawners, then add some youngsters – although my success in doing it this way was by accident, not design. Had all the *Tropheus* and substrate spawners been mixed from the word go, or the adults added later, the substrate spawners would have retreated into the rocks and possibly been starved of food through their timidity.

A better plan would be a group of [illegible] *Cyprichromis*/ *Paracyprichromis*, but even this is stretching it in a 15" deep tank.

I would be inclined to stay with substrate-spawners and forget *Tropheus*.



Sciaenochromis fryeri is sometimes called the 'Electric blue hap'.

'Happy' days are ahead...

I have bought two *Haplochromis ahli*, which are in a 45 x 30cm/18" x 12" quarantine tank, but I can find no information on them. I am setting up a 120 x 38cm/48" x 15" aquarium for them.
NICK LYON, HOLYWELL

[illegible]

More Frontosas than Harrods...

I am planning to set up a 120 x 30 x 45cm/48" x 12" x 18" bow-fronted tank for *Cyphotilapia frontosa*. Is this big enough? How many could I keep? What background would show them off best?
[illegible]

[illegible]

YOUR CICHLID EXPERT

[illegible]

DISCUS LETTER OF THE MONTH

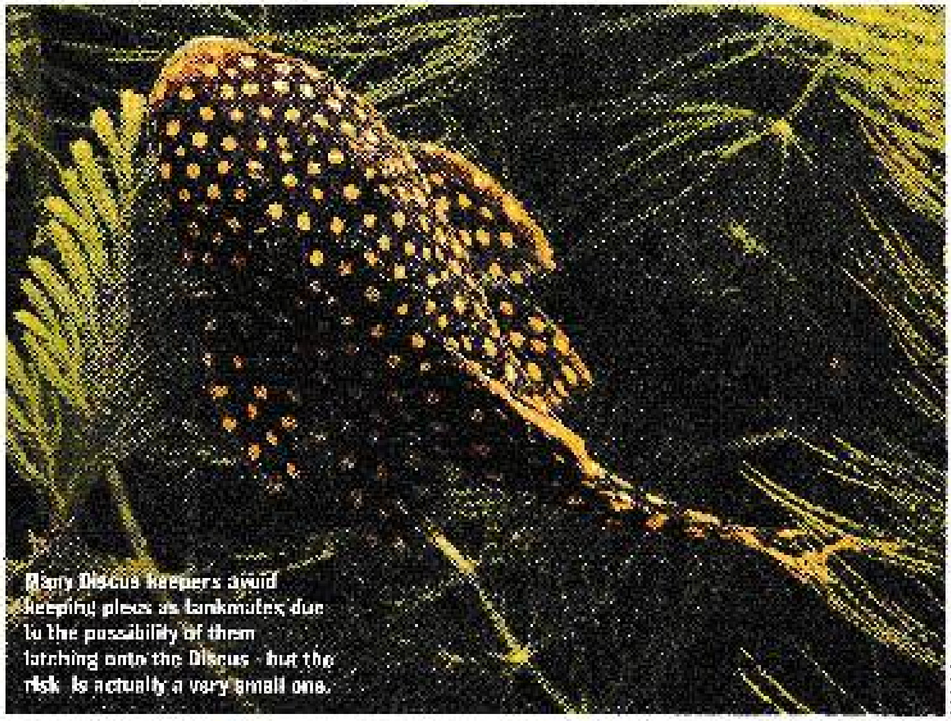
No likelihood of a love bite here

I recently introduced a Gold nugget plec to my Discus tank. If it ever decided to turn on one of these fish and latch onto it in the night, how would I know in the morning?
[illegible]
BARCOMBE

People often express concern about plecs [illegible] [illegible] only ever seen it happen once in 10 years [illegible] [illegible] in every tank I have.

If it were to happen, [illegible]

[illegible] In that case, the injury [illegible] [illegible] won't occur.
MARK EVANDEN



Many Discus keepers avoid keeping plecs as tankmates due to the possibility of them latching onto the Discus - but the risk is actually a very small one.

Tapwater surely can't be that soft

The KH reading in my 1.2m/4' tank is zero, with other parameters pH 6.8, GH 6-7, nitrite zero and nitrate 10-25ppm. How can I increase carbonate hardness? The tank has been set up for five years, but my six Discus are recent introductions, sharing the aquarium with a shoal of Neon tetras and two baby Bristlenose catfish.
ALAN LAW, TODMORDEN

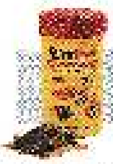
Before you increase the hardness value in your tank, I would suggest that it's extremely unlikely your zero KH reading is [illegible] [illegible] present.

[illegible] compare the readings.

You [illegible] weekly water changes, the GH and KH ought to [illegible] of the mains supply.

Other ways to raise hardness include adding small amounts of [illegible] gravel or [illegible] to the filter, or a little sodium bicarbonate [illegible]

Adjusting one element of water chemistry will affect the others, not always favourably.
MARK EVANDEN

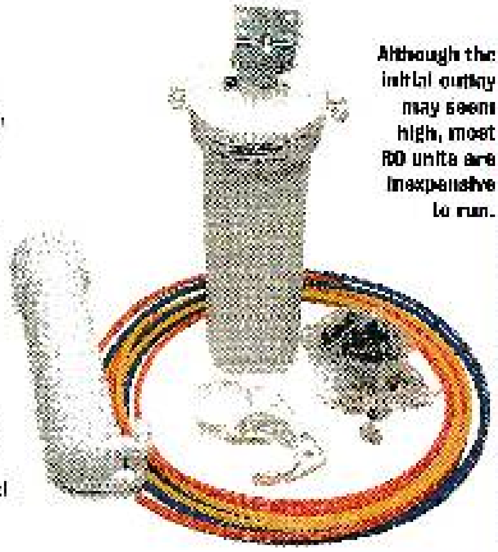


No short cut to soft water

Please could you tell me if there is any way of obtaining soft water without having to invest in an RO unit? I don't fancy using peat, as I fear it will darken the water and prove messy.
MRS C SAVAGE, CHELMSFORD

Unless you have soft water straight from your tap (unlikely in Chelmsford), the answer is no. [illegible] peat has a bad press and not without good reason. [illegible] large amounts of very soft water, but regenerating [illegible] notoriously [illegible]. The [illegible] need [illegible] twice a week, but the cost of replacement cartridges is high.

A fully-fledged, [illegible] 100gpd RO, after the initial outlay, will produce soft water for around 2p a gallon, although this [illegible] will vary according to local mains water chemistry.
MARK EVENDEN


Although the initial outlay may seem high, most RO units are inexpensive to run.

YOUR DISCUS EXPERT

[illegible]

MARK EVENDEN [illegible]

Eggs won't hatch

I have a breeding pair of Discus, both of which are around 12.5cm/5" in size. They have been spawning regularly for a couple of months now, but the eggs don't hatch. They turn a yellowish white colour after a day or so and then fall off the spawning cone. The fish look after the eggs until then. I use a combination of RO and tapwater. The pH is 6.8, 3°GH.

Please could you tell me what, if anything, I could do to solve this problem?
GARY SWIFT, BEDFORD

Your Discus eggs could be failing to hatch for a number of reasons. Some of the most common reasons are that the male is infertile, or what appears to be a pair of Discus are actually two females, or the fish are just too young.

However, I think in your case the problem could be due to your general hardness. Try lowering it to 1°GH and then see what happens.

Good luck.
MARK EVENDEN


The water parameters in your Discus aquarium could affect the viability of any eggs.

The order of the media...

I have a 100 l/22 gal. aquarium for Discus. I am going to use an external power filter. Is there a recommended combination of media, and what order should I put them in?
J CAVE, LEEDS

You will need a mechanical medium, such as [illegible] clay, to remove larger debris, followed by a layer of foam and a biological medium, such as sintered glass products.

Finally, you'll need a layer of filter wool along with a bag of activated carbon. Both will need to be removed regularly.

Follow the maker's instructions as to how to layer the media. It's usually from the bottom of the canister: clay, foam, sintered glass, filter wool then carbon.
MARK EVENDEN

Ask the experts

Email: questions@practicalfishkeeping.co.uk

MARINE LETTER OF THE MONTH

Stony corals - but where?

My 250 l/55 gal. reef tank has been set up for 15 months and holds mostly soft corals, but I should now like to try some of the more difficult *Acropora* species. The mix will be an *Acropora* and a *Hydnophora* in the upper layers, a Sun coral and the stony coral, *Euphyllia ancora*, midwater, and a trumpet coral and a *T. dereasa* clam lower down. How should these be positioned in relation to one another and the 150W metal halide light source from above?

SCOTT GRIMSLEY
DAVENTRY

Choose your corals wisely as hard and soft species don't always mix well.

Waiting game with whitespot

I have just lost all my marine fish to whitespot. I could not treat the tank as it also contains invertebrates. At the moment I have a quarantine tank set up for the new fish to be introduced, and the main tank has been without fish for two weeks. When will it be safe to transfer the fish over?

An unhappy coincidence

Q **Shortly after adding a free sample of bacteria-friendly filter media to my 135 l/30 gal. fish-only system, my Regal tang began acting strangely, breathing heavily and showing the first flush of whitespot. I started a treatment with Myxazin, at which time only the tang was showing any symptoms of disease. The following day, I suffered a total wipe-out. Could this have been down to the change of filter media?**
JAMES WALKER, HADRIAN PARK

A It seems very unlikely that the filter media was at fault. More likely, infection was so severe given that your tang was showing signs of whitespot. It's possible that this was combined with another disease as the fish was breathing heavily. Fish generally have to be very badly affected by whitespot before respiration is affected, but this can be the first sign of velvet.

Velvet disease could also kill your fish quickly, without their showing many obvious symptoms. The treatment with Myxazin probably didn't help much. A copper sulphate-based medication such as Cupramine or Paraguard would have been better.

It is not clear, however, what would have triggered the infection in the first place.
PHILIP HUNT


Regal tangs

You've averted a real disaster

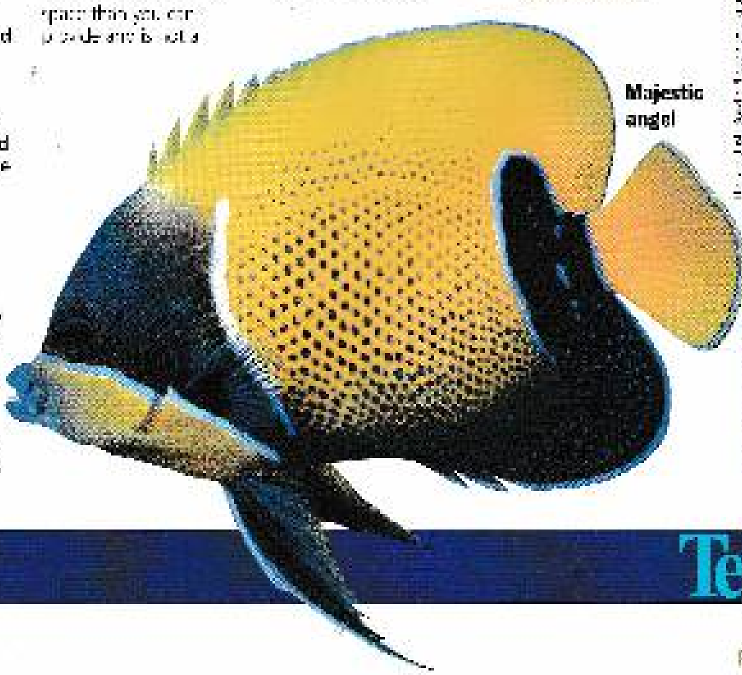
Q **I currently own a 120 x 45 x 45cm/48" x 18" x 18" reef tank, home to a Powder blue surgeon, Coral beauty, Common clown and Pyjama wrasse. I should like to introduce a Majestic angel and half-a dozen Blue chromis, but the more articles on stocking and compatibility I read, the more it confuses me.**
STEVE FUNGE, STOWMARKET

A Thank goodness you asked before buying the Majestic angel, as this fish can attain about 25cm/10" and therefore should not be housed in anything less than a 450 l/100 gal. system with many hiding places. It also feeds upon sponges and tunicates, and is known for picking on and distressing corals.

It is fine for a fish-only tank, but needs more space than you can provide and is not a good choice for your sort of system.

As for chromis, there are many types. If you were really talking about chromis, and not other types of damselfish which are usually aggressive, then the Blues would be a good choice.

I would also consider a small school of Green chromis, probably 10-15 to begin with. Some may die off as they can be sensitive to changes in salinity, but they are peaceful fishes and very inexpensive.
BOB GOEMANS


Majestic angel

Bust the dust that is diatoms

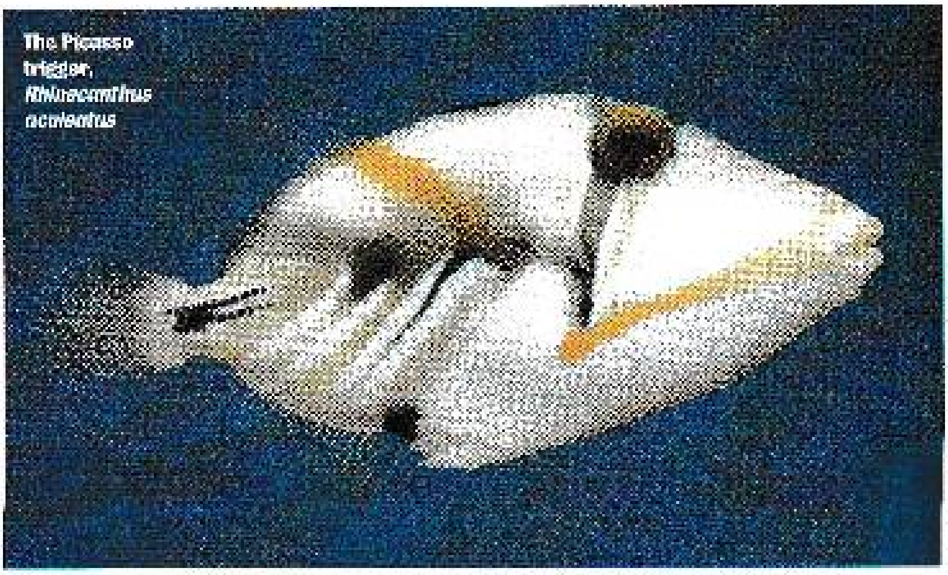
Q I have an 81 x 36 x 50cm/32" x 14" x 20" marine tank which I should like to run as a mixed fish/invert set-up. It has been running for about 10 weeks after a three-week maturation period. A Blue and yellow damsel, a Blood shrimp, two sea slugs and two small hermit crabs are thriving, but other fish I tried to introduce – Lionfish, a Scooter blenny and a Hawaiian wrasse – all died. A golden-brown dust is now covering my sand and rocks, which dealers say is 'new tank problems'. What is this dust, and how can I get rid of it?

[illegible]

Hermit crabs

A The 'dust' is [illegible] diatoms [illegible]

[illegible]



The Picasso trigger, *Rhinecanthus aculeatus*

[illegible]

Limited by tank size...

Q I am setting up a 120 x 45 x 38cm/ 48" x 18" x 15" fish-only tank and would like to keep a scorpionfish and possibly a moray eel, as well as batfish, triggers, surgeonfish and angels.

[illegible]

A A tank your size, even [illegible]

[illegible]

Sponsored by Tetra – experts in fish health

Dealing with hitch-hikers

Q When I bought a green Xenia for my year-old reef tank, I noticed there was something else growing in the middle of it. I took no heed at the time, but now loads of these animals are popping up on my living rock. I think they could be *Anemonia majano* which, I am told, will sting everything in sight. How do I get rid of them?

M. FORRESTER, [illegible]

A Anemonia majano is a small species of anemone that can quickly reproduce asexually in the aquarium. It is considered a pest as it can overgrow and suffocate stony corals. This is a shame really, as they are attractive animals in their own right, looking like miniature bubble-tip anemones, often with fluorescent green tentacles. [illegible] in its own system, [illegible] if they show signs of spreading.

To control them, you can either break off the bit of rock on which they have settled, being careful not to leave any fragments behind which could give rise to new anemones, or inject them with a strong solution of calcium chloride. [illegible] Peppermint shrimps [illegible] will eat some of them.

TIM HAYES

FACTFILE

The Flameback angel is easy to feed.

Common name: Flameback [illegible]

Scientific name: [illegible]

Origin: [illegible]

Size: [illegible]

Diet: [illegible]

Aquarium: [illegible]

Notes: [illegible]

[illegible]

PHILIP HUNT

It depends on which boxfish...

Q I plan to separate a Spiny boxfish from my current set-up and house it alone. Would a spare 120cm/48" tank suffice, so long as I do not add any other livestock?

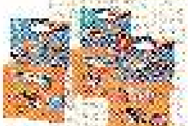
DANIEL [illegible], VIA EMAIL

A If by 'Spiny boxfish' you mean *Diodon holocanthus*, also known as the Porcupine or Spiny pufferfish, then [illegible] a 120cm/48" tank would be [illegible]. This species grows to at least 30cm/12" and the minimum size tank you should aim for is [illegible] gal.

If you mean [illegible], the Spiny or Thornback [illegible], which is a member of the boxfish family, your tank would be fine as the species grows to only [illegible].

PHILIP HUNT

Diodon holocanthus grows to at least 30cm/12".



[illegible]

Such a gas

At times my four Orandas suffer from buoyancy problems, but I have found that feeding them only frozen bloodworm alleviates the condition. Will this restricted diet harm them in the long term?
C. WIGGINS
MALMESBURY

[illegible]

JOE SMARTT

The wrong diet could cause flatulence in goldfish.

Curse of the black spots

I have a 3m x 30cm x 45cm/10' x 1' x 1.5' outdoor cattle feeding trough which is planted up and stocked with five goldfish, a weather loach, two orfe, two tench and several sticklebacks.

The goldfish have developed small black marks on their body and tail fins.

The trough, which has been set up now for four years, incorporates a covered rill, the water being circulated through the system by a pump.

The pH is 7.5, with ammonia and nitrite nil and nitrate at 5 ppm. Is it possible to have the water tested for toxic metals?
[illegible]

[illegible]

NICK FLETCHER

Nuisance algae keeps returning

My 14,528 l./3,200 gal. pond is fitted with a filter and a pump turning over 8172 l./1,800 gph, a UVC and a magnetic blanket weed controller. Last summer I was getting prolific floating algae, which I could not net out fast enough to keep in check.

Eventually I bought three algae control mats and put them into the filter box. They worked well for three months, but then exhausted themselves.

During the winter the algae returned, though this time it did not float but stayed on the bottom, where it was easy to net out.

I have now made up three large bundles of barley straw to see if that does any good. I never change any water as the quality always seems so good, but could this be at the root of the algae problem?

G. GODDARD, W. MIDLANDS


Water changes are essential to reduce nitrate levels in your pond.

You cannot expect a single, relatively small pump-fed filter like the one you are using to cope with more than a fraction of the generated solids. The remainder are breaking down into sludge and contributing to the organic loading on your system, and the undoubtedly high nitrate levels are promoting algal growth.

The anti-algae mats worked well, but they cannot be expected to last forever. Be careful of home made barley straw alternatives. The straw must be pesticide-free, and if you put too much in, far from working as you intend, it will decay and increase the organic loading further.

The reason the current winter crop of algae is not floating is that light and temperature levels are still too low for photosynthesis. Once algae (as plants) begin to photosynthesise, gas bubbles form which lead to clumps rising to the surface.

You need to upgrade your filter, vacuum your pond thoroughly, and carry out weekly 10% water changes.

NICK FLETCHER

'Jelly' growth is really fungus

One of the goldfish in my pond took to hanging under the waterfall return and seemed to have some sort of growth on its body. When I netted it out, it was covered in a green, jelly-like substance, and did not respond to treatment.

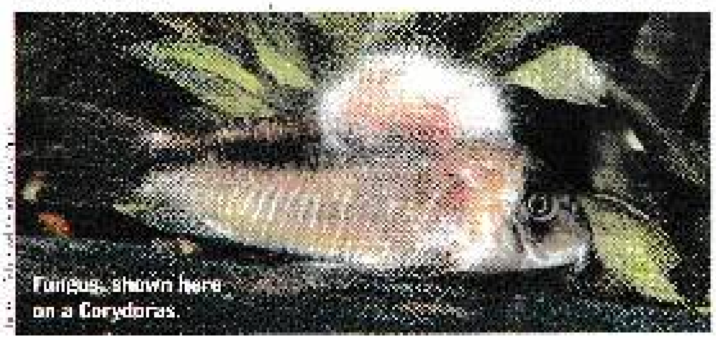
I am now worried that my other fish could catch this disease, but what is it?

LORNA GOLD, LONDON

Your fish almost certainly suffered a bad fungal attack. In water, the cotton-wool like threads of Saprolegnia give victims a furry appearance, but when the fish are taken out of the water, these fine filaments collapse and appear more like a gelatinous coating. They tend to trap any particles in the water – in your case probably single-celled algae, which gave the fish its green tinge.

Fungi is opportunistic in the skin or mucus covering of fish, so your goldfish either suffered a wound or its defences were compromised by a parasite or a bacterial ulcer. It is quite possible this was a one-off, but do keep an eye on the other fish in the pond as they may be suffering a similar problem in its early stages. In that case they, too, will be attacked by fungal spores, which are present in all bodies of water.

NICK FLETCHER


Fungus, shown here on a Corydoras.

YOUR COLDWATER EXPERTS

questions@practicalfishkeeping.co.uk

Frequently asked questions about...
buying a pond pump...

Matt Clarke answers some of your most common questions on choosing the right pump for your pond.

What are pond pumps used for?
The vast majority of PFK readers use their pond pumps for [illegible] supplying a constant supply of water to an external [illegible] filter. [illegible] pumps [illegible] fountains or waterfalls.

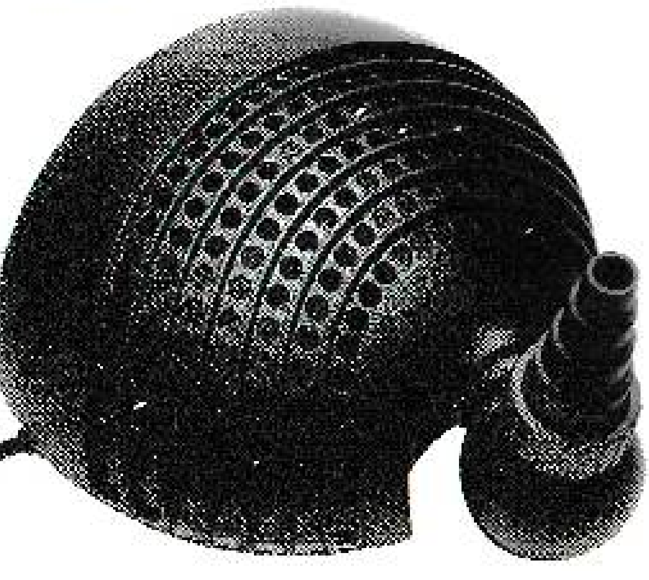
What sort of pump do I need?
It depends on what you want to use it for. [illegible] fall into three broad categories: fountain pumps, solids handling pumps and caged pumps.
[illegible] fountain pumps are the most basic and come with [illegible] a small sponge [illegible] some can be used to feed a waterfall or filter, but the flow is [illegible] between [illegible] a big one if you want to run several things at once.
These models are by far the most [illegible] to maintain and [illegible] clearing in a dirty pond.
Solids handling pumps [illegible] straight through without damaging their [illegible] so there's no need for a sponge, which makes them very low maintenance. These are the best [illegible] run a filter, but [illegible] unsuitable for fountains.
Caged pumps [illegible] somewhere between the two. They don't usually have a sponge [illegible] an oversized cage [illegible] bulky particles out of the pump, but they can only [illegible] with minimal [illegible].
Many can be used with a fountain and they require [illegible] maintenance [illegible] fountain-style pump [illegible].

If the pump has a pre-filter, do I really need a second filter?
I'm afraid so. The pre-filter is [illegible] a strainer to prevent solids from being sucked inside the [illegible] of the pump. It isn't a real filter and won't [illegible] water [illegible] or [illegible] safe for your fish [illegible] you'll need a [illegible] filter.

How do I pick one?
Once you've decided which style of pump is most suitable for [illegible] you'll need to determine the size you need. Don't single out a specific brand, just look at the size for now.
Ideally, you'll want to pick a pump that's capable of [illegible] (or "turning over") the volume of the pond once every hour, or at least once every two hours. So if you've calculated the volume as 6,835 l / [illegible] gal, you'll need a [illegible] that has an output of at least [illegible] 6,835 [illegible] but there's a catch.

And what's that?
The output figures quoted by pump manufacturers [illegible] head, which is [illegible]. The higher you pump the water above the surface of the pond, the higher the head and the lower the output.
[illegible] the pump is not actually lifting water above the surface, it [illegible] a hose and [illegible] your filter or water [illegible] above the water [illegible] the output drops.
If you are using the pump to feed an external filter or a waterfall, [illegible] you'll need to know how high [illegible] above the water level. This is the operational head.

How do I use the head to help pick the right pump?
Once you know what head you're [illegible] and the flow rate you want to achieve, you need to use pump performance curves provided by the manufacturer. These graphs show the output of the pump at different heights, and clearly show how much the output drops as the pumping height, or head, increases.
The [illegible] part is finding a pump



BELOW: Oase's Aquamax has won several PFK Best Buys and is highly rated by PFK readers too. Many other manufacturers have been influenced by its design...

Sponsored by Tetra - experts in fish health

which has the output you need at the same head as your filter or waterfall.

You may need to study lots of boxes before you find the right one for the job. The flow rate drops even more if you run a fountain or have lots of hose attached, as this causes frictional losses.

Always buy a bigger one than you think you'll need. You can turn it down if it's too powerful.

What else should I look out for?
Running costs. Some pumps can cost an awful lot to run. In previous buyer's guides to pond pumps, we've shown that it often makes better economic sense to pay a bit more for a pump that has a lower electrical consumption.

How do I calculate the approximate running costs?
The easiest way is to use the Electrical Costs Calculator on the PFK website. Simply enter the wattage, the number of hours you're running the pump for every day and the current price of your electricity per unit, and it calculates how much it will cost you. Running costs, including the cost over five years, are also included in our buyer's guide.

How do I install the pump?
All pumps should come with at least 10m/33' of cable attached. This should be fitted with a plug and the correct fuse, and then plugged into a circuit breaker in a dry place, such as a shed or garage.

If you need to extend the cable, you'll need to buy a special weatherproof cable connector and some cable. Connectors start in price at about a tenner.

How do I connect the pump to my filter or waterfall?
Most pumps come with a universal hosetail designed to take special hose ranging in diameter from 3/4–11/2". It's wise to pick the largest diameter that will also work with any other attached equipment, such as your filter or UV.

Using a narrower hose may decrease the flow rate. Special non-kink ribbed hose is the best stuff and fits snugly with a special rubber slip-on connector.

Should I turn it off at night?
No. A pump should be left running continuously, especially if it is running your filter. By passing polluted water through the filter, special bacteria inside are able to break down the pollution and make the water less dangerous for the fish. They need a constant supply of oxygen-rich water, and if you cut this down by turning the pump off at night, you could kill the filter, leading to poor water conditions.

Even if you have no filter but have some fish and a fountain or waterfall, you should still keep it running at night, especially in summer.

What maintenance is required?
Pumps need cleaning whenever the flow rate drops noticeably. Those containing a sponge may need daily cleaning. The impeller may also need cleaning periodically.

Are some better than others?
Actually, most of them are pretty good these days, but we'd recommend paying extra for one that can handle solids and has a low electrical consumption. Unless you're running a very small pond and don't have a filter, we'd recommend avoiding pumps containing a sponge if you want a hassle-free life.

Where can I find out more?
Sparsholt College ran a huge trial of pond pumps for us last year, and we revealed their findings in our May 2003 buyer's guide. Pond pumps don't change much from one year to the next, so this is still worth a read.

If you'd like to buy a photocopy of the buyer's guide, please call us on 01733 282764.

Which ones did well or were highly rated by PFK readers?
Two pumps stood out and were awarded with prestigious PFK Best Buys: the Oase Aquamax range and Blagdon's HydraTech Multi pumps.

The Aquamaxs have a superb recommendation among readers and the trade, and combine solid handling ability with good looks, high quality and low running costs.

Although they are more expensive than other brands of similar output, they quickly pay for themselves and have very long guarantees. They often run for months with little maintenance.

The HydraTech Multis are caged pumps and come with fountain fittings, but are equally suitable for using with a filter. They're cheap to run and worked well in the tests.

Are there any new ones to look out for in the shops?
A few manufacturers have launched new models since the last buyer's guide. Several of these are covered in this month's First Sight.

We're currently running our year's reader review on the website looking at pond pumps, so do help other readers out by letting us know what you think of yours.

LEFT: Blagdon's HydraTech Multi pumps did well in independent tests undertaken for us by Sparsholt College.

YOUR EQUIPMENT EXPERT

How does it work?

Heater thermostat

The correct lighting path

I am setting up a 120 x 38 x 45cm/48" x 15" x 18" mini reef tank and have been advised on many different ways of lighting it. It will house a range of soft corals and anemones. I also understand that success in such a tank depends as much on water circulation as lighting. What do you suggest?
FREDDIE BREWER, KINGSTONE

[illegible]

TOM HAYES

[illegible]

Benefits of a UV steriliser

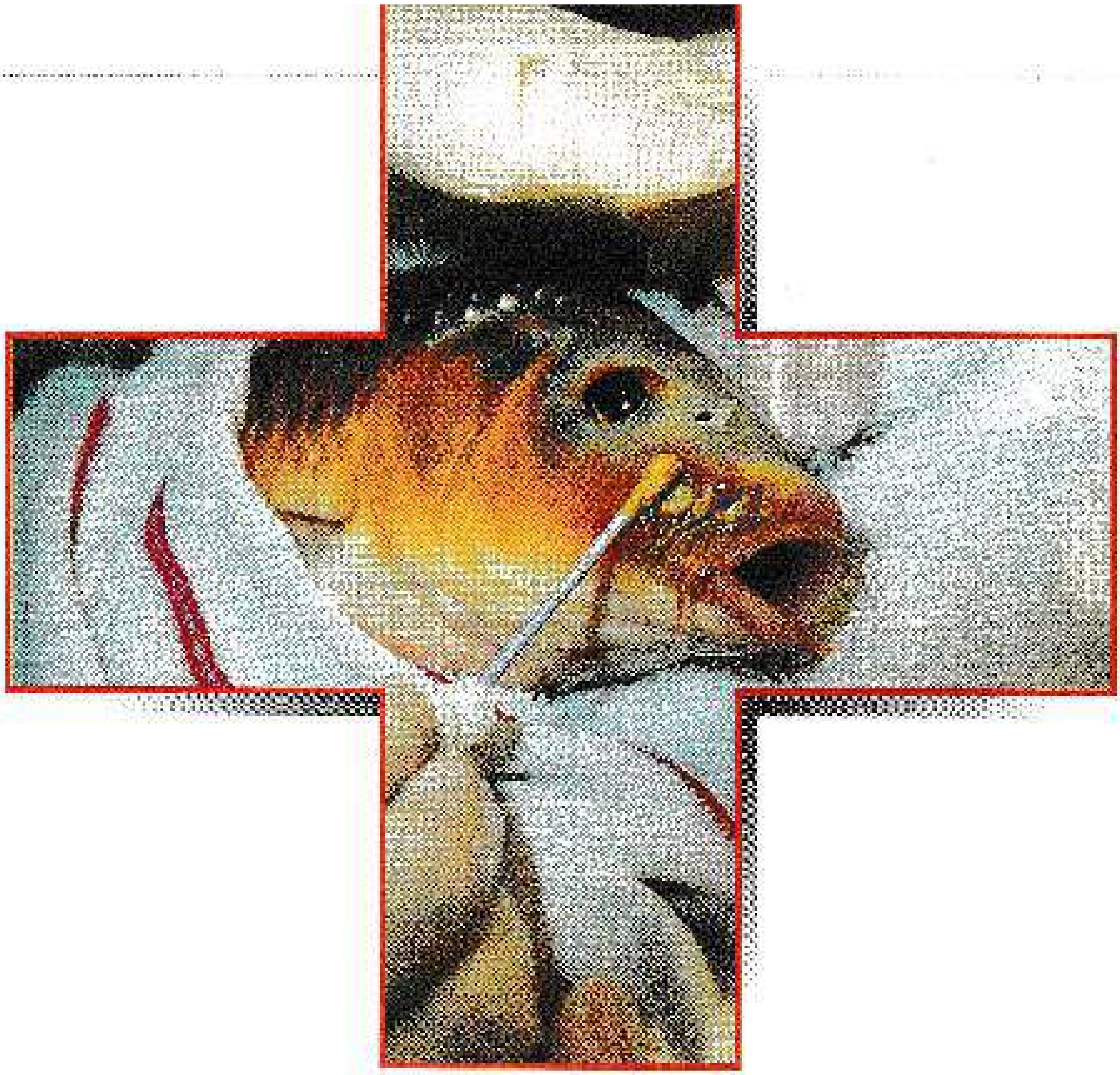
I am setting up a Sectiray 150 x 60 x 60cm/60" x 24" x 24" tank as a reef system. I've been told that a 25W Vecton UV steriliser is a good idea, but what are its benefits? I've also been recommended to use a Deltec APF600 protein skimmer. What is your opinion of this model?

[illegible]

Ways to keep nitrate down

Are there any nitrate-removing products for freshwater tanks that don't need to be incorporated into a filter?
SORREL WILLIAMS, [illegible]

[illegible]



What do you do if your fish has jumped out of its tank or has scratched its skin on a piece of rock? Dr **Peter Burgess** shows you the remedial measures to help you save your fish.

ABOVE: Extensive open wounds can be treated with a topical antiseptic, such as an iodine-based treatment sold for fish use.

FAR RIGHT: Use blunt tweezers to remove large bits of carpet fluff or other debris from your fish's skin.

Sooner or later you are bound to face an emergency situation involving your fish. Perhaps one has jumped out of its tank and lies lifeless on the carpet. Or maybe it has sustained a nasty skin injury. Knowing how to deal with the casualty can make all the difference in terms of its chances of survival.

A fish out of water

Many fish occasionally leap from the water, particularly if disturbed or when chased by another fish.

For some fish, leaving the water is an effective way of escaping pursuit by predators: the freshwater hatchetfishes (Gasteropelecidae) are masters of such aerial manoeuvres, propelling themselves through the air by beating their elongate pectoral fins.

In aquariums, leaping fish sometimes find a tiny gap in any opening in the hood, ending up flapping helplessly on the floor. It's amazing how fish manage to manoeuvre through the tiniest of apertures!

Two life-threatening problems face a fish stranded out of water.

Lack of oxygen to the gills
When exposed to air, the gills are unable to extract sufficient amounts of oxygen so the fish will eventually suffocate and die. The delicate gill tissues are also vulnerable to drying, which is also fatal.

Drying of the skin
When exposed to air, the skin's protective mucus coating will dry and the dermal cells beneath will start to lose water and die. As more and more skin cells die, the skin's protective layers are breached.

Even if the fish gets back into water, its dried-damaged skin will be prone to invasion by bacteria, fungi and other pathogens.

If you discover a fish out of the water, it [illegible]

Casualty

know how long it has been there.

Obviously, the longer it is exposed to the atmosphere, the less its chances of survival. If the fish is still flopping about and gasping, this is an encouraging sign that it has a fighting chance of recovery. But even if it appears inactive and its skin looks dry and covered in carpet fluff, don't give it up for dead. It is amazing how long some fish manage to survive out of water.

First-aid procedure

Return the fish immediately to water, ideally back to its own aquarium. If an aquarium net is to hand, pop the fish in the net and temporarily suspend this in the aquarium, ensuring the fish is fully submersed. This is preferable to releasing the fish back into its aquarium as tankmates may attack or peck at any fish that appears lifeless or swims unnaturally.

After its return to water, if the fish is still not moving, check whether it is breathing properly.

To do this, look for regular beating of the gill covers and/or opening and closing of the mouth. If there are no signs of breathing, try resuscitating the fish by passing a stream of water across its gills.

Use a pair of blunt tweezers to gently pull away any large bits of carpet fluff or other debris that's adhering to the fish's skin. Take extra care when extracting debris from the gill area.

Move the fish to temporary housing so it can recover by itself. A small quarantine aquarium is ideal. Rig up an air-pump and air stone: well-oxygenated water will assist breathing. If the fish is a salt-tolerant species (many such as catfish and tetras are not), a little salt will help alleviate osmoregulatory problems.

Closely monitor the recuperating fish. Even if the fish resumes normal breathing, its skin may take time to heal and its dry-damaged skin will be vulnerable to infection.

If the fish's skin appears badly damaged or patchy, dose the tank with a mild anti-bacterial medicine as a precaution against infection. The Aloe vera-based remedies (as sold for fish use) are excellent for this, being mild on damaged skin but effective against a range of skin-pathogenic bacteria.

Some of these herbal products are rich in mucopolysaccharides that help coat the damaged skin

Resuscitating a fish

The fish seems unconscious and is not breathing [illegible] its mouth rhythmically opening and closing as it tries to get more oxygen into its body.

However, giving your fish mouth-to-mouth resuscitation (the 'kiss of life') won't have the same beneficial effect as it does on a human! The best action is to pass oxygenated water across its gills.

To do this, keep the fish still, ideally by putting it in a net that is partly submersed in the aquarium.

Using a plastic pipette or clean eye-dropper, very gently squirt aquarium water in the direction of the mouth. The water jet will usually cause the mouth to open, enabling the water to enter the mouth easily and over the gills.

By repeatedly squeezing the pipette bulb, pump water into the mouth for a minute or so until the fish coughs into life and resumes breathing normally.

Note: This method is also useful for reviving fish that are slow to recover from anaesthesia.

ABOVE: Common causes of poisoning in pondfish include contamination by garden chemicals. (Children should always be supervised around ponds).

RIGHT: Tight-fitting lids are required with hatchetfish.

Remember... [illegible]

surface, effectively acting as a liquid bandage.

Return the fish to its own aquarium only when it has fully recovered. This may take several days to a week or more. If a weakened fish is returned too soon it may not compete well for food or might be bullied by tankmates.

Last but not least, minimise the risk of further escapes. Ensure the aquarium has a tight-fitting hood!

Skin and fin wounds

Injuries to the fish's skin or fins are fairly common. Sharp decor, eg sharp-edged rocks or gravel, can result in cuts or grazes to the skin. Fighting or other aggressive behaviour between fish can also result in skin damage or torn fins. And damage can occur when handling and transporting fish.

Most minor cuts and grazes to the skin or fins will heal by themselves without any intervention by the fishkeeper. However, whenever the skin is damaged, there is always a risk of infection, and this risk increases significantly under poor or unhygienic water conditions.

Where the skin damage is significant, as with a complete loss of part of the skin covering, isolate the fish and maintain scrupulously clean water conditions throughout the healing period. An anti-bacteria treatment will reduce the likelihood of the wound becoming infected.

Extensive open wounds may be cleaned and dabbed dry before treating with a topical antiseptic such as an iodine-based treatment sold for fish use. The wound may then be smeared with a sealing ointment, such as Orabase, which also [illegible].

Cleaning and sealing large wounds will reduce the risk of infection and may help reduce the wound's 'leakage' of salts and water, which could otherwise affect the fish's ability to osmoregulate.

In some cases, the fish should be anaesthetised beforehand to prevent it from struggling or experiencing pain during wound treatment.

Fish anaesthesia is generally best left to a vet or other suitably trained fish health professional. However, some anaesthetic products (eg Koi Calming NT) are sold for hobbyist use and come with instructions.

Specialist Koi health suppliers stock a range of products for cleaning, sealing and treating skin wounds. Such products can also be used on medium to large aquarium fish. But ensure you know what you are doing: some Koi health books show how to treat skin wounds.

If in doubt, seek expert advice.

Extensive wounds and wide gashes can be closed using stitches. This is definitely a job for the vet, and stitching is not feasible on very small fish.

Suspected poisoning

Whenever most or all the fish suddenly react or behave unnaturally, first consider a water problem as the cause. Some form of poisoning cannot be ruled out.

Common causes of poisoning in aquarium or pond fish include high ammonia levels, high nitrite levels and toxic chemicals, metals leaching from metal ores and rocks. Unless you have a grounding in geology, it is safer to buy rocks from the aquarium shop rather than to collect them from the countryside.

Other forms of poisoning can arise when young children add items into the aquarium, and among pond fish, contamination

Why do fish suffocate out of water?

[illegible]

Note: [illegible]

of the pond with garden chemicals.

Some poisons are easy to test for. Aquarium test kits are available for measuring ammonia and nitrite levels, but others can only be detected by submitting a sample of the water to a specialist laboratory for analysis. This can be expensive and takes time for the results to return – and time is not on your side!

If poisoning is suspected, an immediate course of action is to prevent further exposure to the offending chemical or item.

Ideally, move the fish to an uncontaminated aquarium.

If a spare tank isn't available, make one or more large water changes to dilute the poison to less toxic levels. For example, removing three-quarters of the water will dilute any poisonous chemical four-fold. If necessary, a similar water change can be given sometime later (eg the following day) to further dilute the poison.

Such a large water change is far from ideal, but is the lesser of two evils under these drastic circumstances. Ensure you temperature-match the replacement tapwater and pretreat it with a water conditioner to remove any harmful chlorine disinfectants.

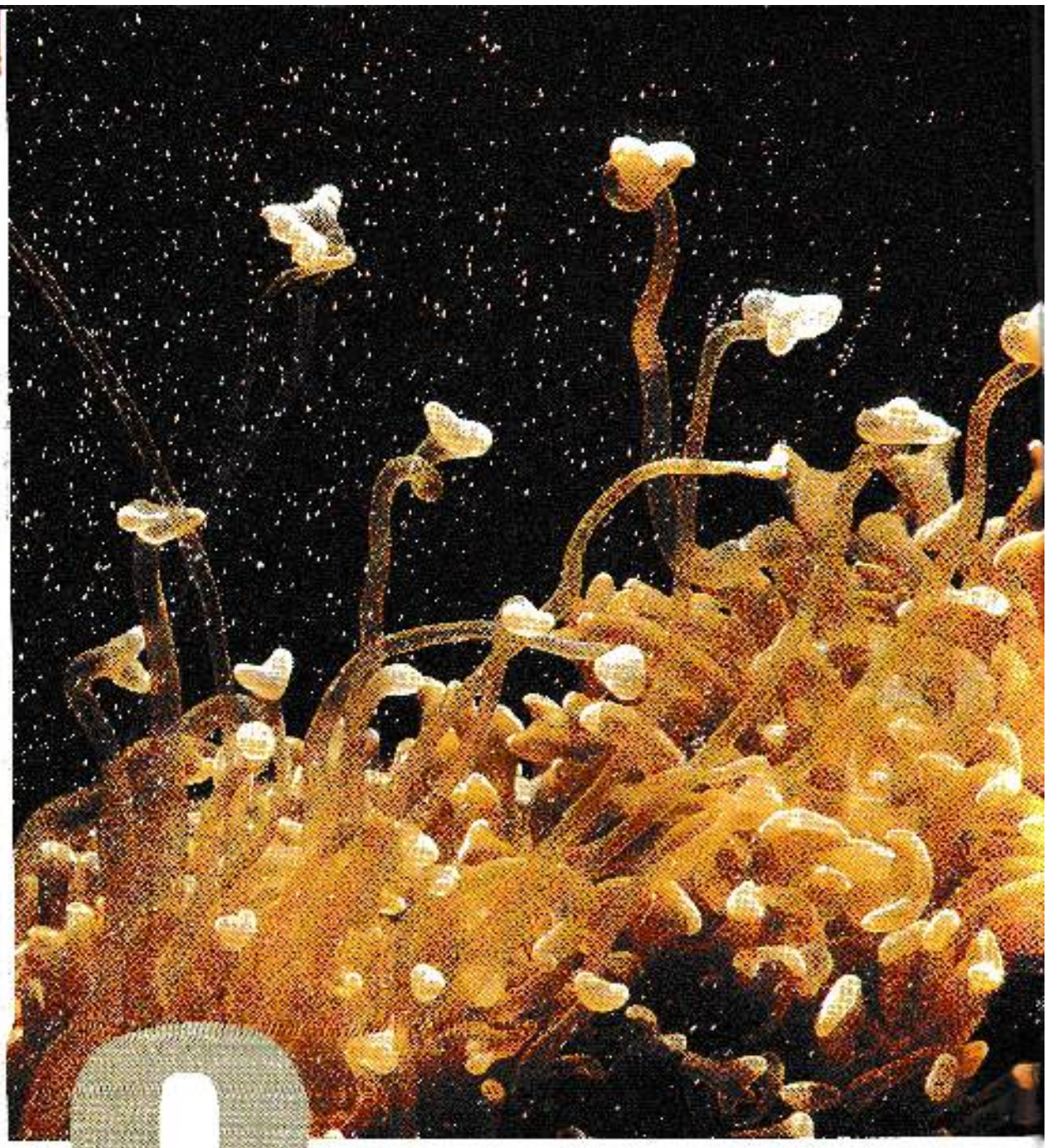
Little can be done to treat poisoned fish, but the following chemicals may help reduce the effects of exposure to certain poisons:

Salt (sodium chloride) will help reduce the damaging effects of a high nitrite level. Contrary to popular belief, you do not need much salt: just 0.01% (0.1g per l) is effective. Most freshwater fish will tolerate prolonged exposure to such a low salt concentration.

If metal poisoning is suspected, treat the aquarium with a full dose of a water conditioner product that contains heavy metal neutralisers.

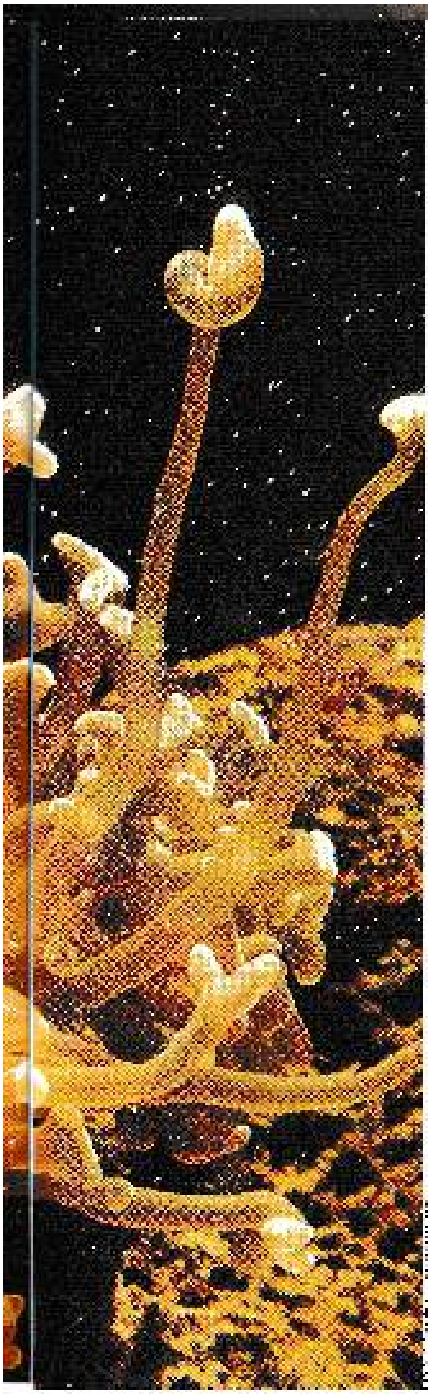
These are quick-fixes only while the source of the poisoning is dealt with.

BELOW: Fish can cut themselves on sharp pieces of gravel or stones, so always choose those with smooth surfaces.



8 steps to success with your corals

Phil Hunt has some advice to help you keep those corals happy, healthy and growing strong...



LEFT: A large *Euphyllia* will sting neighbours in its strive for territory.

Coral keeping has become much more successful over the last few years, such that live and long-lived colonies are not unusual any more. Indeed, captive propagation of corals is becoming increasingly common and generations of corals can be grown from initial frags or cuttings.

Unfortunately, casualties still occur. Sometimes they are the result of buying the wrong species – non-photosynthetic corals are hard to keep by even the most experienced [illegible] ... then there are difficult species such as *Goniopora*, which rarely last long in captivity. Often corals that don't make it are species which usually do well in the aquarium, but something just goes wrong in some way. Here are [illegible] ways to help you avoid this.

1 Location, location, location

Corals can't move, so you need to make sure that you put them where they need to be. And that means a location that is [illegible] in terms of light, water movement and water quality.

You can manipulate lighting over the tank at the design stage when you select the type and intensity of illumination. Once this is determined, you can still vary the light received by a coral by choosing its position carefully: shallow or deep, in the open or partly shaded. In this way you can accommodate species with quite different requirements within the same tank.

The same goes for water movement. In most tanks, a position high up the water column will be exposed to strong currents, but there will be quieter zones [illegible] of rocks or lower down.

The idea of selecting corals according to water quality may seem an odd one. Surely all corals need excellent water quality? Well, not quite. Although water that is chemically very 'clean' (low in dissolved organics and algae nutrients) suits many species, especially small-polyp stony corals, many popular aquarium corals come from quite nutrient-rich areas.

Examples are tooth corals, *Catalaphyllia* [illegible], clove polyps, *Sarcophyton* and *Clavularia* spp., and star polyps, *Pachyclavularia*. These corals are unlikely to do particularly well in a tank with a [illegible] skimming designed for keeping *Acropora*. So when setting up the aquarium, you need to choose between [illegible] your conditions and a [illegible] reef.

Corals in the wrong place often don't show great signs of distress. Instead, they usually fail to expand fully and quietly fade away. So do your homework before you buy.

2 Give them space

[illegible] the reef is a constant struggle for space. There's a limited area of substrate for corals and other invertebrates to colonise, and as they grow, they must compete with their neighbours. They do this in a number of ways: shading each other, often with specially adapted tentacles, secreting toxic substances into the water and stinging each other. [illegible] corals can be dealt with by skimming and chemical filtration, but the solution to the other forms of aggression is to leave enough space between corals. If you don't, your corals may damage each other, stings may destroy parts of the coral, and damaged areas may become infected, possibly leading to the loss of the whole coral.

How much space is needed depends on the coral. Some [illegible] will grow happily in close clusters of different species, whereas a large *Euphyllia* coral [illegible] neighbours [illegible]. Doing your homework is very important. It's also better to have fewer corals and let each grow into impressive specimens.

5 Make them secure

What's the best way to damage or kill two corals? Drop one on top of the other and leave it there. This rarely happens, but it can easily happen by accident if corals are not firmly fixed.

Such failure to fix corals securely comes down to smaller specimens or cuttings or frags can easily end up in unsuitable positions – in dark corners or buried in the sand, neither of which will do them any good. And small corals can easily be dislodged by grazing snails, sea urchins, starfish or even hermit crabs.

Sometimes corals can be wedged in position securely, and large stony corals will often stay in place due to their sheer weight. But there are corals fixed to the irregularly shaped [illegible] such as living rock, lack flat surfaces and straight edges. Often some sort of adhesive is needed.

There are two types: epoxy putty and superglue gel. The former, [illegible] aquarium brands, can be used on corals of all sizes. However, this is more difficult to use and doesn't set immediately. For big corals, it is the only realistic option.

A [illegible] disadvantage is that large blobs of epoxy putty need to be used sometimes and these being usually grey or white are very obvious. Fortunately, coralline algae [illegible] itself, so after a few months the putty will disappear and look like part of the living rock.

4 [illegible]

[illegible]