

Today's Fishkeeper

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Welcome!

After the tragic death of *Today's Fishkeeper's* editor, Derek Lambert, it's quite difficult to know what to say in this month's welcome page. I am sure readers and hobbyists alike will miss him greatly for the enthusiasm and expertise he brought to the hobby. *Today's Fishkeeper* has gone from strength to strength over the past few years and this is in no small part down to Derek, who achieved so much during his short lifetime.

I have mixed emotions as I am obviously very sad that he is no longer with us but at the same time I feel very honoured to be editing the magazine and excited at the prospect of carrying on his great work. If you turn to Points of View on page 36 you can read a selection of the many tributes to Derek.

I would like to dedicate this magazine to Derek and, indeed, he did much of the 'behind the scenes' work towards this issue. Thanks also to Pat Lambert whose support and help with the magazine has been a godsend. Her strong positive attitude has been inspirational and will come as no surprise to those who know her well.

Now a bit about myself... I have worked on aquatic and gardening magazines for more than six years. The last title I edited was *Water Gardener*, which happened to be *Today's Fishkeeper's* 'sister' magazine. Before this I edited *Koi Corp* magazine which gave me a passion for koi and other coldwater fish. My partner is also in the fish trade and has always carried a flame for South American Cichlids. There's just no getting away from all things fishy in our household! We're hoping to move house in the next few months and the one prerequisite seems to be that we have a garage or workshop large enough to build a tropical fish house. And here's me thinking that a state-of-the-art kitchen was what sold a house...

This month in *Today's Fishkeeper* there's a great mix of articles covering all aspects of the hobby. You'll notice in the centre pages that there's a section devoted to ponds and coldwater fish. The season is upon us where we feel it's safe to venture into the garden again after the cold winter months. So if you're thinking of building a new pond or upgrading your existing one, you'll find everything you need to know in this supplement starting on page 39. We help you choose your pond type, find the best place to site it, select the equipment you need and add the fish you want.

Please keep the letters and questions coming in. And if there's any particular fish or aspects of the hobby you wish to see covered in *Today's Fishkeeper*, just drop me a line.

See you next month

Christina

Christina Guthrie



APRIL

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Starting Point...



Just beginning in the hobby? Pat Lambert writes especially for you

You purchase a fish at the same time as a friend and when you see his fish in his set-up you are astonished at the difference in size when compared to your fish. Compared to his, yours is a veritable giant but his conditions look the same. But why should this be?

Some fish of the same species grow much bigger than others and it is often difficult to say why this happens. Environment certainly influences growth rate and a more spacious, uncrowded tank is certainly one factor. Diet is a contributory factor too – what you feed and how often makes a difference. Frequent water changes help. Strong filtration for riverine, fast swimming species makes them grow faster, but for species which live in still water growth could be inhibited. Lighting also influences their growth.

Of course it may be in the genes. Many fish have different size morphs and if a fish carries the genes for large size it will outgrow others that carry the genes for small size.

However, one thing you have absolutely no control over is what happened to the fish before you bought it. It may have been stunted by poor feeding regimes and overcrowded conditions. Providing optimum conditions in your tank will help, but often these fish will not reach their full potential.

Look for the red flash

I have a great fondness for rasboras as a group for they are very good community fish, being peaceful and active. Many are colourful although some are quite inconspicuous. I'd really like to reiterate what Erwin said last month about tetras, take a step into the unknown and look around for something a bit different.

This month I'd like to introduce the Red-tailed rasbora *Rasbora borapetensis* so let's take a closer look. This fish is aptly named for the flash of red in

Rasbora borapetensis make great community fish



Strong filtration for riverine, fast swimming species makes them grow faster, but for species which live in still water growth could be inhibited. Lighting also influences growth.

Bororus maculata the Dwarf rasbora is a beautiful little fish. It only grows to 4.5cm and fits in well in a community tank with other small fishes



broad, longitudinal line runs along the mid body from gill cover to caudal peduncle. Just above this a golden yellow line runs parallel to it. Males and females look alike, both having the typical torpedo shape of most rasboras, except that males may be slimmer. They are a small species only growing to 5cm and should fit in well with a community of small fishes. They co-habit well with other rasboras and danios and make a lively display. As with many rasboras coloration heightens when the tank water is slightly on the acidic side of neutral. Give them plenty of open swimming space with clumps of plants into which they can retreat. This is a shoaling species and it is best to purchase a group. Some species, like the beautiful harlequins, are very well known but there are many species of rasboras out there which bring something a little different to your aquarium. Look out for them.

Heating matters

The majority of tropical fish are far more adaptable to temperature than we give them credit for. In the wild a pool may be 16°C first thing in the morning but reach 35°C by mid-afternoon. Such wild fluctuation in temperature do not harm the fish in that pool because they have adapted to them over many generations and because the changes occur slowly over a period of hours. A sudden change of such magnitude would more than likely kill the same fish outright.

Stay within the normal range 21°C-26°C for a general community tank. Higher temperatures will speed up their metabolism and lower temperatures will make them sluggish.

There is a wide range of heater stats on the market. Depending on the size of the tank, different wattage heaters will be required to maintain the temperature

required. As a rough guide allow 10W per 4.5 litres of water. For example a 45cmx25cmx25cm tank, which contains 27 litres of water would require a 60W heater.

Should you suffer a power cut in winter or should the heater/stat break down (you should always have a spare), cover the tank with a blanket to keep the heat in. Once the heating is back on allow the tank to return to the correct temperature slowly. Make sure you keep an eye on the fish for the next few days in case whitespot develops due to chilling.

WARNING

Never pour in hot water to keep the temperature up as this can cause more damage than would a short period at a lower temperature.



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LOST FOR WORDS

Adhesives: silicon rubber is commonly used in glass tank construction. Solvent welded cement is used for plumbing plastic pipework. These should only be used in areas that are well ventilated as very strong fumes are emitted.

Absorption: the taking up and holding of liquid as a sponge does. This should not be confused with adsorption which is the process in which dissolved organic matter sticks to a substance like activated carbon where it remains until the carbon is removed.

Strengthening bars: strips of material, usually glass, sometimes plastic used to add rigidity to the top rim of an all glass aquarium. They may run along the individual panes to strengthen them, or centrally along the long axis of the aquarium to prevent outward bowing.

Double bagging: some plastic bags are leakers which might not be obvious at first. Placing the fish bag inside another plastic bag is a safeguard against leaks.

Hydrogen sulphide: sometimes this highly toxic substance can be found in water supplies from effluent discharges. Hydrogen sulphide is produced under anaerobic conditions by bacteria at the bottom of your aquarium or pond; the bacteria multiply rapidly in the absence of oxygen. If you disturb the decomposing organic matter in pond or aquarium you can release hydrogen sulphide causing death to your fish. Electrical failures can lead to anaerobic conditions in your filter which lead to hydrogen sulphide poisoning. There's one thing for sure. You can't fail to notice that it's there it's the smell of rotten eggs.

Exotic species: any species that is not native to the area in which it is present. Exotic species introductions are often mentioned when discussing habitats. It is also commonly used for species which are rare or have highly distinctive characteristics.



The exotic-looking Mexican big eye

Satellite male: a male which mimics the female of a species and mates with a female while she is mating with a dominant male. In size, these males are halfway between the dominant male and the small male that sneaks in on the spawning act. Satellite males are not usually seen as rivals by the dominant male. This behaviour is common among sunfishes.

Gamma irradiation: foods of the deep frozen type are rendered sterile which means they are free of disease causing micro-organisms by being exposed to a dose of gamma rays.

STOP! THINK BEFORE YOU CONSIDER BUYING ONE OF THESE

Arowana can grow up to 120cm, so make sure you have a tank large enough



The Arowana is a fish that attracts many admirers. This is a fish that reminds you of the world of *Jurassic Park*. Movement through the water is rather snakelike. As the fish undulates through the water, the scales reflect many colours as the light strikes them. Unfortunately, the Arowana grows far too large for most home aquaria, reaching a size of 120cm. This slender-bodied fish has a very long based dorsal and anal fin that almost join up. The lower jaw has a forked protuberance and it has a very big mouth. This fish can only be kept with others of larger size (think about this, your tank will have to be VERY large). Arowanas are liable to snap at each other and are predatory fish that will eat any fish that will fit in the large capacious mouth - they tend to swallow the fish whole. These fish are best viewed in a large public aquarium where they can be admired and serve as a reminder of a world long since passed.

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Aquarian Catfish Tablets contain alanine and arginine - these two amino

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browsing catfish can feed at leisure.

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the inside of the aquarium to create a "feeding station", the tablet will attract most types of fish - bringing them to the front of the aquarium where they can be easily seen and enjoyed as they indulge in a feeding frenzy.

Aquarian Catfish Tablets can be fed in combination

with Aquarian Flake foods. If your aquarium houses catfish, botias or loaches, feed Catfish Tablets two or three

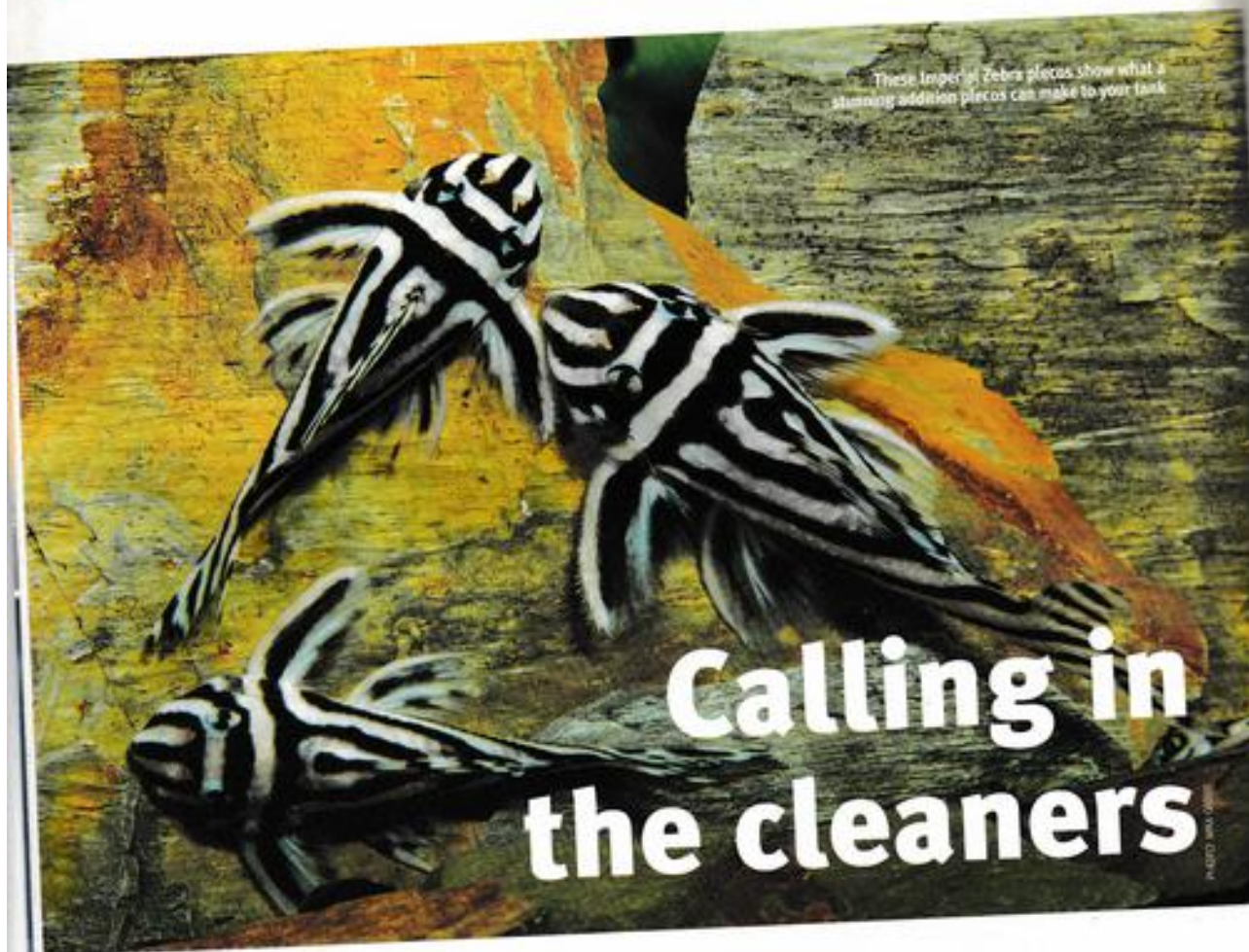
times each week in addition to the Aquarian Flake diet. For other fish, feed Catfish Tablets as an occasional alternative to flake food.



For more information on Aquarian Catfish Tablets or any aspect of fish care, log on to www.aquarian.co.uk

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These tropical zebra plecos show what a stunning addition plecos can make to your tank.

Calling in the cleaners

They can work wonders for algae in your tank. **Mary Sweeney** takes a look at the best and the worst aspects of plecos

It's always been a big 'no-no' in the tropical fish hobby literature to refer to plecos and other animals with similarly useful attributes as 'scavengers'. A lot of hobbyists, perhaps fearing some kind of negative connotation, insist there be no mention of the more useful habits of the various species, as if this would place them in some sort of fishy lower class. Absolutely not, these fishes should never be described by certain trademark works. It's like insisting that your plumber be called by some code name, or just "the man who lays the pipes". And then there's the old-fashioned, and possibly out-of-date euphemism, "a real treasure", that seems to be a code-word for someone who does a

great job on the porcelain and the windows and doesn't seem to realise that the minimum wages have increased.

What follows is a smattering of species, perfect community tankmates all, who do useful work wherever they are kept and who seem none the worse for it. In fact, they are born to their work, for a suckermouthed catfish is never quite so happy as when it's left behind a perfectly cleared expanse where once there was nothing but a sheet of green. (The other side of the glass is your problem, and in fairness, once the fish has done the hard work on the inside, it will do you no harm to give the outside of the tank a swipe once a week so you can both see clearly in and out).

Yes, I'm talking about those hardworking fishes who rasp every surface clear of algae and diatoms and tumble the substrate, turning and aerating the gravel for the

Tetra



health and good will of all, but notice – there's not a single scat in the crowd.

Algae-eating suckermouths

There are a good number of species of algae-eating fish in the underwater world. Some you'd like to invite into your aquarium and some are better left in the wild. For starters, let's talk briefly about one fish that's better left out of the home aquarium. The Chinese (sometimes called Siamese) algae eater, *Gyrinocheilus aymonieri*, is most often offered by shops when it's very young, and it's only then that it serves any good purpose as an algae eater. It soon outgrows its taste for algae and makes a general nuisance of itself as it has a sharp and nasty sucker mouth that does real damage to its tankmates. Once it has outgrown its juvenile taste for algae, it develops an adult taste for fish slime and scales and is to be considered the true suspect in mysterious cases of fish mutilation in otherwise peaceful community aquaria. So, pass this fish by in favour of other, much more useful and benign species like the South American species of loricarids often called plecos.

Many kinds of pleco

The word 'pleco' is a nickname that comes from the old genus name, *plecostomus*, that has long since been divided out into many of the genera of loricarids that are distinguished by their big sucker mouths, wonderful dorsal fins, and beautiful ugliness. There are many kinds of plecos, so many that hefty numbers of them don't even have scientific names yet, but are called by 'L-numbers' and a huge variety of common names that change by whim. Most of the time, it isn't necessary to know the true scientific name to keep a fish in the community tank, though it is helpful to know how large the fish plans to grow and if it is kept in the 'usual' manner. Here your shopkeeper should be able to help you if he is offering unusual loricarids for sale. It's good business on his part to point out that the 'pleco' you're eyeing is not your run-of-the-mill species and requires higher or lower temperature or more meat or more veg or any number of variables that will help you keep an unusual fish more successfully.

Plecos are very interesting to watch, especially when they attach themselves to the viewing side of the aquarium. You can get a good look at the constant movement of the mouthparts and appreciate how tight the bond is between the powerful mouth and the inside of the tank. (Don't try to



The Chinese (sometimes called Siamese) algae eater, *Gyrinocheilus aymonieri* is best left out of the home aquarium

PHOTO: NINA OBERG

force a separation when moving the fish. It will let go on its own, and in its own good time. A spatula is not required. More about moving plecos later).

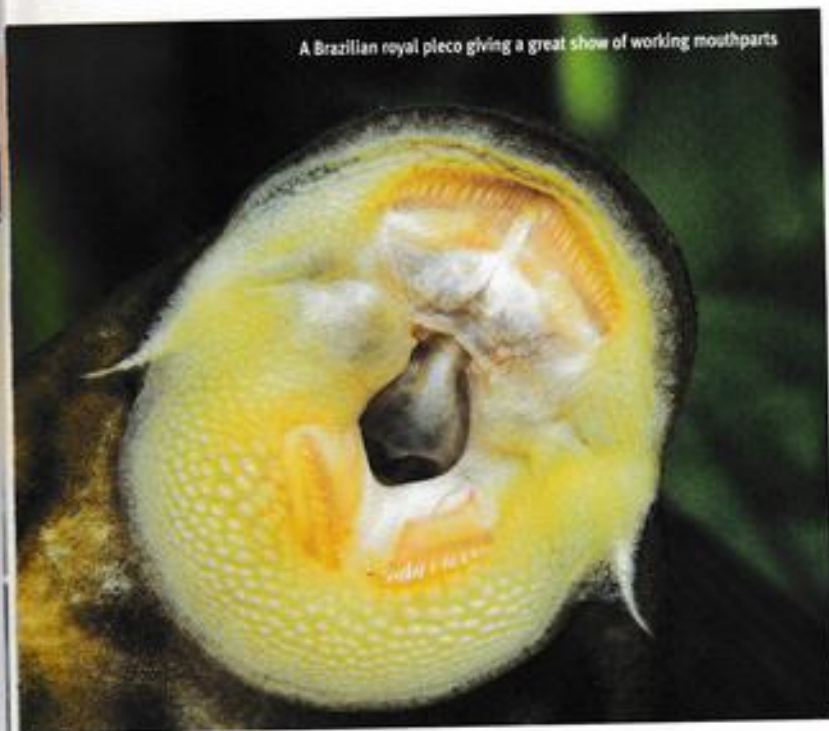
Feeding time

The pleco's diet consists of algae, diatoms, tiny crustaceans, and other common aquarium fare. Yes, they do consume the small white worms (planaria) that are often seen on the glass of overfed aquaria, another bonus from these 'scavenger' fish. As these are nocturnal species, it's best to place the food in the tank just before lights out. Do be sure to offer fresh greens such as small slices of green or yellow summer squash (zucchini) without the seeds, peas with their shells

slipped, Romaine lettuce, and other greens they enjoy. (The time-honoured trial and error method will help you find your fish's favourite vegetables). Usually it's best to place the greens in the microwave or boiling water for a few seconds to help break down the tough parts. Remove leftovers frequently or you will soon have a manky tank. It is very helpful to use a feeding clip so you don't lose remnants of these foods into the filter, where they will put an unnecessary strain on your filtration. While plecos are fond of algae and vegetarian fare, they are omnivorous and will make short work of a ball of blackworms, a serving of beefheart, and many other living, frozen, or otherwise prepared fish foods. Just be sure that there is enough food in the tank for this hungry prehistoric-looking eating machine – that also does windows.

Tetra, PO Box 373, Eastleigh, Hampshire, SO53 3UX

A Brazilian royal pleco giving a great show of working mouthparts



Plecos are territorial among their own kind. You'd never suspect what they get up to after the lights go out. One way to spy on them is to install a red light in the room where the aquarium is. Once the bright lights go out, you'd be quite surprised to see how perky this daytime lay-about becomes. There's no worry for your other fish species (with a couple of exceptions that I will get to momentarily), but it takes a very large aquarium to house more than one pleco. They simply batter each other. These heavily armoured fish can take quite a beating, but it's very bad 'fishmanship' to try to force them to get along. It just won't happen.

On the move

When moving plecos, it's better to use a plastic colander to trap the fish than a net. Plecos are covered with a wonderful assortment of armour, rays, and spines, all designed to tangle up in the softest of fish nets. It's nearly impossible to free them if they get really caught in the net and can damage the fish and cost you your net. They are quite leery of nets anyway, so the easiest way to move a pleco is to bait a small plastic colander (new and clean, of course) and when the fish has moved in to take the bait, just lift the colander out of the tank and transfer the fish.

ATTACHED TO DRIFTWOOD

It may be inexpensive and common but *Hypostomus plecostomus* will grow up to 50cm and is an 'eating machine'

For the most part, however, the inexpensive little brownish plecos sold are *Hypostomus plecostomus*, and there is no great mystery about them, but there are some special features that should definitely be taken into consideration before adding one to your aquarium. First, adult size is about 50cm. So the cute little fellows wiggling across the front of the aquarium glass are real babies. These fish are bred by the gazillion in Singapore and Hong Kong for the aquarium trade. They are hardy babies and travel well, so they come to us in true infancy. Just make a mental note that in several years you will have a large pleco that will need a suitably large home (hopefully in your home).

This suckermouthed catfish is a veritable eating machine. Like so many of its kind, it requires aged driftwood as a part of the aquarium decor, which it will also use as a kind of 'toothpick'. The fish will scrape algae and diatoms off the driftwood and in doing so will also file down small layers of the driftwood as well. So, no, it's not your imagination - the driftwood will get smaller over the years as it lives in an aquarium with a suckermouth. The fish really needs the wood as a part of its diet, so even though you must replace the



driftwood occasionally, please don't consider keeping suckermouth catfishes without this necessary accessory. Plecos are truly 'attached' to their driftwood and the underside of the piece will probably also serve as the fish's favourite place to settle in and study the outside world. Take a close look at the tiny eye of the pleco. The shape is distinctive; and this is called an 'omega' eye.

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NOW THE UGLY TRUTH

Plecos are wonderful aquarium faithfuls, but they are deadly tankmates for 'laterally compressed' fishes. Yes, they will make short work of discus and angelfish, especially when the plecos are juveniles. It seems that the smaller the pleco, the more attracted it is to the delicious slime on the sides of the angels and discus. This makes them strictly unwelcome wherever there are these flat-sided fishes. The plecos will strip them alive. I've had the misfortune; and I guarantee it's not something I would wish on anyone to awaken to the sight of their beautiful discus destroyed by the night-time rampage of an innocent-looking baby pleco. It's no good blaming the fish...



Angelfish and plecos do not make good companions

10 Community Cautions

Big fish will usually eat small fish

- 1 Be aware of the size to which the species in your community set up will grow and try to keep them even

Fish require different water temperatures

- 2 When creating a community, always ensure that the fish you are choosing can live at the same temperature and adjust your thermostat accordingly.

Fish have varying dietary requirements

- 3 Remember to cover the scope of dietary needs within your feeding regime and add extra filtration if you stock carnivorous species.

Do not mix riverine and still water fish

- 4 Riverine fish require higher oxygen and filtration levels than still water fish. Still water will kill them. When exposed to fast moving water, still water fish quickly become distressed and lose condition. Choose either a still water OR a riverine Community.



Fish have different water requirements

- 5 Always ensure that your community tank only contains species that need the same water pH and hardness.



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The Heart and Mind of Aquatic Life

Fill all the levels

- 6 Different fish live in different areas of the tank. There are top, middle and bottom dwellers. A good community tank will include each of these.

Never over stock

- 7 Cramped conditions can lead to aggression in otherwise placid species.

Keep your eyes open

- 8 Look for bullies in your community and remove them immediately. Prevention is always better than cure.

Provide sufficient territory

- 9 Always ensure each species in your community has it's own territory. For example if you have 5 species of cave dwellers, ensure there are 5 caves...

Differing dispositions

- 10 Quiet tranquil species can easily become distressed when in close proximity to lively boisterous tank-mates. Keep the temperaments of your community fish similar.

Create your community with Tetra's Virtual Aquarium at www.tetra-fish.co.uk

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Q&A

Tropical

Not all fish grow at the same rate and you can often only guess at the reasons

Stunted Angelfish

Q I bought three small Angelfish a few months ago when they were approximately 2cm in size. Two of them have doubled in size but the third one is still the same size as when I bought him. He is healthy and eats normally like the other fish. Why isn't he growing?
Peter, via email

A There could be many reasons why your Angelfish hasn't grown at the same rate as his companions. The best thing I can do is direct you my Starting Point column on page 6.
Pat Lambert

Can I add more fish?

Q We have a 55-gallon (240-litre) brackish tank, which houses two small, very gentle Puffers (two of the ones saved thanks to TFK's previous advice). We are interested in possibly adding the following fish as we would like a community tank: a large funky Goby, Orange Chromides, Celebes Rainbowfish, Glassfish and possibly Scats. Obviously the last thing we want to do is overstock, and our main concern is that our puffers are happy and not bullied, so we have

singled out the most gentle fish (we think!). What advice would you give as to the quantity of the above mentioned fish or would you scrap one or more of the species?
Dayle Cameron, via email

A I would have some reservations about the mix of fish you are considering. Let's look at them individually and I'll explain why. First of all, I'm not sure which species of Puffer we are discussing, and certainly even the more



Orange Chromides are underrated but they can be a bit aggressive when breeding

gentle ones do have a very strong bite and may injure other fish just through curiosity, so this needs to be borne in mind at all times.

Seas grow large (potentially 20cm+), really need to be in shoals, and are a boisterous and competitive fish that will totally dominate the other fish you mention, so these can be ruled out straight away.

Glassfish are hugely underrated and delightful aquarium inhabitants, and seeing a couple of males displaying for the attention of a female can be a stunning sight. They are quite shy and delicate when first purchased, and will not compete well for food. They need good quality frozen or live foods, and I have never known them readily accept dry foods. Not all the species available actually require brackish water (although most will accept it). One species that does prefer brackish water is the gorgeous Filament Glassfish (*Gymnocharacin filamentosa*) which I found thrived on a diet of live Daphnia, Brine shrimp and fine frozen foods, but whether they would be able to deal with the attentions of the other fish I doubt. If you can find any of the more robust species (any of the common Glassfish that have managed to avoid being abused with dye injection) they would be worth a try, but even these will need extra care in feeding.

Celebes Rainbows (*Marosatherina ladigesii*) are not actually a brackish water fish from what I can tell (even though they are often recommended for these conditions). I suspect that they are sold as such because they can be prone to infection when first imported, and salt in the water helps to prevent this. They will live quite happily in the long term under slightly saline conditions, and so they are certainly worth considering. Being active but peaceful they would

not harass or be harassed by the Puffers, and the courtship display is quite superb. They get to a top length of around 8cm, so you could have quite a decent little shoal.

I'm unsure what a 'funky' goby is, so I really can't give a definite answer on the suitability of this fish. Although brackish water Gobies should make great tankmates for your Puffers, many Gobies do have large mouths and this could spell trouble for any smaller fish. Why not look at the Knight Goby (*Stigmatogobius sadanundio*) – they get to about 8cm, will take most foods and are quite characterful. They can be housed in small groups, so you could have two males and three females and see plenty of social behaviour.

Quite aggressive

Orange Chromides are yet another greatly underrated aquarium fish, but for the purposes of this situation it has to be remembered that they are Cichlids, and so when they breed they can be quite aggressive. If plenty of cover is available, this should be manageable in a 55-gallon aquarium, but careful observation would be needed. If you decided to try them, this would certainly rule out the Glassfish, as the Chromides would be too aggressive and competitive for them. It might be worth checking out some of the better aquarium outlets for other small Asian brackish water fish, certainly in recent years the range of fish available from this area has increased greatly. At my local large outlet, BAS, there is always a huge choice of fish for such an aquarium, and I'm sure that retailers in your area may also be able to offer alternatives.

Pete Liptrot

Today's Answers Expert Panel

All Stalsberg Cichlids

Pete Liptrot General questions on tropical fish and oddballs

Andrew Caine General questions on marines

Ben Helm General questions on coldwater plus equipment and technical advice

Lance Jepson Health

Tony Sault Discus

David Armitage Anabantids

Pat Lambert

Livebearers, Rainbows and breeding fish

Ian Fuller Catfish

Andy Gabbutt Killifish

Stephen Smith Goldfish

Bernice Brewster

Koi and ponds

Val Davies

Reptiles and amphibians

Questions by Post

Please indicate clearly on the top left-hand corner of your envelope which person you wish your query to go to. All letters must be accompanied by a SAE and addressed to: Fishkeeping Answers, Today's Fishkeeper, 7 The Rickyard, Clifton Reynes, Olney, Buckinghamshire MK46 5LQ

Internet Service

Fishkeeping Answers is also available via email. Most of our experts can be contacted via the internet. A few are still not on-line so we will have to pass your messages on to them by snail mail (we will tell you when this happens) but otherwise you should receive a reply to your questions in a few days rather than weeks. Send your emails to: questions@today-fishkeeper.com

Pla Kats are the same species as *Betta splendens*



Bettas or Pla kats?

I am interested in breeding fighters, and have purchased some good quality specimens. My problem is that I think I was mis-sold several fish as *Betta splendens* (which is what I'm trying to breed) but in actual fact they are Pla kat fighters. So my first question is what are the implications/complications of cross breeding the two species? If I was to send you good quality photos, could you confirm my classification for me?

My second question is where can I obtain breeding quality bettas preferably of known gens/phenotype (preferably a super delta or halfmoons)?

Alex Beebe, via email

The first thing to sort out is that Pla kats ARE the same species as *Betta splendens*. Sometimes it is thought that they are the wild form but this is not the case. Pla Kats are the form specially bred for fighting and

wagers. They normally have an indented forehead and are unusually aggressive. In contrast, the true wild Betta has a smooth forehead and looks more in body shape like the smaller species, *Betta imbellis*. It is certainly not unusually aggressive. At the moment I have a strain from Ban Na in Thailand which answers the latter description. The females live in harmony with the males and they are not especially colourful fish. The main colour is in the unpaired fins which are blueish-green. See my article in *JFK* October 2003.

By all means send a photo but you can't tell what genes the fish is carrying from its appearance. A short-finned brown fish could be carrying all kinds of colours and fin lengths so if you breed your 'Pla Kats' you could end up with liquorice all-sorts. In the UK, there are a few members of the AAGB in Yorkshire who attend the Betta shows in Dijon and Blois each year and keep lines of German and French stock Bettas.

David Armitage

MYSTERY EGGS

I have a problem with my newly set up tank. My tank is 30 gallons and three weeks old and has six x-ray tetra in which have been in for a week. My tank was crystal clear for about four days of having my newly purchased fish in and then suddenly eggs started covering the glass on the tank. These eggs are transparent/white and about 2mm diameter.

I went to a local garden centre to ask advice and they said it must be some kind of insect larvae. The tank now looks cloudy even when I scrape the eggs off and they come back in a few days. Do you have suggestions?

Darrell, via email



This sounds a little mysterious, but the obvious answer may be the x-ray tetras themselves. If it is such a new aquarium, and assuming that there is no other aquatic life in it, then the fish must be responsible. It may also make sense as most freshwater tropical egglayers spawn as a result of a change to their environment and the change from the shop to the relatively 'fresh' and new water of your aquarium may have been just the stimulus that your tetras may have required to breed.

To test whether they are eggs (of any description), why not leave a few and observe what they hatch into. Regarding the cloudiness,

LOACH COMPATABILITY

I have three Zebra loaches (*Botia striata*) in my aquarium along with Harlequins, Golden barb, Pearl gouramis and a Siamese flying fox – all are very peaceful towards each other in a well established tank. I know that some Loaches can be territorial and aggressive, whilst others are sociable and need the company of others of their own species. Would the Zebbras accept the presence of a Polkadot loach or would there be a problem? Could you also let me know the expected size and how to feed these beautiful fishes.



The Polkadot loach closely resembles *Botia dayi* but its correct identity has not yet been determined. In the October issue 2003 Erwin Schraml featured this species as a new introduction, but until its identity is confirmed ultimate size and disposition cannot be stated for sure. Loaches are generally smallish and very few reach over 30cm. Many are not aggressive but there are exceptions.

Excellent appetites

As to feeding, in the wild *Botias* feed on small worms and insect larvae. They love earthworms but take most foods. They have excellent appetites and forage in the substrate for tasty morsels. Many also have a partiality for snails. As this species is new to the hobby input from current Polkadot keepers would be great.

Pat Lambert

Q&A

Seahorses are amazing creatures but they do have special requirements

PHOTO: ILLUSTRATION



Star Letter 

Fallen for Seahorses



I visited an aquarium shop recently and fell in love with seahorses. I have a 2ft x 2ft x 2ft aquarium and would like to make a mini reef system. What fish, coral and anemones can I keep with seahorses? Also can you tell me what filtration system is best for seahorses in an aquarium this size?

Matthew Rosewood, via email



Unfortunately some retailers do not inform the purchaser about seahorse requirements resulting in a dead beast and a confused owner. Thank you for stopping and thinking before you purchase such an animal. Seahorses (*Hippocampus* sp) and their close relatives are a separate entity in marine aquatics and as such require an aquarium created around their needs. They need top water quality, low water movement, sea grass beds or plenty of macroalgae. They have specific food requirements and need little competition for it in the aquarium, so there are some very big differences from your proposed reef tank.

Filtration, you can range from external filters to specially designed sump systems, but employ biological and chemical filtration, a protein skimmer and live rock. A seahorse will look at food for what seems to be an eternity before it consumes it, so any other livestock in the tank must not eat fast. Pipefish such as the Banded pipefish, *Doryrhamphus dactylophorus* and dragnet fish species like the Mandarin *Synchiropus splendidus* are ideal. You must feed vitamin enriched live brine shrimp, and try to get them to take frozen mysis. Possible corals (all under halide lighting for your depth of tank) would be the Torch coral or any of the *Euphyllia* sp and Bubble corals *Pterogyra* sp in and around the sea grass with polypstones *Palythoa* sp and mushrooms *Discosoma* sp on any exposed rockwork – anemones, no. Don't let all this put you off. If you love them, you will create the right environment and have a great time.

Andrew Caine

 AQUA MEDIC

for all your marine keeping answers

Help me get rid of algae

I have a fish-only marine aquarium with a capacity of 400 litres. It has a total stock of 47cm consisting of Clown trigger, Spiny puffer, Polkadot panther grouper. The filtration is via two external filters one packed with sintered glass, the other has a mixture of biological filtration and rowaphos to combat the phosphates. My skimmer is a large air-driven type – I replace the air stone every month and empty the cup of dark waste material every week. My readings are all within acceptable parameters and the fish are in good health but I have a recurring algal problem. A dark ready brown covering starts to appear in the morning when the lights come on, by the afternoon long strands of the algae are rising up into the water suspended by what I think is a gas bubble. This gets really bad by the time the lights are turned off, then in the morning not a trace is left only for the cycle to begin again when the lights are turned on. Please please can you tell me what this is.

Rob Newal, Penrith

What you have here is a species of algae commonly called dinoflagellates, and make no mistake about it is a nasty little devil. What we have to do here is cure the problem and then address why your system has deteriorated so much.

This beast proliferates in good light and a high organic load in the water, this load has come from a few areas within your aquarium. The first is the stock – we have dirty eaters here and every time you feed they will rip up the food and small particles are lost to the system, these rot down and cause organic pollution. In a reef tank this doesn't happen as hermit crabs and other cleaners pick up such food particles. However, you cannot add these to your aquarium as the fish will eat them. This is the source of your organic pollution and the cause of the algal population explosion.

The simple way to sure the problem is to turn off your lights and leave them off – this will stop the algae from growing. I presume that the aquarium is not in a dark room so the fish will get light from the other sources in the room. The situation will be cured, but if you turn your lights on again after a week it could come back so you'll have to clean up your water.

First and foremost think about changing your skimmer – this piece of

kit is so important in removing organics (the cause of the problem). You need a power skimmer preferably one which incorporates a needle or pin wheel impeller. Yes, they will cost you over £250 but do you want this algae back? When you get your skimmer, clean the collection cup every two days – this allows the skimmer to work efficiently.

Add a good grade activated carbon to your external filters. Normally I only advocate carbon use for three days per month but in an aquarium with a high biological load I would say add 250ml and replace on a monthly basis leaving it in all the time. Andrew Caine

A summary:

- Turn off the lights for two weeks
- Replace the skimmer ASAP
- Clean the cup every two days
- Add some carbon to your filters
- Replace the carbon after 10 days
- Start lighting your aquarium after 14 days for only four hours at a time
- Leave the lights on for this time period for seven days observing the aquarium for any algal growth
- If the algae starts to come back turn the lights off for a week again
- If there's no growth increase the lights every week by two hours per week until you are at a maximum of 12 hours photoperiod
- Good luck!



Hermit crabs do a great job in an aquarium by picking up particles of food

STRUGGLING COOLER

I have a cooler on my reef aquarium which is fed via a drain bypass. The problem is that the aquarium is next to my swimming pool which is heated, and the cooler, which is a refrigerant type, is struggling to keep the temperature below 28°C even though it is set at 26°C. Please can you advise me if I have set this up incorrectly as it should cope with my water volume.

Yes your cooler is set up incorrectly. What you have to do is install a tap in line with drain bypass so you can control the velocity of the water flow through the cooler. Also you could install the cooler outside in a little ventilated building, this will allow the dispersal of the heated air created by the cooler and allow it to work more efficiently. Slow the water flow down and your cooler will work as it is intended to.

Star Letter Prize from

AQUA MEDIC

Modern Coral Reef Aquarium books, written by All J Nilsen and Svein A Fossa are regarded as probably the most authoritative series of books for the marine hobbyist in years.

Aqua Medic, the leaders in Marine Aquarium technology, is pleased to present whichever of the three volumes, normally £55.00 each – desired to this month's star letter



ANTIPHOS

Consciously better phosphate remover

ALL PHOTOS: JUAN MIGUEL ARTIGAS AZAS



The brave

A *Cryptoheros spilurus* male in dominant coloration in roadside creek, a tributary of Belize river near Belmopan, Belize

Blue-eyed cichlid

Juan Miguel Artigas Azas says you won't regret giving the Blue-eyed cichlid a go...

Cryptoheros spilurus is distributed in lowland rivers and lakes in the Atlantic slope of Central America from the southern part of the Yucatan peninsula in Mexico in Lake Bacalar to northwestern Nicaragua. This species exhibits striking geographical variation in the populations, so much that a population from Rio Lancetilla, Honduras was proposed by Henry Weed Fowler (Fowler, 1932), as a separate species (*Cichlasoma cutteri* Fowler, 1932).

Cryptoheros spilurus are beautiful little fish; in the wild males seldom grow over 12cm and females remain smaller than 10cm. The populations from Mexico, Belize and Rio Polochic in Guatemala are mostly grey with a brownish to olive green head and a yellowish chest, with six black (besides the caudal blotch) vertical bars, evenly dark. While a population from Rio Ciénega in Guatemala has a front dorsal fin and red cheeks (Stawikowski and Werner, 1998.) Populations from Honduras

(those referred as 'cutteri') have a yellow grey head, red chest, yellow sides and a bright sky blue coloration in the anal area from the base of the anal fin to the caudal peduncle. The central vertical bar (third) is more strongly darkened.

Although it has been suggested the *C. spilurus* range extends to Costa Rica and Panama, this is not the case. *Cryptoheros spilurus* has been introduced into Hawaiian islands (Eldredge, 1994).



Cryptoheros spilurus male in the clear waters of Laguna de bacalar, a freshwater lake fed by sunken wells in Quintana Roo, Mexico. This is the northernmost area where a *Cryptoheros* representative can be found

Habitat

Cryptoheros spilurus prefers shallow areas of clear water streams and lakes in the lowlands (up to about 300m) within its range. *C. spilurus* can be found in very small creeks as well as shores of the bigger lakes and rivers. It is normally found over sandy or rocky substrate but also found over mud. This cichlid apparently prefers areas where some kind of cover is present.

Water chemistry within its range is normally alkaline, above and over neutral with moderate to high dissolved solids. Temperature ranges from 20-28°C, as I have observed in several habitats in Mexico and Belize. Stawikowski records water parameters for Guatemalan habitats with a pH 8; 4-10 °KH;



Blue creek, Moho river, Belize; a clear water stream over sandy and rocky bottom habitat of *Cryptoheros spilurus* as well as the cichlids *Thorichthys aureus*, *Chuco godmanni* and *Cichlasoma solvini*.

2-12 °dGH, with water temperature from 25-30°C and clear (Stawikowski & Werner, 1998). Some Honduras habitats presented hardness values as low as Honduran 1-2 °dGH; 2-3 °KH. The pH values were however always over 7, and the temperatures were lower than those found in Guatemala (21-26°C.)

Feeding

Cryptoheros spilurus are gregarious cichlids, found mostly in the shallow areas of their habitats, where they spend a good part of their time close to the substrate picking for tiny invertebrates or algae. I have observed on several occasions *C. spilurus* in their natural habitat turning over littered leaves in the bottom of the habitat, in search of invertebrates that may hide below.

Cryptoheros move slowly leaning their bodies towards the substrate, normally sand or detritus, to pick on it.

Whilst foraging for food *C. spilurus* seem to be very tolerant of other individuals of the same species or other kinds of fish, only occasionally do adult males chase other adult males. *Cryptoheros* however, as most cichlid fishes, are opportunistic in terms of food choice, and they will eat small fishes if given the chance.

Breeding

Breeding season for *Cryptoheros spilurus* corresponds with the dry season in Central America, from December to May, apparently with a peak in March. Unlike females of other *Cryptoheros* species, which are more colourful than males, outshining them especially at the abdominal zone, *C. spilurus* males and females are similarly coloured. Females having slightly more colourful bellies, a trait that is believed to be used by

the female to attract the best males. It is also known that females of their relative *C. nigrofasciatus* are very antagonistic to each other, especially against females with strongly golden coloured bellies (Beeching et al, 1998).

The dorsal fin of *Cryptoheros spilurus* females shows a black spot in the middle area, absent in the males, which contributes to their sexual dimorphism, more obvious by the difference in size.

Females form breeding territories among rocks in or near moving water in their

CONSERVATION STATUS

***Cryptoheros spilurus* is not listed in the Mexican Official Norm NOM-059-ECOL-2001 or the IUCN Red List of Threatened Species. The habitat remains stable in most of its range.**

distributions, *Cryptoheros spilurus* (and *Cryptoheros* as a whole) look for the most covered areas. When natural caves are not available for breeding, females look for a cornered vertical rock surface. Females start breeding efforts as small as 4cm in length, although they have a potential of growing to about 10cm in length in their natural habitat.

When courting, pairs of *Cryptoheros* adopt a very striking coloration, with a clear background and dark bars, females then show a distinctive darkened belly area. At this point a dark bar appears running from the lower eye cavity to the back the mouth. *C. spilurus* also show very bright blue eyes. This is when their colours shine at their best.

FACT FILE

Name :

Blue-eyed cichlid

Scientific name:

Cryptoheros spilurus (Günther, 1862)

Size :

Male 12cm, female 10cm

Distribution :

Lowland rivers and lakes in the Atlantic slope of Central America from the southern part of the Yucatan peninsula in Mexico in Lake Baralar to northwestern Nicaragua.

Aquarium type :

Will share their quarters with other fish such as Poeciliidae, Characidae, Cichlidae and Goobiidae. Choose with care though, pH: 7-8

Temperature:

20-28°C

Males are courted by females while passing by, mainly by presenting males with their ripe darker bellies, maybe to convince them how suitable they are to breed, and how many babies they are going to produce. Females try to obtain the largest males they can and males correspondingly try to obtain the largest females, so this normally ends with big males pairing with big females and vice versa.

Once pairs are established their bonding is pretty stable. Females deposit approximately one to two hundred ovoid eggs on a pre-cleaned vertical rock surface in their spawning cave. Eggs measure 2mm long by 1.4mm width (Coleman, 2004). Eggs are placed by runs made by the female in which her genital papilla softly touches the spawning surface. This results in a row of several white yellowish adhesive eggs, which are immediately fertilised by the male, following the female path. The eggs then take around three days to hatch. I presume eggs are placed vertically to prevent drifting detritus from settling on them.

The genus name describes a hidden breeding behaviour for this group of species, but *C. spilurus* will more willingly spawn in the open. Sometimes depositing their eggs on exposed vertical rocks, a behaviour also documented in the aquarium (Axelrod and Burgess, 1973). This is not to say they don't primarily like caves as a spawning place, as they actually do in my experience.

Nest guarding

Guarding the nest brings a striking change in coloration for both *Cryptoheros* parents. Male and female assume a uniform pattern of eight contrasting black vertical bars (plus the caudal peduncle spot) on a white background. Once wrigglers have lost their

A *Cryptoheros spilurus* pair in dominant coloration in Blue creek, a tributary of Belize river near Belmopan. Note the darker belly of the female



heavy yolk sacs, which supply them with nutrients for the first days of their lives, about four days post hatching, they reach the free-swimming stage. Fry congregate in a close pack and stay below their mother. The male role in this case is to stay close and guard the territory, from which all intruders are chased away. This includes much bigger animals. Males always stay close to the female and are braver than many other Central American cichlid counterparts, which are less willing to risk themselves in defence of their babies. Their success is highlighted by the reduced batches of babies they produce compared to other Central American cichlids, which can produce thousands of eggs.

Parents signal their babies into chasing them with spasmodic movements in which they open and close their ventral, anal and dorsal fins, done simultaneously with a sudden shake of their bodies. The partner showing this behaviour is followed by the pack of babies. Both parents guide their babies throughout the surrounding territory during the day, but consistently return to the spawning cave in the afternoon to spend the night. The female then stays inside the cave and the male just at the entrance, presumably making it more difficult for night predators, especially catfish, most likely *Rhombia guatemalensis*, to reach the babies.

Feeding the babies

Males and females alternately get close to the soft substrate, sinking their ventral areas in it and waving their pectoral fins



Cryptoheros spilurus breeding pair in blue creek, Mono river system, Belize, with the very contrasting black bars over the white background

vigourously, producing a cloud of detritus on which the babies pick their food. Babies would otherwise pick the detritus for edible matter.

Pairs of *Cryptoheros spilurus* guard their babies for an average of six weeks post spawning, when they are about 10mm in size. Males rarely leave females in the care of their babies, especially in a high stress situation, when fry guarded by just the female are less likely to reach adulthood.

Give them a go

If you want to try *Cryptoheros spilurus*, you won't regret it. Abide to a regime of good water maintenance, proper feeding and you will enjoy them in full. Provide caves for them to breed naturally, which can be

AQUARIUM KEEPING

Cryptoheros spilurus are especially sensitive to bad or neglected environments. These little gems come from pristine habitats and won't settle for less than enough room and proper water parameters and maintenance.

This apparently easy-to-keep species also has its tricks, even in big 400-litre aquariums. This little fish can be very effective in reducing male competition, by just systematically bullying competing males so they can't feed and eventually perish through stress.

Successful keeping and breeding of *Cryptoheros spilurus* is possible in tanks as small as 40-litre capacity or even smaller ones but I would not advise it if there is a possibility to offer them larger quarters, so their natural behaviour and interactions can be more easily appreciated. If you keep more than one pair of *Cryptoheros* in your aquarium, break territories with visual barriers, like rocks placed at the middle of the tank.

easily replaced by clay pots; provide the adequate temperature and water chemistry, so you can see them in their best colours and more normal behaviour; and provide quality food for their colours to be bright and their health to be good.

Cryptoheros spilurus, as an added bonus, will easily share their quarters with many other fish, making beautiful displays; Poeciliidae, Characidae, Cichlidae and Goobidae are normally found in their natural range. They can easily hold their own even in the company of much larger cichlids. Common sense and trial and error are irreplaceable if you can't get the right species with which *Cryptoheros spilurus* share their habitat. They are obtainable though, and it probably won't be too difficult to find them.



Shrimp talk

Painted cleaner shrimp (*Lysmata amboinensis*) make a colourful and useful addition to your tank



They're colourful, have character and do a great job cleaning up reef tanks. **Andrew Caine** sings the praises of Cleaner shrimps

I started my life swimming along the currents of the tropical seas. Oh what fun we all had, my brothers and sisters and I, just surfing the currents up and down over the reef, far and wide out to sea and back again. But more of that later... we are a very important animal in the ecology of the reefs and more importantly to you humans in the care of your aquariums, and the animals you keep in there. We are totally undervalued as most people only think of us as something pretty to have, and I must say, that's a bit of an insult to us. We are the dentists of the sea, we are the doctors of the sea, we are the cleaners of the sea, yes my friends, you humans call us Cleaner shrimps, I can't pronounce the Latin name you gave me but my mates just call me Sammy.

So back to when my larval life was just finishing, nearly all of my siblings had been eaten – it was just horrible. Just take a moment when you see us in the shop to think how lucky we have been, so take good care of us – we deserve it. We are encased in a hard shell commonly called a cuticle, this gives us protection but is inflexible. Our bodies cannot shrink or expand like others so if you drop us

into water of a different salt concentration the flow of salts into or out of our body can cause us to explode or implode quickly. Slow acclimatisation to your aquarium water is a must here or all that larval life escaping predators will have been wasted, only for a human to mess it up.

A new skin

With this shell or cuticle encasing us it's impossible to grow so we have to shed it to allow growth to occur. The old skin splits and we crawl out. Then we take in water and expand our bodies (oh how good it feels!) and wait for the new skin to harden. We normally try to do this under cover of the night, well would you want everyone looking at you in your underwear? But really we are vulnerable as we have soft skin and the night offers us more protection.

We clean, no not the office floor, but all of the fishes and other animals. They're a really dirty bunch indeed – they don't brush their teeth, they don't wash their scales, in fact personal hygiene is way down on their list of

'must dos'. All this filth is good for us, any bits of food in the teeth is soon picked up by my little pincers, and parasites or other undesirable animals on the skin are tasty little snacks. We clean the fish of the coral reefs, and we are so good at this that when scientists removed all of us from an area of the reef, fish aggression shot through the roof as the dirty fish just couldn't handle the irritation.

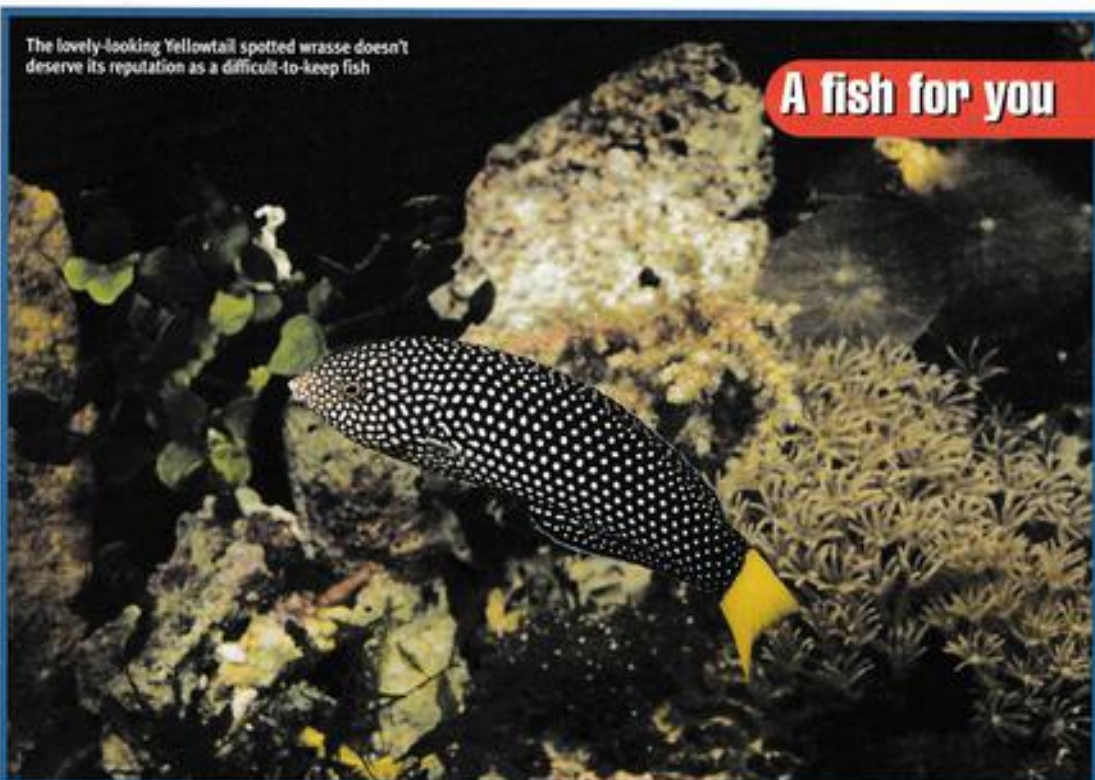
We also search for food lying in and around the rock work of your aquarium, stopping it from rotting down and causing pollution and algae problems. We clean fish and your aquarium, so reward us by dropping good bits of food for us twice a week. One other thing is that myself and a friend are no good in a 1.2m-long tank, there's just too much work for us to do. So if you don't want the aquatic unions to call a strike, get the right stock: two shrimps every 30cm which equates to eight shrimps in a 1.2m-long house. Your tank will indeed be clean in a very short time, oh here is a puffer fish with debris in his teeth – it's rude to talk when you are eating so see you all later, take care of us and we will take care of you.

AQUA MEDIC

AQUARIUM FILTRATION
– Bio-engineered

PHOTO: MARK DUBBS

The lovely-looking Yellowtail spotted wrasse doesn't deserve its reputation as a difficult-to-keep fish



A fish for you

YELLOWTAIL SPOTTED WRASSE *ANAMPSES MELEAGRIDES*

What a total beauty. They don't come much better than the Yellowtail spotted wrasse. However, it's a fish that has lots of false information attached to it, so it's time to put the record straight on this 'difficult to keep cracker' which so many avoid because of its reputation. A reputation that evolved years ago when we were plagued with poor equipment, poor water quality and poor feeding. All this added up to poor survival records. However, the dark ages have thankfully past but the reputation holds!

Hiding places

This visual delight knows no boundaries to the joy it can bring to an established reef. Lesson one: introduce to a reef over one year old – the water conditions will be stable, natural live food will inhabit every crevice of the live rock, and there will be plenty of hiding places. Non-aggressive tank mates and a nice 5cm fine sand bed for it to sleep in is also a must.

When you spy one look at its belly –

anything but nice and fat, is a fish to be avoided. Ask the retailer to drop some food into the tank and see if the fish are interested – this one test will allow you many years of pleasure. All reef fish need a good supply of food in small amounts ('He's off on one again', Yes I am!). Food is energy and energy is life. Feed at least five times a day, with a varied diet soaked in vitamins and your reward will be immeasurable.

I have never seen a true pair, but that doesn't stop you making one. Two individuals displaying a distinct size difference will form a pair. It is best to introduce them together to avoid a battering. We know more and more species change sex and this is one of them. Reef keeping doesn't come any better than to have a pair of these darting gracefully in and out of the rockwork of your reef.

The Yellowtail spotted wrasse is a fish that is screaming to throw off its reputation, like so many others. Just make sure it's feeding then the rest is up to you.

PROFILE

Family:

Labridae

Name:

Anampses meleagrides

Location:

Red Sea, Pacific

Feeding:

Small, vitamin-enriched meaty food, five times a day

Size:

8cm

Reef compatibility:

One of the best

Difficulty:

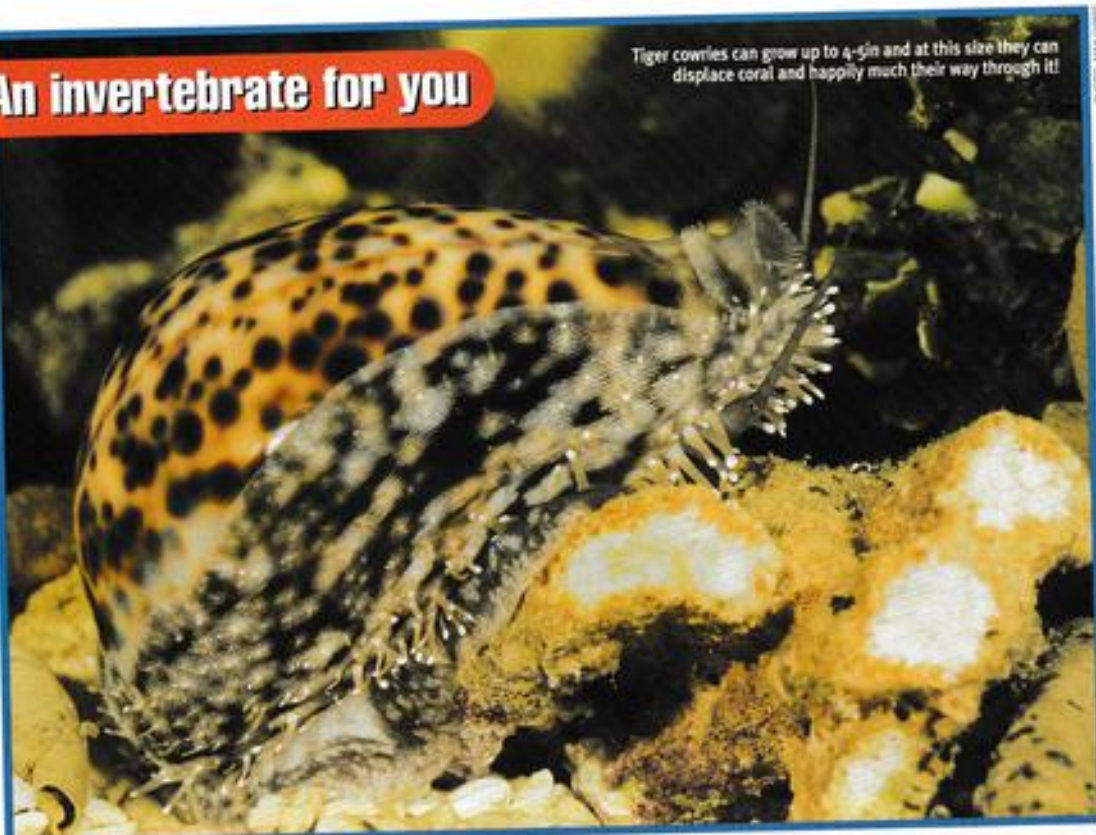
Very easy if the food is there

AQUA MEDIC

AQUARIUM LIGHTING
– Consciously better

An invertebrate for you

Tiger cowries can grow up to 4-5in and at this size they can displace coral and happily munch their way through it!



MONEY COWRY *CYPRAEA MONETA*

Over the past few years we have seen an upsurge in demand from reef aquarists for a wide variety of different small invertebrates to help with the cleaning of the aquarium in an effort to replicate how nature cleans the reefs. Scientists have shown with exclusion experiments that if natural grazers are removed only a short time period is needed for previously clean rock surfaces to be smothered in algae. What a coincidence that as we strive to replicate a more natural environment in our aquariums we are keeping the rock free from the algal plague.

A dazzling delight

Enter our little beast the Money cowry (not shown), not to be mistaken for most other species of cowry that can be destructive to reef aquariums through diet or sheer bulldozing size. Our baby depends totally on algae for its diet (joy of joys), is extremely hardy, is small, and

to top it off the shell and mantle of this beast is just a dazzling delight to behold.

The porcelain appearance of the shell actually gave porcelain its name. Derived from the Italian word for shellfish in the middle ages 'porcellana', the new pottery being imported from China was named after it because of its smooth sheen. The shell is so smooth because the mantle of the animal stretches over the whole surface, laying down a new layer each time, as the animal grows. Also this constant covering stops larval animals from settling and damaging the shell.

They were also used as currency in some countries hence the common name, but try to buy a yellow tang with 20 shells and see how far you get!

They're fantastic animals to have but don't expect two to do the job for you. Pile them in, get a good population in your aquarium, and surprise surprise your algae will never be seen again.

PROFILE

Phylum:
Mollusca

Name:
Cypreaa moneta

Location:
Indo Pacific

Feeding:
Algal grazer

Size:
3cm

Reef compatibility:
Great

Lighting:
Strong lighting required for growth of food

Difficulty:
Easy

AQUA MEDIC

AQUARIUM FILTRATION
- Bio-engineered

Fish world



When it comes to people's preconceived ideas about what a fish looks like, most will think of something close to a Common goldfish

Kathy Jinkings explores the wonderful and seemingly fantastical world of fish

What are fishes like? Ask any reasonably voluble group of children this question, and you'll get the same answers – a description of something that is a vague cross between a goldfish and something sold whole off the fish counter at Sainsbury's – herring perhaps. Fishes, as everyone knows, live in and breathe water, swim well, are shaped more or less like an oval with a triangle stuck at the end, and served their main purpose long ago when one of them hoisted itself onto the beach to take up life as the first amphibian. Egg laying, cold-blooded, scaly, full of those nasty little bones that get stuck in your teeth – everyone has a mental picture of fish that is more or less the same, even aquarists who know that fish come in a lot more shapes and sizes than ovals with triangles on the end.

Not a tree, more a hedge

Fish, in general, have a pretty bad press. Evolution is an ongoing process, and the fish haven't just been marking time since some of them opted for a different lifestyle. Indeed, rather than an 'evolutionary tree' it makes more sense to imagine a sort of hedge – there are indeed branches growing up and out of it, but the roots are still continually sending forth little suckers, new variations on the old themes. Today we are lucky enough to have among us representatives, changed very little, of some of the families of fish that swam the seas four hundred million years ago, and some that are recent outcroppings from the hedge.

Primitive Hags!

The Hagfishes, however, are generally acknowledged as being fish, but still haven't made it as vertebrates. They have brains (albeit small ones!), but no real skeleton. The brain is protected only by a fibrous sheath, although cartilage does support the head structure, and stiffen the caudal fin. Although the Hagfishes can be characterised as 'primitive' they nonetheless have some very specialised adaptations to make them really

good at being Hagfishes. To start with, they have four hearts to keep the blood flowing, although if injured they do not bleed and the wound will not become infected. Somehow

NOT QUITE A FISH

A curious group of animals called the Lancelets hover in the no-mans land between fish and invertebrates. You could argue that the Lancelets aren't really fish, and therefore their curious characteristics have no real bearing on what makes a fish 'fishy'. Perhaps they are best regarded as being similar to an ancient 'proto-fish' – an organism that hasn't quite become a fish. The Lancelets are part of the Chordata, the group of animals that has a long rod supporting the body behind the head. In vertebrates this is the spinal column, but in the Lancelets it is just a long stiff rod, the notochord. There is no cranium (skull), no brain as such, no eyes, no ears. They do have gills, and spend their adult lives filter feeding at the bottom of the sea. It is likely that fish evolved from creatures of a similar construction to today's Lancelets, which are still thriving.



Ornate birchies have ganoid rather than ctenoid scales which most modern day fish have

they manage to have an immune system that produces antibodies, but completely lack bone marrow, a spleen, or a thymus, which are the sites where antibodies are produced in vertebrates. As active predators whose preferred position is with their mouth buried in something else, it is useful to them that they can breathe not only with their gills, but also through their skins. Lampreys too have no "bony" skeleton at all, so King Henry I may have died of a 'surfeit of Lampreys', but at least he didn't have to worry about those nasty little fish bones!

Skeleton – inside or out?

Although the Lampreys and Hagfishes get through life perfectly well without any real skeleton, other fishes have taken up the concept of bone with rather more enthusiasm. The Placoderms were a group of fishes arising in the late Silurian, who had all died out by the early Carboniferous, three hundred and fifty million years ago. The Placoderms were named for their extraordinary bony armouring – the name means plate-skinned – as thick bony plates covered the front half of the body. Although it didn't work out for the Placoderms, many modern fish have redeveloped the practice of having at least some skeleton on the outside. The Mailed catfish, the loricariidae, have their backs and top of the head covered with heavy bone plates called scutes, meaning shields. As they are bottom feeders, with a flat ventral surface which is kept safely pressed against where they are feeding, protection for the upper surface is adequate to keep them safe. Not only are they armoured with bony plates, but they also have teeth on their skins! The odontodes appear as bumps on the skin, and are almost identical in structure to teeth. The marine Trunkfishes take this a step further, and are

completely enclosed in a bony box.

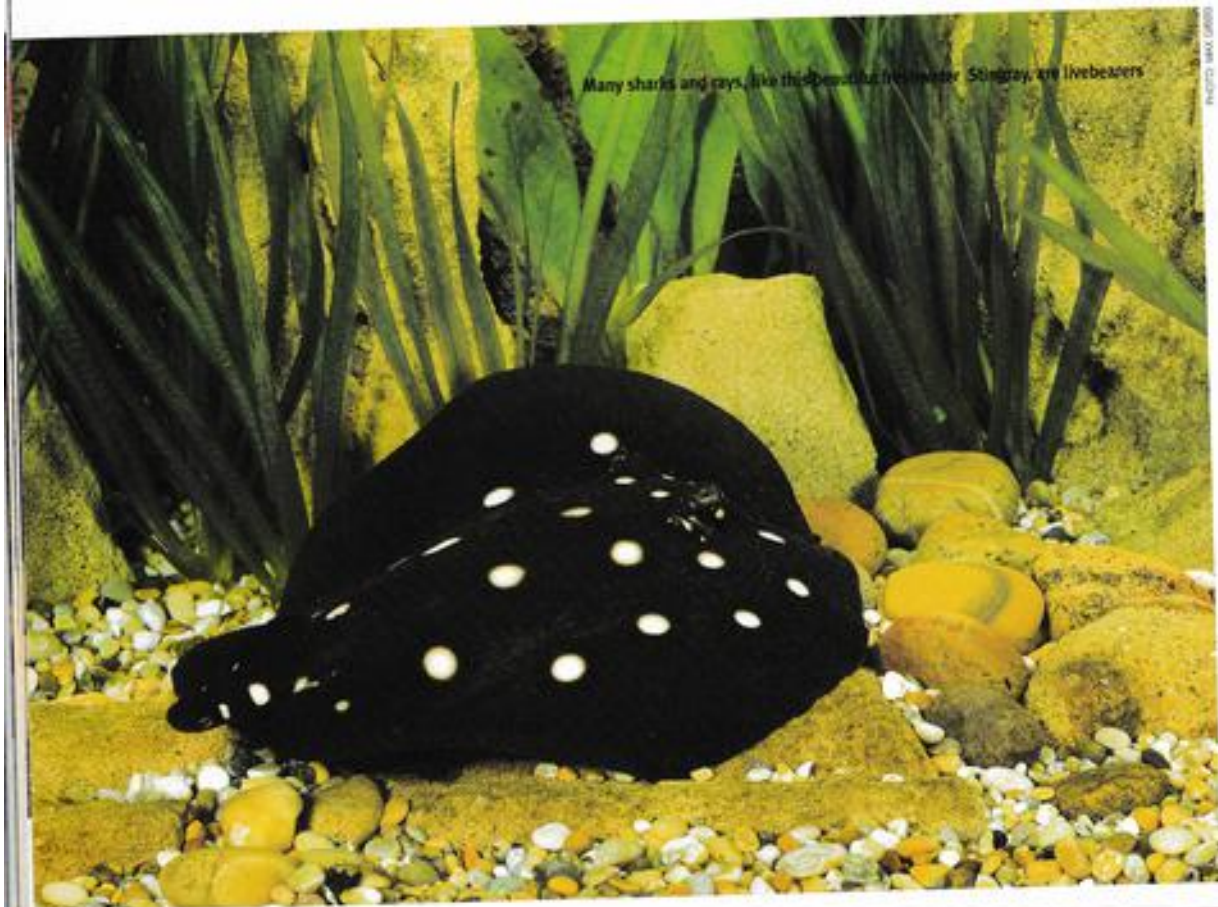
Still, to at least the casual glance, scutes aren't a million miles from scales, and everyone knows fishes are scaly. Scales come in four types. Placoid scales are teeth, with an enamel-like outer coating and a pulp cavity, and these are the scales that give

Sharkskin its characteristic rough feel. Cosmoid scales are composed of two layers of bone with enamel-like layers over the top, while ganoid scales are similar to cosmoid scales with an outer layer of ganoin, a bone salt. These can be seen in today's Sturgeons, Paddlefishes, Gars and Birchies. The majority of fish today have ctenoid or cycloid scales, which overlap to give flexibility, and are composed of a thin "bony" layer and a deeper fibrous layer. However, our old friends the Hagfishes have no scales at all, which is why their skin is in demand for 'eel-skin' products – presumably 'hagfish-skin' just doesn't have the same ring to it.

Eels appear to be scaleless, which is why they don't meet the criteria for kosher foods (which requires that a fish have both fins and scales). However, the eel has escaped narrowly – they do in fact have scales, although they are microscopic and embedded in the skin. However a number of other fish are indeed scaleless – many catfish have dispensed with scales entirely, including the Electric catfishes. Such fish tend to pose problems for aquarists as they are often far more sensitive to medications (and also to skin complaints such as ich, thus requiring medications). The *Botia* genus of loaches, and the Clown loach in particular, are notable sufferers.



Trunkfish, like this Hawaiian spotted trunkfish are completely enclosed in a bony box



Many sharks and rays, like this beautiful freshwater Stingray, are livebearers

PHOTO: MAX GIBBS

Livebearers abound

The concept that fish have all adopted the (eminently sensible) method of procreation that involves dumping your eggs somewhere and leaving them to it is true in many cases, but equally untrue in many others. As the topic of fish breeding has been covered thoroughly in these pages before, I shall not dwell too long on the parental care exercised by many species. Egg laying itself is not necessarily a fishy characteristic. Two of the most ancient lineages of fish are the sharks and rays, and the "living fossil" Coelacanth. Since the concept of internal fertilisation and pregnancy is often assumed to be some clever innovation exclusive to "higher" forms of life, it is therefore food for thought that both these groups of fish were practising internal fertilisation and in many cases giving birth to live young hundreds of millions of years ago. Among common aquarium fish the Goodeids not only give birth to live fry but attach and feed the fry via structures called trophotaeniae which act in a similar way to umbilical cords and supply nutrients to the growing fish. Many of them make excellent aquarium fish.



The *Skiffia multipunctata* is an attractive goodeid that makes a perfect addition to a community of other peaceful fish

Top Gear

All the new products and news from around the aquatic industry

Hidden filtration

Do you hate the sight of the big black box filter by the side of your pond? If so, OASE has the solution for you. The FiltoClear pressure filter range can be almost completely buried in the ground, so do not cause any impact on the look of your garden. The filters offer superb filtration with the minimum of maintenance, and with the integrated ultra-violet light, these filters are guaranteed to give clear water when used correctly.

The easy-clean technology used on the FiltoClear range allows maintenance to be done on the filter without taking out those messy filter sponges. All maintenance can be performed without getting wet and dirty. Simply turn a dial on the top of the filter, lift a handle a few times, and the waste from the filter can be flushed out of the secondary outlet, direct to a drain or

onto the garden (this waste makes an ideal garden fertiliser!).

Three models are available, for ponds of up to 11,000 litres in size. The FiltoClear range of filters are also available in sets with a suitable size of Aquamax solids-handling filtration pump and bacteria starter.



The FiltoClear filter which can be buried virtually out of sight

GOODBYE BLANKET WEED GIVEAWAY



If you've got a pond, then it's more than likely it has its fair share of blanket weed. Nishikoi's Goodbye Blanket Weed is a patented blanket weed treatment that combines the powers of bacteria, enzymes and activated barley straw, packed into water-soluble dosing sachets.

One of the great things about this product is that it's harmless to fish and beneficial aquatic plants. It harnesses 'miracles of nature' to clear ponds of nuisance algae.

Each pack of Goodbye Blanket Weed contains eight water-soluble bags, providing an eight-week treatment programme for ponds up to 1,000 gallons. Simply drop them into the pond or filter and watch them do their magic.

This eight-week treatment for a 1,000-gallon pond costs £14.99 and we have 15 to giveaway.

So if you're fed up of blanket weed and you would like one of these packs, send your name and address to Goodbye Blanket Weed Giveaway, Today's Fishkeeper, 7 The Rickyard, Clifton Reynes, Olney, Buckinghamshire MK46 5LQ. The first 15 entries picked at random will be sent a free pack.

AQUASCAPE CONSTRUCTION PUTTY

This product has been specially developed in association with Milliput for use within marine aquariums. AquaScape cures underwater to the colour of coralline algae which makes it far more aesthetic than standard Milliput.

The new formula is also stickier so that it bonds better to wet substrates such as coral frags or rockwork.

Its main uses are for fragging, construction of rockwork, clam bases repairs of pipe fittings and all of the usual applications. The pack comes with detailed instructions for its preparation and also with hints for specific use within the aquarium. It can be used in freshwater aquariums or ponds.

The SRP for this product is £3.99



New formula AquaScape construction putty

Home-build reverse osmosis kit

Why use reverse osmosis water?

Normal tap water, apart from containing chlorine (which is added by the water authority to stabilise bacteria levels) also contains many other unwanted materials. Tap water varies from area to area and ranges from soft (acidic) to hard (alkaline) depending on the level of dissolved mineral salts and carbonates. Tap water also contains many other ions, including but not limited to, heavy metals such as lead, phosphate, nitrate, silicate, calcium, sodium, aluminium, fluoride and a whole host of bacteria.

Drinking water in rural areas may become infected by fertilisers and organic chemicals especially during periods of flooding. Tap water impurities in small quantities are safe for human consumption but can be extremely dangerous in aquarium habitats.

The Flowtech FT800U R/O unit offers an economical and effective method for producing pure water for aquariums.



The home-build reverse osmosis kit from Flowtech

approximately 1:2.5/2:3. This ratio decreases dependant on water pressure and temperature and is offered as a guide only.

What you get

- A 24usgpd (20imp gallon) reverse osmosis system utilising the latest TFC (thin film composite) USA membrane.
- Quality injection moulded, pressure rated housings.
- Self-piercing saddle valve connection to your cold water supply.
- All necessary hosing to plumb the unit and collect pure product water.
- Semi Opaque in-line sediment filter, so you can see when the media needs replacing.
- High quality in-line coconut shell carbon filter to protect the membrane from Chlorine damage.
- Mounting clips for both in-line and membrane filters.

- Clear easy-to-follow instructions for construction, maintenance and long term operation of the filter.

For more information visit www.flowtechaqua.com

What is the reverse osmosis process?

Reverse osmosis is the passage of liquid through a selectively permeable membrane. Normal tap water is forced under pressure against a plastic membrane containing many microscopic holes (measured in angstroms). The membrane allows water molecules to pass through but traps larger contaminant molecules. Waste water containing concentrated pollutant is flushed from the system.

The ratio of product water and residual (concentrate) water is

Reverse osmosis kit FREE to one lucky reader

The unit is available from Flowtech direct for £69.95 and we are giving one away to one lucky reader. To be in with a chance send your name and address to Flowtech Reverse Osmosis Kit, Today's Fishkeeper, 7 The Rickyard, Clifton Reynes, Olney, Buckinghamshire MK46 5LQ or fax your details to 01234 714633. The first entry picked at random will be sent a kit.

Tongs come down in price

Aquascape tongs have been available from D-Deltec for some time but due to a new deal have now been significantly lowered in price. The tongs are invaluable for adjusting, retrieving or placing anything in your aquarium or pond. With their 32in reach and 4in gape they are ideal for picking up even large corals or pieces of rock. Ideal also for use in freshwater aquariums and ponds. SRP £21.99. They're also available in a 4ft version for larger tanks or ponds. SRP £34.99.



ON THE MOVE

Tetra UK Ltd has relocated its offices to The Clock House, Gaters Mill, Southampton. Following 15 months as an independent company this means complete autonomy which will allow the leading fish food and treatments supplier to benefit from the combination of expertise and entrepreneurial culture of an independent company.

Chris Nickson, UK Marketing Manager Tetra, comments: "The move comes at a very exciting time for the organisation and strengthens our independent status. The Tetra management team remains in a great position to bring growth both to ourselves and the market especially with a successful years trading as Tetra UK Ltd under its belt."



Tetra's new premises

NEW FISH FOODS

Following Interpet's launch last year of their aquarium food range, they have added two new items to meet demands.

Tropical flake and Goldfish flake are now available in a new 5litre (200gram) size. As with the smaller sizes of flake, both the new foods contain the immunostimulant Beta-glucan that aids fishes' immune systems and helps combat disease. Other key ingredients in this range include the highly effective, natural colour-enhancer Spirulina, a type of algae that has long been recognised as one of the most efficient natural colour enhancers available. All the essential vitamins required in order to provide aquarium fishes with a nutritious varied diet, including vitamin C, are also included.

In addition to flake foods, the Interpet aquarium food range includes granular



Aquarium flake food - Goldfish and Tropical

foods for both tropical and coldwater fish, and an adhesive tablet that can be stuck to the inside of the aquarium, allowing fishkeepers to watch their fish feeding at the front of the aquarium.

The tablets are also ideal for catfishes, such as plecostomus, when allowed to sink to the bottom of the aquarium. Mrrp £13.99 (Tropical) and £8.49 (Goldfish)

NEW POWERFUL, EFFICIENT PUMPS

Powerjet Free-Flo

Laguna has brought out foam-free fountain and waterfall pump kits which give unrivalled intervals between cleaning and maintenance. They are packed with features and have high outputs and low running costs.

Features include:

- Unique backwash feature - allows the cage to be cleaned from inside via connection to garden hose.
- High outputs - from 350lph to 10,600lph.
- Special riser joint allowing the riser stem to remain vertical even if pond floor is uneven.
- Two diverter valves for absolute control of fountain and waterfall.
- Large intake surface to restrict clogging.
- Click-fit fittings for easy connection. Compatible with most filter systems.
- Remote filter connection - for increased filtration and intervals between cleaning.

Recommended retail price £39.99 - £239.99

Powerjet Max-Flo

Ultra high performance solids handling waterfall pump. The foam-free Powerjet Max-Flo has enhanced performance with massive lift and low power consumption. This powerful pump delivers solid waste direct to the filter and is ideal for use with the Power-Flo external filter.

Features include:

- Two level suction - solids suction capability from lowest level possible as well as upper cage to ensure maximum pond cleaning.
- Superb output - from 3,500lph to 10,600lph.
- Able to handle solids from 6-8mm diameter - depending on model
- Easy click-fit fittings. Compatible with all filter systems.

Recommended retail price £139.99 - £244.99
Both Free-Flo and Max-Flo have:

- Spring loaded fastenings for easy access to pump cage
- Easy cleaning due to wide rounded surfaces
- Anti-leaf ribs to ensure continuing suction when pump is covered
- Low, low running costs - largest pump runs on only 125w
- High stability due to low centre of gravity



The Powerjet Free-Flow



Sadly missed

This month in Points of View Dick Mills introduces a selection of the many tributes to Derek Lambert

Points of View this month will have a common theme. After a discussion with our new editor, Christina Guthrie, I thought the best way we could mark the tragic loss of Derek Lambert would be to feature here a selection of tributes received from aquarists the world over. We offer them here as a celebration of his life as an aquarist and to give thanks for his services to the hobby and to this magazine in particular. He will be missed by many.

His real forte was getting his hands wet

Derek Lambert, although taken from us so suddenly and at such a young age, nevertheless managed to pack an awful lot of fishkeeping into his life. He began at the age of 11, as a junior member of the Kingston Aquarist Society based in south-west London. After a few years on the competitive scene, he turned his interest to livebearers – an aspect of fishkeeping that he was to make his own speciality.

He authored several books but his real forte was getting his hands wet, delving into the natural waters of his beloved fishes mainly in Mexico and, just recently, Cuba.

When *Aquarist and Pondkeeper* magazine was seeking a new editor in 1999, Derek fitted the bill perfectly. He brought the same zeal and organisational abilities that he had refined whilst heading up the "viviparous" specialist livebearer society to this 'office job' and quickly produced a magazine which was both authoritative and entertaining at the same time.

For such an eminent aquarist, Derek was still able to converse with every level of fishkeeper – from novice to expert – yet he was ready to admit he was still learning. We



feel especially sad for his mother, Pat, his companion on many a field trip and constant support through the years. Can there be anything more distressing than for a mother to lose a child?

In today's instant society where it seems that the younger person is not willing to get involved, Derek could be seen as an exception; his departure will leave a void that will take some filling.

Dick Mills

A passion for all things aquatic

Derek was a naturalist from his earliest days but it was at the age of eight, when he had his first fish tank, that the passion for all things aquatic first began. He joined a fish club at the age of 11 and it was by dabbling in the cold English rivers on fish club outings that he acquired the skills for the hunt and the excitement of finding out what was there. At the age of 21 (the earliest you can become a fish judge) he became a judge for the AofA. His links with all fish federations and associations throughout the land were very strong and unity was forever a driving force. Kurt Jacob's book in the 70s opened a whole new world of livebearers to him. In 1983 he went on his first collecting trip to Jamaica to collect *Gambusia melanocephala*, a fish he has loved ever since. He worked tirelessly for the livebearer hobby visiting Denmark, Holland, USA, Norway, Ireland, Scotland promoting livebearers. Above all other lands he loved Mexico, the land, the people and his beloved Goodeids.

In 1990 he went on a scientific collecting trip with Dr Smith and a couple of students. His job to look after the living specimens. In the field his IDs were second to none and because of this, new species were discovered on this trip. *Z. tequila*, *A. zacapuensis* and the species recently named from Zacapu as *G. irene*. Derek was very sad to see the plight of some of these fish and in an inspired lecture at Bolton Metro Aquarium he awakened the scientific community to the trouble these species were in and the livebearer Faltaq was born. He travelled England giving talks about Goodeid territory and the goodeids. There were very few rivers, ditches and ponds in Goodeid country that he had not explored with his nets. He brought back *S. francesae*

in association with

ROSEWOOD
PET PRODUCTS

SICCE

(a species extinct in the wild) to this country from Belle Isle aquarium and shared out the fish with the public aquaria where they have thrived, as they have in his tanks. Many public aquaria in England house his collections and some of his specimens are lodged in the British Museum.

Over the last few years his efforts have been focused on *Today's Fishkeeper* which he crafted, bringing in a team of knowledgeable aquarists who were also, with him, part of the fishkeeping community.

Trade and hobby together paid tribute to his life at his funeral on March 1st.

His family would like to thank the trade and the hobby alike for the many flowers, cards and emails that have been received.

Pat Lambert

We've all lost a mate

I met Derek at my Yorkshire Cichlid group meeting last year for the first time. I'd just like you to know he taught me a few tricks on how to keep my cichlids that bit better.



Characodon litensis. Derek was a great advocate of Goodeids and gave talks throughout the UK

He didn't give me too many science words, just plain English. He will be missed – we've all lost a mate.

Emma Bailey, Hull. A reader

Proud to have known him

It goes without saying that Derek was a highly-respected and much-loved member of the aquatic fraternity and I for one was proud to have known him.

Andrew Werendel, Aquatic Solutions

Respected all over the world

Derek's sense of humour was one of his most endearing qualities and we always enjoyed his company. His depth of knowledge and his dedication to all things

fishy was respected all over the world. His death will leave a void in the lives of all aquarists that may never be filled. I personally would never have been such a keen aquarist without Derek's help and encouragement.

Jane and Geoff Bell, Darlington. English hobbyists

Sorely missed by the hobby

Although it is almost seven years since my trip with him to Mexico and my visit to England, these have always ranked high as my most enjoyable vacations. Derek was always a great help to me when I was preparing fishkeeping/breeding articles for publication by ALA. His expertise in breeding, collecting and husbandry of fishes will be sorely missed by the hobby and all his friends.

Rich Serva, US hobbyist

"What I do I do because I love the doing, I have sought no accolades for it, for my fishkeeping life gives me great pleasure and that's everything to me."

Derek Lambert



people and their pets

... somebody has to understand them

telephone: 01952 883408

April's show, auction and club meeting dates, page 55



Jack Dempsey *Nandopsis octofasciatus*



Copy for Today's Diary Dates

Copy for Today's Diary Dates should be sent to Today's Fishkeeper, 7 The Rickyard, Clifton Reynolds, Olney, Bucks MK46 5LD. Telephone 01234 714784, fax 01234 714633 or e-mail editor@today-fishkeeper.com
Copy deadline for May issue April 14.

Beginners' Guide

COLDWATER



Today's Fishkeeper

**COLDWATER
SPECIAL**

LEARN HOW TO:

- 40 Choose and position a pond
- 42 Install a pond
- 44 Get to grips with UVCs
- 48 Select the correct pump
- 50 Understand filtration and water quality
- 52 Select and introduce new fish
- 54 Feed your fish correctly

IN ASSOCIATION WITH



WHICH POND AND WHERE?

Ponds and running water enhance any garden but when you decide to install a garden pond a decision has to be made about the kind of pond you want to create

40



A wildlife pond doesn't have to look unkempt to attract wildlife. This well-kept pond looks stunning

The creatures that you intend to introduce into this watery environment are the most important factors when considering pond design. There are basically three kinds of ponds, wildlife ponds, general garden ponds and koi ponds.

- Wildlife ponds can be located in wilder areas of the garden, they are not suitable for ornamental fish and are self-sustaining environments, the creatures' nourishment being provided by the diversity of life in the pond.
- Koi ponds occupy much more room, and design for koi goes hand in hand with filtration

systems. Some koi fanatics devote their whole garden to one massive koi pond to house their pets.

- A general garden pond where fish and plants live in harmony together is the one most widely kept and much of the information given in this pond section relates to this type of pond. These are ponds which can

vary in size according to the size of your garden.

LOCATION

Location is very important and before making a decision about the positioning of your pond take a good look at your garden from an upstairs window or overlook the garden at ground level if it's a one-storey building.

IN ASSOCIATION WITH

Laguna



PHOTOS BY DAWE BEWAN

If you want to keep koi you'll have to have build a pond over 1,000 gallons and add filtration

Near the house has certain advantages, it will be closer to the electricity supply and will be easily viewed from the house or conservatory in winter. It will also be less exposed to the elements. Waterfalls, however, often form a backdrop to the pond and their full beauty may be more clearly seen from a distance.

Locating a pond near trees can be a disaster and there are good reasons why the pond should not be situated under trees. Leaf fall can be a major problem in autumn and some trees' leaves, berries and blossoms are toxic to fish. The weeping willow that languishingly droops into the pond together with trees such as poplar, oak and elders can spell death to fish. Even if you dig out the trees, left behind tree roots can

regenerate and at a later date rise to puncture your established pond.

Although a spot where a natural pool forms in a low lying part of the garden might seem an ideal location, if you try to locate your pond where the water table is high, you will have a constant battle against rising water filling your hole as you excavate or lifting your liner once the pond has been installed.

PRE-FORMED PONDS

Pre-formed ponds come in a variety of shapes and rigidity – durability and size are the keynotes here. Flexible ponds are only suitable for small ponds up to 320 litres.

High density, less flexible polythene ponds are stronger and less likely to puncture, they

also hold up to 900 litres.

Rigid glass fibre ponds are the strongest, built to last a lifetime and there are ponds ranging from the tiniest volume up to 4,500 litres.

FLEXIBLE POND LINERS

These all come in different depths, shapes and arrangements of shelving areas for marginal plants. There are several grades linked to quality and durability. What options are there?

Pond liners are made from PVC rubber and hi tech composite materials and can be bought off the roll or pre-cut and packaged to size.

All kinds of shapes are available in pre-formed ponds but when installing a flexible liner it is best to stick to clean cut lines and curves.

Ponds for koi

Koi are very special requiring a pond specifically designed for them. Often ponds are constructed using concrete and fibreglass so require a lot more time and effort. They can grow to 1m long and develop deep bodies. They require much deeper water, about 2m deep. They need a much larger swimming area with clean, uncluttered lines. Optimal water conditions are required and an expensive filtration system is a must. This can be costly but if you can't invest in this it is best not to keep koi. If you want to keep koi, read up as much as you can about designing a koi pond.

INSTALLING A POND

Digging a pond is hard work, so be prepared for it. Plan each stage of the operation in advance and you'll make your life easier

42

RIGID GLASS FIBRE PONDS

The hole that you dig should be slightly bigger than the pond outline, and slightly deeper.

When tracing the outline of your new pond stand the pond in an upright position as if you lay it top down you will have a mirror image of the pond you really want to dig. This might sound a silly thing to do but it happens! The outline can be traced with sand.

When digging, frequent checks should be made to ensure the hole is level.

When the hole has been dug to the required size and depth, a layer of moist sand should cover the base before insertion of the pond.

Check that the pond is level before starting the filling and backfilling. Fill to a depth of about 10cm before you start to backfill. Backfill with loose sand or soil as you gradually fill the pond. Stop to make frequent checks that the pond is level.

FLEXIBLE POND LINERS

Flexible liners are exactly that, for they can be any size or shape you wish! although liners are better suited to larger ponds which can be formal or informal. You need to mark the outline of your pond with hose-pipe or strong rope. Take care



A preform pond (right) makes an excellent beginners' choice. Liners come in different grades (above). Don't skimp – buy one that will last



when shaping shelves, they need to be sculpted out from the solid earth not formed from loose soil.

When you are satisfied with your hole, a 3-5cm depth of sand covering plus liner underlay to help ensure against stone and root piercing.

Before purchasing the liner you need to work out the pond's dimensions, maximum width,

length and depth. If you want to incorporate a waterfall, flexible liners are invaluable for this as you can incorporate the liner for the waterfall in your calculations, the waterfall liner being an extension from the main pond liner.

Today's top tip

Store pond liner upside down until hole is ready. A heavy storm could fill it!





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This waterfall is made using natural stone, but there are some realistic pre-formed ones that won't break your back

Although it is impossible to avoid creases when installing the liner, broad lines and curves will reduce these to a minimum. Stick to simple shapes, intricate shapes create problems.

Stretch the liner out flat across the hole and begin to fill. As the liner fills eliminate as many creases as possible by pulling and stretching the liner as you go.

Only when the pond is full should the liner be trimmed. An overlap of at least 30cm should be left and don't forget the extended liner where you plan to have a waterfall. This means that the line of the pond is unbroken and will create fewer problems than adding on later.

WATERFALLS

Waterfalls can be created by using preformed units or natural stone. Pre-formed units range

from rigid fibre glass shapes to reconstituted stone shapes, this cascade should be placed on the liner extension of the pond and should not leak although there may be some water loss through splashing. York stone can be easily chipped to shape and is the best stone to use in the construction of a waterfall. The structure can be built up from a mortar foundation embedded in the extended waterfall liner. Each level, built from the bottom up should have a lip which overlaps the level below. Filter and UVC are easily hidden away at the top.

FOUNTAINS

These are easy to install as they are joined directly to the pump in the pond and come with a variety of fountain heads and attachments through which the water flows.

Area of liner required

Take the longest and widest measurements down across and out of your pond allowing a 30cm overlap all around.

Example:

Pond's dimensions are 12 x 8 x 3
Liner is $(12 + 3 + 3 + 1) \times (8 + 3 + 3 + 1) = 19 \times 15$



ULTRA VIOLET CLARIFIERS

It is not even 20 years since UVCs first became available as a mainstream piece of pond hardware. Why have they proven to be so successful, and do you really need one? Ben Helm answers some frequently asked questions

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WHY MIGHT MY POND NEED A UVC?

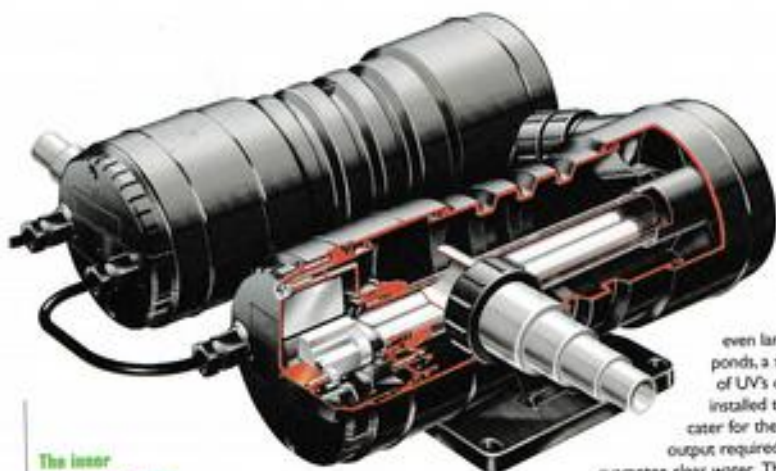
If you own a pond, then it is highly likely that your pond has suffered from green water at sometime through the season. Greenwater is caused by a suspension of microscopic algae that bloom under specific favourable conditions, causing the appearance of your pond to deteriorate into a pea green soup in only a couple of days. A UVC (which stands for Ultra Violet Clarifier) works in conjunction with a pond filter to clear your pond of greenwater. Microscopic algae cells that before were too small for a filter to remove, now clump together when exposed to the UV light into particles that can be removed by a conventional filter.

I THOUGHT MY BIOFILTER ALONE WOULD BE SUFFICIENT TO KEEP MY POND WATER CLEAR

A biofilter's primary function is to break down and detoxify the by products of digestion that fish excrete into the pond. However, a mature biofilter in conjunction with a balanced and well-planted pond will often be sufficient to keep pond water clear. The benefit of fitting a UVC is that it guarantees clearwater in even newest of ponds, with most UVC manufacturers now offering a 'clear water guarantee'.



UVCs can be hidden out of view



The inner workings of a UVC

HOW DOES A UVC WORK?

Ultra violet light (or more correctly radiation) is found between the visible blue end of the electromagnetic spectrum and X rays. UV light fills a broad band within the spectrum from 13nm to 400nm (nanometres).

The germicidal UV light falls between 200 and 295nm with most lethal rays being at 254nm. At 254 nm, UV radiation is at its most lethal. It is an indiscriminate living tissue killer (i.e. it kills both pathogenic and non-pathogenic micro-organisms). For this reason, under no circumstances must the bulb be viewed directly or indirectly by the naked eye as it can cause tissue damage.

Compared to other pieces of pond equipment, UVCs are relatively straightforward in their design. It is merely an electric bulb seated within a water-tight housing. In fact, it is the UVCs simplicity of construction and design that makes them so easy to install (even to retrofit into an existing pond set-up), making them almost as standard in a garden pond as a pump and filter. Germicidal UV light causes these elusive cells to clump together into larger particles that can then be removed by a conventional filter, thus solving the green water problem.

ARE THEY EASY TO INSTALL?

A UVC is very easy to install, requiring basic plumbing and electrical DIY skills. All that's involved is cutting the hose between your pond pump and

filter and inserting the UVC (which will most likely be fitted with two tapered hose tails for ease of installation). It will then simply need connecting to the same electrical source as your pump to ensure that the 2 units run simultaneously. Remember to use waterproof connectors and junction boxes.

A UVC should be pump-fed, positioned either between a submersible pump and a filter or after a dedicated UV pump and the return to the pond. This will ensure full bulb coverage improving the efficiency of the unit. Some pond filters are sold



There are other methods to reduce algae. See which one works for you

with an integrated UV, making their installation even more straightforward.

A UV clarifier should run continuously from spring to autumn to have the desired effect on green water. Units start at 4W for the smallest ponds, right up to 55W bulbs which are rated to clear a 10,000 gallon pond. For

even larger ponds, a series of UVs can be installed to cater for the output required to guarantee clear water. The wattage of even the larger UV bulbs is less than the average household bulb, making them very economical to run.

WHAT ABOUT MAINTENANCE?

A UVC should be turned on in the spring, having been fitted with a new bulb (which will last for 12 months), requiring minimal maintenance through the season.

The quartz sleeve may need cleaning to remove sludge or muck and in extreme cases, may need replacing if it has accumulated a coating of stubborn lime scale.

Immediately after fitting, you will notice an increase in the amount of organic sludge being deposited in your filter. This is the flocculated microscopic greenwater cells that have now been removed by your filter.

Because of this extra loading produced by the UVC, it is recommended that mechanical filtration should be 'oversized' whenever UV units are installed.

You will have to keep on top of cleaning your filter as your foams or other mechanical filter media will become overrun more frequently than before.

ARE THERE ANY DRAWBACKS OF INSTALLING A UVC?

It is difficult to list any serious disadvantages of using a UVC and as a result, they can be installed to carry out their clearing role with great confidence. It is not possible to overdose with UV and its action is limited to the water which passes beneath the bulb. Furthermore, a UVC is likely to improve fish health by reducing

the number of pathogenic organisms (bacteria, viruses, fungi and parasites) in a pond. Consequently a UVC is very environmentally friendly and will not interfere with other desirable plant growth in a pond.

However, as far as pond ecology is concerned, a UV unit is a reactive treatment to a symptom of a nutrient-rich pond. It does not remove the nutrients from your pond water on which the greenwater thrives, leaving the gate wide open for other opportunistic algae to thrive unhindered and unshaded by green water. It is therefore not surprising to find that the incidents of blanketweed in garden ponds has increased at the same time as UVCs have become available to pondkeepers.

The clear water allows excellent sunlight penetration, coupled with the ready supply of nutrients that are no longer being used by green water can produce phenomenal blanket weed growth.

So UVCs can cause as well as solve algae problems in a pond. A UVC can be used very effectively in conjunction with blanketweed treatments that consume or bind-up algae-promoting nutrients, which will prevent the re-growth of other algae such as blanketweed.

HOW MUCH DO THEY COST TO BUY AND RUN?

UVCs are available as single units (if you already have a filter) or as combined filter/UV units (if you are building a new pond).

Single UVCs

TO BUY:
 UVC for 600 gallon pond £50.00 (6W)
 UVC for 10,000 gallon pond £170.00 (55W)

Replacement bulbs (6W) £7.50
 Replacement bulbs (55W) £25.00

RUNNING COSTS:
 For a 6W UVC for one season. Assuming 1Kwh = 10p = £3.02

BUYING THE RIGHT PUMP

Buying a pump that's too low in capacity or too high in electrical use is one of the most common problems pondkeepers are faced with. We help you get it right

To make life easier, and to make sure you get the right pump for the right job, work out the answers to the following questions when you go to buy a pump from a garden centre or aquatic outlet.

- What do you want to use the pump for? What sort of fountain, filter or watercourse will it be powering?
- If you want a fountain, how high will the spray be and what style of spray do you want?
- If you are building a stream, how long and wide will it be? And will the water trickle gently or would you like a gushing effect over a waterfall?
- What are the approximate measurements of your pond?
- Do you want a pump that runs all the time or intermittently?
- Will the pump be fitted in a pond with fish present? If so, do you need a biological filter?

THINGS TO THINK ABOUT BEFORE BUYING A POND PUMP:

⊕ The volume of the pond (including the filter)

A pond's volume should be turned over at least once every two hours. For example: if a pond has a volume of 1,500 litres, a pump capable of pumping 750 litres per hour would be suitable. But be aware that any extra work that a pump has in pumping water to a filter or waterfall will also significantly reduce the pump's performance.

⊕ Head that a pump has to achieve



Tip: The inner workings of a solids handling pump and (below) the Maxflow pump and filter



The flow rate of a pump is reduced as soon as a pump has to move water above the water's surface. The vertical distance between the water's surface and the delivery height of the pipe is described as the 'head' with the greater the head, the greater the work and the lower the pump turnover. Returning to the previous example, if a pond has a volume of 1,500 litres and requires a turnover of 750 litres per hour. If that same pond has a waterfall that is one metre high, then a suitable pump would be one that provides a turnover of 750 litres per hour (minimum) at one metre of head. This will mean choosing a larger pump than you may have first expected. Check the pump's specification on the side of the box.

⊕ When comparing pump performance, make sure you

are comparing like with like. A factor of trading in the EU is that pump flow rates are more often measured in litres per hour rather than gallons per hour. This can cause problems when comparing the performance of similar pumps so be prepared to convert gallons to litres and vice versa.

⊕ The effect of pipework on flow rates

Using the incorrect diameter pipework can mean that even having chosen the correct pump, that once installed, it underperforms.

When piping water from a pump up to a waterfall, use as few elbows as possible, tending towards the use of sweeping bends in a flexible hose if possible. This will reduce the friction of the water in pipework, improving pump performance. Always use the pipe diameter as recommended by the pump's manufacturer (even if reducing hose-tail adaptors are provided with the pump) as deviating from the ideal diameter will also reduce pump performance.

⊕ Running costs

As a pump is likely to be used continuously, the running cost is a significant consideration when pricing up for a pond pump. Power consumption is measured in Watts with a greater figure relating to a more power-hungry pump. The wattage will not always relate to the overall



Check your pump

Regular maintenance is a good idea as it prolongs the life of your pump and ultimately saves you time and money. Even if you don't have a problem take time every month or so to take out your pump and make sure that it's clean and working properly. Look for any cracks in the housing and make sure the impellers run freely, without being blocked by algae, dead snails or debris. You'll be amazed at how much stuff can find its way into your pump, even when there hasn't been any activity in your pond.

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The size, height and flow rate of the waterfall you want to achieve will have a bearing on the type of pump you choose

performance of a pump as efficiencies in design and construction can enable some lower wattage pumps to outperform pumps with larger motors. The difference in running costs over the lengthy lifespan of two different pumps could amount to the price of a new pump. Often the cheaper pumps have higher running costs so outlaying a bit more money to begin with could save you money in the long run.

DIFFERENT TYPES OF PUMP

There are three types of pond pump available to the pond keeper – the external or surface-mounted pump and two types of submersible pump.

1. External pumps

External pumps are sited outside of the pond. Such pumps are often referred to as swimming pool pumps and are better suited to larger, more specialist situations where above-average turnover of pond water is required. Consequently, external pumps form a very minor part of the mainstream garden pond market, being better suited to larger more specialist koi ponds.

2. Submersible pumps

Submersible or internal pond pumps are by far the most popular pond pump. They are extremely versatile, being available in a range of sizes to suit most applications from a tiny fountain pump for a self-contained water feature to a jumbo submersible pump for a

large pond complete with waterfall and filter system. They are very straightforward to install and having been developed in a very demanding market are sold with lengthy guarantees.

The only moving part in a typical submersible pump is the magnetic impeller assembly that is driven by an electromagnet that is situated within the main pump body. All of the electric components within the body of a submersible pump are safely encased in hard resin that is itself retained in a robust and watertight pump body. Even so, to ensure complete

safety, submersible pumps should be plugged into the mains through a 'RCD' breaker. Some pump manufacturers produce low voltage pumps that take their current from a transformer, further reducing any risk of a large electric shock.

Laguna pump



THE IMPORTANCE OF WATER QUALITY

Providing the correct environment for your fish is vital to their health

To be a successful coldwater fishkeeper, you have to provide an environment in which the fish will be able to live healthily and thrive. Nearly all problems encountered by new fishkeepers can be directly attributed to poor water quality and/or inadequate filtration.

Fish in natural lakes, ponds, rivers and oceans thrive because stocking rates are typically a lot lower than in a garden pond and where a balanced ecosystem is maintaining healthy water quality. Most natural bodies of water have marginal and submerged plants which play an important role in maintaining a healthy environment for the fish and other aquatic animal life. The plants put essential oxygen into the water and remove the



Filtration system from lagoon

nitrogenous waste, which in fish is ammonia. The aquatic plants will then use the ammonia fish waste directly as a source of nitrogen and, in this way, remove it from the water.

However, in an artificially created environment very often there isn't the natural balance between the fish and plants. This is even more true of koi ponds which tend not to have any plant life (koi are very greedy fish!). So when this balance is disrupted you will need a biological filter which is essential for removing the ammonia waste produced by the fish and for removing other organic detritus, which would otherwise accumulate.

HOW DO I MAINTAIN GOOD WATER QUALITY IN MY POND?

Problems can occur in a small pond where the number of fish can be unnaturally high. This is accepted as the norm, and should not lead to a decline in water quality if a number of guidelines are followed:

⊕ A pond filter is an essential requirement. Fed by a pump, its job is to remove solid waste from the pond, keeping the water clear and to breakdown the soluble and invisible toxic fish waste in less toxic by-products. This is achieved over

time by beneficial bacteria that naturally colonise the filter media.

⊕ Feed fish sparingly, bearing in mind that the amount of food eaten by fish is directly related to the amount of toxic waste they excrete. If too much food and too many fish are added to a pond then water quality and fish health problems are likely to arise.

⊕ Carry out regular partial water changes. About 10-20% of water should be changed every three to four weeks in spring and summer to dilute the build up of stubborn toxic by-products. A water change will also 'freshen-up' a pond, having a noticeable and positive affect on fish behaviour. Always treat raw tap water with a conditioner when carrying out a water change as tap water may be good enough to drink, but is not guaranteed to be fish friendly.

⊕ Add aeration. This is easily achieved by placing the return of the filter down a waterfall or attaching a fountain to a pump. The extra agitation of the water will increase to dissolved oxygen content, which can drop to worryingly low levels in the warmer summer periods.

WHAT DO I TEST MY WATER FOR?

There are lots of different test kits available, each testing for a specific water parameter. Do not let this put you off, as there are only really three that you should need to use to give you useful information rapidly.

⊕ pH

This is a measure of how acid or

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What effect does water quality have on fish?

Water quality has a very direct and predictable influence on fish health.

Poor water quality = poor health
Good water quality = good health

As fish are unable to escape poor water quality, they must suffer the stress of swimming in a soup of toxic compounds which they have excreted – not a healthy situation. This makes fish more susceptible to disease, and a downturn in water quality usually causes a change in fish behaviour.

Watch out for:

1. Loss of appetite
2. Sulking on the pond bottom
3. Hanging motionless at the surface
4. Clamped fins
5. Gasping at the surface.

All these changes in behaviour will usually indicate a deterioration in water quality.

alkaline the pond water is. Pond water must be above 7 and no higher than 8.5, or 9 at a push. If upon testing your water it is within this range, then leave well alone. Tap water is made alkaline by water companies, so regular water changes should help to keep your pH acceptable. If your pH is below 7 (acidic), then a water change or the introduction of lime stone chippings in the filter will bring it back up to the desirable range. If your pH is above 9, and too alkaline, the probable cause is the running in of untreated lime into the pond. Seal any surrounding cement work with a clear plastic sealant.

Ammonia

This tests whether the toxic waste (ammonia) that fish excrete is being broken down. An ammonia test is only usually required when a new pond and filter are being matured over the first couple of months and there is a question over the functioning of the beneficial bacteria in the filter. The desirable ammonia reading is zero, but should a positive reading occur then carry out the following:

- Stop feeding
- Do not introduce any new fish
- Carry out a 20-30% water change
- Only start feeding when reading is back to zero (this may take a few days). Carry out a test each day for the next week.

However, if a positive ammonia reading reappears upon daily testing, carry out steps one to four again. As the filter matures, an ammonia reading is less likely to occur.

Nitrite

Nitrite is a persistent toxic by-



Unless you have a planted pond with very few fish, you are likely to need some sort of filtration

product of the bacterial breakdown of ammonia. Although it is slightly less toxic than ammonia, the bacteria involved in breaking it down further are slower to act than those involved in the breakdown of ammonia.

The desirable nitrite reading is zero, and if a nitrite reading is present, it is an indication that the filter is not coping with the amount of waste being produced. Even a low nitrite reading is undesirable and if present, the same procedure (one to four) for ammonia toxicity applies. Similarly, the water need only be tested for nitrite in the early weeks of a pond and filter, while the bacteria responsible for its breakdown become

Koi pond filter systems

The filter system on a koi pond usually has two main elements, the mechanical and biological filtration. The mechanical filters may be sponges, brushes or a vortex unit, which is situated at the beginning of the system. Its purpose is to strain out, or in the case of the vortex, use centrifugal force to spin the organic and particulate material out of suspension in the water column. It is very important to keep the mechanical filtration clean and free of this organic detritus. If the mechanical filtration becomes congested with this organic material, it encourages parasites such as *Trichodina* sp. and flukes to thrive, so prevention is better than cure and it is easy to keep them clean. Because the mechanical filtration is effectively there to strain out this material, it is not important that it becomes colonised by bacteria, this is the purpose of the biological filtration, so the brushes or sponges can be frequently given a very thorough cleaning.

established. Once the filter bacteria have colonised to the level of your stocking and feeding rate, a nitrite reading should not occur again as long as the feeding and stocking rates remain pretty constant.

HOW DO I TEST?

Test kits typically use a change in colour to measure a water parameter. A sample of water is taken from the pond, filling a clear test phial. Either a series of

liquid re-agents or a tablet are added (depending on the manufacturer), and the sample is left for a set time, waiting for the colour to develop. The final colour is simply compared to a chart to determine the reading. It's as simple as that.

Before using liquid tests always shake the bottle well. Simply compare the test tube result with the colour chart provided. Perform tests regularly so you can be one step ahead.



Water testing is the one sure way to find out your water quality

TO BUY OR NOT TO BUY

Selecting and introducing new fish is one of the main reasons many people build ponds in the first place. Here's how to get it right...

Whether you're buying fish for the first time or introducing new stock to your pond it's important to buy healthy fish. Often when you visit an aquatic outlet your first impression can tell you whether or not to make that purchase. Does the shop look clean and are the staff willing (and able!) to give advice? When you go to the outlet ask yourself a few questions and take time to look and listen.

- Are customers regulars? It's always a good sign and you may be able to ask them a few questions such as how long have they been visiting the shop and why?
- Take a look at the vats or ponds the fish are being sold from. Stocking density is not too important as, behind the scenes, there is probably a filtration system more than capable of dealing with the waste. If the vats are murky, or if there is a fishy smell, this is a bad sign.
- Does the shop quarantine their fish? If they do any obvious problems will make themselves known before the fish are offered for sale. This is no guarantee that the fish you buy will not subsequently succumb

Top tip

Make sure that you have enough room in your pond for the new addition's. Take time to find out what the stocking density should be for the particular fish you wish to buy. Overstocking is one of the main cause of problems in garden ponds.



Common goldfish: they're colourful and easy to keep

- to bacterial or viral infections – it just lessens the risk.
- Are the fish in tip top condition and behaving normally. Avoid any that 'sit' on the bottom, hang round the tank inlet or set themselves apart from other fish.
- When you see a fish you like, ask for it to be netted so you can have a closer inspection. This way you can note its respiration rate, and whether the gills are sharing the workload equally.
- Depending on which type of fish you are buying you will be looking for different health attributes but generally: is the body nicely filled-out? Is the backbone straight? Check out

- the mouth, inspect the eyes (they shouldn't be bulging or sunken) and don't buy a fish with raised scales, reddened areas of skin, lesions, abrasions or ulcers.
- If you are buying koi, do you have a heated pond? If not you should really wait 'til late spring.
- When buying any fish be sure you can care for them properly. Koi especially demand high standards when it comes to pond size and filtration.

TRANSPORTING THE FISH HOME

- Take the fish/ies home straight away. The less time your new fish spends in a bag the better off it will be. Never leave your newly

purchased fish in a car on a hot sunny day unless you like them par-boiled

- If possible use a Styrofoam cooler to transport the bagged fish home. This helps keep the temperature stable.
- Keep the fish in the dark. They're a lot calmer being transported this way and are less likely to flash around and get stressed.
- When you get your fish home make sure you test the water regularly. Pollutants, like ammonia, nitrite and nitrate are a common cause of problems. You can buy master test kits which include kits for pH, ammonia, nitrite and nitrate.

Common pond fish

GOLDFISH

The most popular of the pond fish, they are hardy and tolerant of a range of conditions. Growing up to 38cm (15in) long, they are colourful with many varieties to choose from, including comet, fantail and shubunkin. They are also easy to breed and many live for up to 20 years.

RUDD

A good choice for the inexperienced fishkeeper, rudd are suitable for smaller ponds as they grow no larger than 15-23cm (6-9in). With a silver body and red fins, they enjoy open areas of water where they can bask in the sun, but are equally happy in planted ponds. They tolerate lower oxygen levels and higher temperatures, and also like to feed on algae.

ORFE

Orfe need a bit more space as they can grow up to 50cm (20in) long. They can be seen scavenging for insects near the water surface, and if you add six or more they shoal and can become quite tame. Golden orfe are orange all over with a silver underside, while common orfe are silver all over. They have a high oxygen requirement so extra aeration, using a waterfall or fountain, is needed.

TENCH

Growing up to 45cm (18in), both green and golden tench are sold as scavengers to remove waste from the bottom of the pond. They're shy floor dwellers, so once you introduce them to your pond you may never see them again.

ROSY MINNOW

Great for small wildlife ponds, the rosy minnow and three-spined stickleback grow no bigger than 7cm (3in). They move around in shoals and are great for keeping mosquito larvae at bay.

KOI CARP

These graceful, colourful fish can grow up to 1m (3ft) so should only be kept in ponds of over 1,000 gallons and ideally in a depth of no less than 4ft. They do have a tendency to stir up mud and silt from the pond bottom and eat soft-leaved aquatic plants. However, in the right pond they can make great pets and can live to a ripe old age.

When you do pond water changes make sure you use a water preparation which removes harmful chlorine and metals from tap water



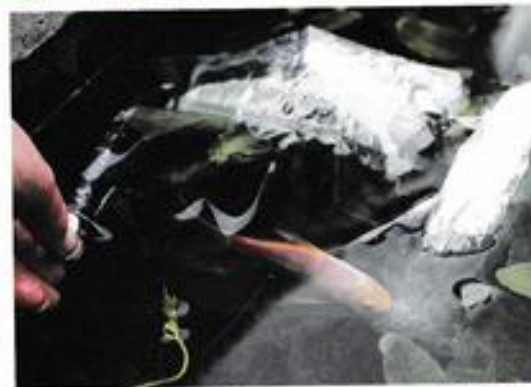
Introducing new fish to a pond



Step one: To minimize the time they are in the bag, you need to start the releasing process as soon as you get home



Step two: Float the bag on the surface of the pond so the fish can adjust to the temperature in their new home



Step three: After about 30 minutes you can release the fish into the pond. Try not to get any of the bag water into the pond

FOODS & FEEDING

A healthy diet and correct feeding lead to healthy and colourful fish

Koi and goldfish are the most commonly kept pond fish. There are specialist foods available for these, and most fish foods have been manufactured to give them a very good diet.

Fish food is produced as pellets, sticks, granules and flake and a choice has to be made according to size, swimming level and eating habits of the species involved. For the smaller fish flakes are ideal, they float for a while and sink slowly through the water column giving food at all levels. Sticks soften more quickly than pellets and small fish have a chance to nibble bits off. Floating sticks give the pondkeeper a good opportunity to watch their fish feeding at the surface and to see that all the food is eaten fairly quickly, this means overfeeding is less likely to occur.

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BOTTOM FEEDERS

This is all very well, but what about fish like the Tench that live down in the bottom regions? These fish could be in danger of starving if the food does not reach them. For this reason it's best to feed sinking pellets or flake at the same time as the top dwellers are receiving their floating sticks, only then you can be sure that the bottom dwellers receive their fair share.

The carnivorous Orfe is a surface feeder and needs a higher protein diet than goldfish and koi. Proteins are the major building blocks of the body. They replace worn out tissues and build new ones as growth

proceeds. Proteins are generally lower in pond fish foods as the fish are expected to get good supplies from surface insects and other pond life that the fish forage for.

Content wise, fats are needed in sufficient amounts to supply the fish's energy, but too much and there will be a build up of fatty tissue. Colour

enhancing foods will improve the colour on Chubb, Roach and Rudd as well as goldfish and koi. It is important to remember that pond fish require small feeds throughout the day. Heavy feeding leads to uneaten food polluting the water.

In spring and autumn when the weather is cooler, fish need a low protein diet that they can digest easily and wheatgerm is the best food at this time.

When the temperature falls below 8°C the fish will not come to the surface to feed, they will sink below into warmer

regions until spring. If the fish have been well fed throughout the season the slow metabolic rate of the sluggish fish will enable them to live on the stored reserves in their body.

There are lots of balanced fish foods on the market



With time you can encourage koi to take food from your fingers

Read the small print

The labels on every fish food container will have a breakdown of ingredients printed on them so look at the small print.

- Thurs 1st** Glenrothes meeting; Contact D. Smart, 4 Lochly Ave., Kinglisse, Fife.
- Fareley A.S. meeting;** Contact 01738 561291 or 07714 889507
- Sandgrounders A.S. meeting;** Contact 01704 541177
- Fri 2nd** North West Cleithrid Group meeting; Contact 01942 207393
West Cornwall Fishkeepers meeting; Contact 0179 9401248 or 01209 644538
- Sat 3rd**
- Sun 4th** Kirkcaldy A.S. meeting; Contact John Reid on 01738 634689 or Joe Graham on 01592 782904 after 6pm or email: joe@grahamgo.freemove.co.uk.
- Sotway A.S. meeting;** Contact 01387 750606
- St Helens A.S. meeting;** Contact 01942 671463
- Ayrshire Fishkeepers Association meeting;** Contact 01294 605272
- Reigate & Redhill A.S. meeting;** Contact 01293 781282
- Mersy-side Aquarist Society meeting;** Contact 0151 260 3664
- Warrington A.S. meeting;** Contact 01525 481979
- Ilford & District A & P Society meeting;** Contact 020 85507329
- Port Talbot A.S. meeting;** Contact 01639 770736
- Co Armath tropical/marine fish society meeting;** Contact 0283 833 2210 or 0776 0405
- Tues 6th** Southend Leigh & D.A.S. Contact 01702 305740
Palsley & District A.S. meeting; Contact: beeburns@thefreemove.co.uk
- York & Dist. A.S. meeting;** Contact 01904 414272
- The Irish Tropical Fish Society meeting;** Contact on 4568196
- Halton A.S. meeting;** Contact 0151 2898190
- North Bucks A.S. meeting;** Contact 01908 377313
- Presdon A.S. meeting;** Contact 01772 311145
- Lang Town Aquarists and Pondkeepers Group meeting;** Contact 01592 595825
- Wyke A.S. meeting;** Contact 01482 445543
- Wed 7th** Conry & D.A.S. meeting; Contact 01536 799932
- Quais Fish Club (Sunderland) meeting;** Contact 0191 984513
- Perth A.S. meeting;** Contact 01 738 621704 or 01506 510958
- Clacton Fish Keeping Club meeting;** Contact 01255 428065
- Portsmouth A.S. meeting;** Contact 01703 885152
- Bracknell A.S. meeting;** Contact 01897 732874
- Ryedale A.S. meeting;** Contact slmarsh@thefreemove.net
- Tameside A.S. Meeting;** Contact 0161 339 6693
- Plymouth & District Aquarists' & Pondkeepers' Society meeting;** Contact 0795 6421510
- Thurs 8th** Mid Sussex A.S. meeting; Contact 01924 602407 or 01551 761743
- King's Lynn Fish Club meeting;** Contact 01553 769522
- Fareley A.S. meeting;** Contact 01738 561291 or 07714 889507
- Isle of Wight meeting;** Contact 01983 721246
- Fri 9th** South East Marine Aquarist Society; Contact 01279 301542
- Yorkshire Cleithrid group meeting;** Contact 01924 367086
- Bassingsdale A.S. meeting;** Contact 0128 970 1464
- Sat 10th**
- Sun 11th** Kirkcaldy A.S. meeting; Contact John Reid on 01738 634689 or Joe Graham on 01592 782904 after 6pm or email: joe@grahamgo.freemove.co.uk.
Bristol Aquarist Society (Goldfish) meeting; Contact 0192 207467
- Grimsby & Cleethropes meeting;** Contact 01472 349178
- St Helens A.S. meeting;** Contact 01942 671463
- Olley A.S. meeting;** Contact 01274 531418
- Robin Hood A.S. meeting;** Contact: met@robinhood.aquarists.freemove.co.uk
- Derby and District Aquarists meeting;** Contact 01322 773416
- Tues 13th** Darwin A.S. meeting; Contact 01254 201925
Northwich A.S. meeting; Contact 01666 882966
- Coer Ulla A.S. meeting;** Contact 0191 523144
- Telford & D.A.S. meeting;** Contact 01924 409721 or 01922 694420
- Lang Town Aquarists and Pondkeepers group meeting;** Contact 01592 595825
- Northern Goldfish and Pondkeepers meeting;** Contact 0161 9697567
- Greenock D.A.S. Meeting;** Contact 01475 704219
- Bangor Aquarists & Breeders Society;** Contact 028 9187 3539
- Clyde Aquarist Society meeting;** Contact: johnd@furnard.freemove.co.uk
- Hull A.S. meeting;** Contact 01964 562387
- Stroud & D.A.S. meeting;** Contact 01634 221291
- Aberdeen A.S. Meeting;** Contact: alanandm@bierford.kent.co.uk
- Wed 14th** Lullington Aquarist Society meeting; Contact 01506 510958
- Halifax A.S. meeting;** Contact 01274 880471
- Tamside A.S. meeting;** Contact 0161 339 6593
- Bradford A.S. meeting;** Contact 01274 615442 or 0112 257 7709
- Hounslow D.A.S. meeting;** Contact 020 8890 6933
- Dunstable & D.A.S. meeting;** Contact 01582 750564
- Humbleton And District Aquatic Club;** Contact 01765 640644
- Plymouth & District Aquarists & Pondkeepers' Society meeting;** Contact 0795 6421510
- Thurs 15th** Glenrothes meeting; Contact D. Smart, 4 Lochly Ave., Kinglisse, Fife.
- Bristol Tropical Fish Club meeting;** Contact 0117 973 2145
- Sandgrounders A.S. meeting;** Contact 01704 541177
- Fareley A.S. meeting;** Contact 01738 561291 or 07714 889507
- Fri 16th** Discuss Ireland meeting; Contact 0661 385923
- Sat 17th**
- Sun 18th** Robin Hood Aquarists open show; Contact 015 9531635
- Mon 19th** Kirkcaldy A.S. meeting; Contact 01738 634689 or 01592 205165
- Norwich A.S. meeting (was Thorp);** Contact 01603 416259
- Sotway A.S. meeting;** Contact 01387 750606
- Mersy-side Aquarist Society meeting;** Contact 0151 260 3664
- Ayrshire Fishkeepers Association meeting;** Contact 01294 605272
- Olham A.S. meeting;** Contact 0161 652 6207
- Port Talbot A.S. meeting;** Contact 01639 770736
joe@grahamgo.freemove.co.uk.
- Tues 20th** Southend Leigh & Dist A.S. Auction; Contact 01702 305740
Greater Manchester Cleithrid Society meeting; Contact 01706 810284, 01706 353301, 0161 766 4457 or 01422 942 155
- Midlands Marine Aquarists Society;** Contact 0121 359 4469
- Lang Town Aquarists and Pondkeepers Group meeting;** Contact 01592 595825
- Wyke A.S. meeting;** Contact 01482 445543
- South Park Aquatic Study Society;** Contact Eric 0208 6792080
West Yorkshire Marine Aquarist Group meeting; Contact 01924 420201
- Clacton Fish Keeping Club meeting;** Contact 01255 428065
- Tongham Aquarists Society meeting;** Contact 01242 251606
- Portsmouth A.S. meeting;** Contact Gill Utling 9. Inverness Rd, Gosport, Hants.
- Perth A.S. meeting;** Contact on 738 621704 or 01506 510958
- Bracknell A.S. meeting;** Contact 01897 732874
- Warrington A.S. meeting;** Contact 01525 481979
- North East Yorkshire K&B Group meeting;** Contact 06453 618977
- Thurs 22nd** Mid Sussex A.S. meeting; Contact 01927 307407
- Fri 23rd** West Cornwall Fishkeepers meeting; Contact 01209 644158
Earshorne & District Pondkeeping; Contact 01323 773189
- Sat 24th**
- Sun 25th** Hull A.S. open show; Contact 01964 562387
- Mon 26th** Kirkcaldy A.S. meeting; Contact 01738 634689 or 01592 205165
- Tue 27th** Northwich A.S. meeting; Contact 01606 882966
Lang Town Aquarists and Pondkeepers Group meeting; Contact 01592 595825
- Greenock D.A.S. meeting;** Contact 01475 704219
- Croydon Aquarist Society meeting;** Contact 020 8654 0984
- Stroud & D.A.S. meeting;** Contact 01634 221291
- Castelford Aquarist Society;** Contact 01977 730754
- Wed 28th** Hounslow D.A.S. meeting; Contact 020 8890 6933
- Halifax A.S. meeting;** Contact 01274 880471
- Tameside A.S. meeting;** Contact 0161 339 6693
- Warrington A.S. meeting;** Contact 01525 481979
- Thurs 29th** Glenrothes meeting; Contact D. Smart, 4 Lochly Ave., Kinglisse, Fife
- Bristol Tropical Fish Club meeting;** Contact 0117 973 2145
- Sandgrounders A.S. meeting;** Contact 01704 541177
- Fareley A.S. meeting;** Contact 01738 561291 or 07714 889507
- Fri 30th** West Cornwall Fishkeepers meeting; Contact 01209 644158
Earshorne & District Pondkeeping; Contact 01323 773189

League competition hots up as season ends

All the news from around the club scene

The winner of last year's Show League will be presented with the trophy on Sunday 28th March.

The competition hotted up towards the end of the season with a last minute entry flow. Read all about it in next month's club news. This competition certainly boosted up the entries in many shows.

Send in your news

We would like to hear from clubs throughout the country about interesting club activities. This is your page and we would like to fill it with your news. Many readers would like to join a club if they knew more about you, so come on folks send in some information to: Club News, Today's Fishkeeper, 7 The Rickyard, Clifton Reynes, Olney, Buckinghamshire MK46 5LQ or email: editor@todays-fishkeeper.com



The First Winners 2004

Fancy going to a show?

Many readers may not have been to a show before but they are very interesting events to attend. Apart from some very good fish to admire you will meet many knowledgeable fishkeepers and you can have many 'fishy' conversations. Don't be shy – if you want to ask questions about any fish you see, there's always someone to natter to. However, don't talk to the judges while they are judging, although they are usually quite happy to talk to you when judging has finished.

Highlighting an event this month which might be in your area:

Robin Hood Aquarists are holding their 13th Open show and Auction on Sunday 18th April 2004.

This is usually a well supported event and the Show Secretary, Clive Hinton, invites you to The Highbank Community Centre, Farnborough Road, Clifton, Nottingham. If you wish to show fish benching is between 10.30am and 12 midday. Auction commences at 12 midday.

TREASURED AQUARIST GOLD PINS REINSTATED FOR BEST IN SHOW

In January 2004 Today's Fishkeeper was pleased to announce the return of the hobby's most prestigious show award – the Aquarist gold pin. These badges were originally given out at every open show in the UK for the Best Fish in Show award and to this day are treasured by any exhibitor who has been lucky enough to win one. We are pleased to announce that this award was reinstated for all shows held after last year's exhibition.

Over the coming show season any club in the country that holds an open show is entitled to award one of these at their show. Club secretaries should send in the details of their open show to us as soon as possible and apply for the Aquarist Gold Pin. State the address the badge and certificate should be sent to. It's a good idea to include in your schedule the fact that Best in Show will receive the Today's Fishkeeper Aquarist Gold Pin.

The address to use is: Re The Aquarist Gold Pin, North Side, Spridlington Road, Faldingworth, Market Rasen, Lincolnshire LN8 3SQ, email: white.shark@btinternet.com or phone Pat Lambert on Tel: 01673 865352



Ponderings



The great crested newt is now protected by law.

ILLUSTRATION BY PAUL J. HARRIS

The rarest of our native newts and the first visitors to any new garden pond are among the topics chosen by **Dave Bevan** this month

The great crested newt is both the rarest and largest of our native newts. With its grainy looking skin and crest along its back the male looks like a miniature water dragon. Once common, their numbers dwindled, due to the reduction in large, fish-free ponds which used to be a common feature of much of the countryside.

About eight years ago they appeared in my newly built garden pond in Norfolk and bred successfully each year. They are now protected by law which means you cannot legally disturb them in their natural habitat. So in order to protect and encourage the newts the pond rapidly changed from a garden pond to a fish-free wildlife pond and a second raised pond was built for my goldfish. The two ponds and their occupants flourished side by side.

TOAD HOMING INSTINCT

Unlike frogs, which will colonise virtually any garden pond, toads are more particular, often travelling miles to reach the pond of their choice. They may congregate in their thousands. These migrations often mean crossing busy roads where many meet their death each year.



DEAD FROG SPAWN

Under normal conditions, even large quantities of frog spawn in a relatively small pond, does not pose any problems to water quality or the other pond occupants. However, if the spawn does not hatch for any one of several reasons then water quality may be affected at a time when the fish are at their weakest.

With spawn being produced earlier each year, frost is a real threat and spawn laid in shallow pools is at risk, particularly if it has been frozen into the ice. Disease and infertility can also lead to large quantities of spawn not hatching so any spawn which remains intact by the middle of April should be viewed with suspicion. Look for signs that the central portion is grey rather than black which is a good indication that it will not hatch and once sure, remove it from the pond.



BULLHEAD FACTFILE

Species:	Bullhead (<i>Cottus gobio</i>)
Other names:	Miller's thumb
Other forms:	None
Size:	Up to 15cm
Weight:	About 80 grams
Availability:	Only from specialist outlets
Habitat:	Will live in larger well-oxygenated ponds or even a well balanced wildlife pond but in the wild they favour well oxygenated streams with a stony bottom.
Identification:	A large head and a complete lateral line the bullhead also has two dorsal fins. It can adapt its colour to match closely that of its surroundings.
Habits:	A bottom dwelling fish at home amongst the moss covered stones of a fast flowing stream. It breeds in April and the male guards the developing eggs.

Bullhead (*Cottus gobio*)

Pond fish value: rarely seen in the pond as it remains on the bottom hidden under the stones.



The backswimmer is one of the first visitors to a new pond

BACKSWIMMERS

If you dig a new pond then the chances are that even before it's completely filled with water a backswimmer will appear and start to float on the surface. They are opportunistic and extremely successful bugs which exploit the water surface, catching and eating any insect unfortunate enough to fall onto the water.

Their streamlined shape makes them ideally suited to life on the water and in

order to maximise their chances of catching prey they actually swim upside down with their wing cases forming a streamlined hull and their elongated back legs a pair of oars. These features, together with their sharp rostrum which pierces their prey, allowing them to inject digestive enzymes and suck out the resultant soup, makes them more than a match for most insects.

**GRASS SNAKE
IN FILTER**

Snakes have had a bad press in the past so when a snake took up residence in the filter of a friend's pond his immediate reaction was how could he get rid of it. In order to tackle the problem identification is vital as it is just possible it could be an escaped pet. In this case it was easy – a warm spring day and there it was coiled up on the top of the filter basking in the sun. The yellow neck collar clearly visible as it slithered back into the filter. The largest and most common of our native snakes is the grass snake.

So why was it there? Again the answer was simple – his pond attracts over 100 frogs each year at spawning time and they remain in and around the pond. Grass snakes eat frogs so we had provided it with both food and shelter. Left to its own devices he moved on after a few weeks to pastures new. And guess what? My friend actually missed seeing it basking on the filter each day.





DEEP WATER AQUATICS

Deep water aquatics are essential for a balanced pond and whilst their roots absorb phosphates and nitrates from the soil on the bottom of the pond, the leaves spread out over the surface providing shade which helps to reduce algal growth.

A much smaller group of plants than the marginals or bog plants, it contains some of the most popular plants like the early flowering golden club, the prolific water hawthorn and the beautiful lotus.

The water lilies, a varied and prolific group of plants with countless cultivars are also deep water aquatics whilst the fringed water lily (no relative) with its delicate yellow flowers spreads so quickly it can completely take over a pond in June.

Look out for the more unusual plants like *Amphibious bisort*.

Deep water aquatics like this lotus 'Charles Thomas' not only look good. They help balance your pond too

UV OVERHAUL

The fish are on the move and things are starting to happen. The filter is up and running but all is not well as the water develops a murky green colour. Action is required before it becomes a thick green soup.

The UV appears to be working so this should not be happening. Time for a few basic checks:

- Are the tubes lit up (check for a blue glow after dark) if not then the tube needs replacing and/or there is no power to the unit.
- The tube is lit up but when was it last replaced? Check against the manufacturer's recommendations and replace if over limit as tubes lose efficiency with use.
- If the tube is within life recommendation then it may need cleaning. Over a period of time a layer of slime may build up which blocks the UV rays reducing efficiency. If this is the case then a wipe over with a cloth may be sufficient. In hard water areas calcium can build up on the tube and this requires tube removal and immersion in an acid cleaner. Be gentle as the tubes are very fragile.



■ And finally before rushing out to buy a new unit just check that the water is flowing through the tube at the correct rate.

A few basic checks can prolong the life of your UV

GREEN WATER CONTROL

One of the first and possibly easiest to control, problems to occur each season is that the pond water turns green. The cause is a rapid build up of unicellular green algae and the solution is to install a UV filter which will kill the algae, causing them to flocculate so they can be removed in a mechanical filter.

However the question you have to answer is why they appeared in the first place? If you turn off the UV unit then there is a good chance the water will be as green as pea soup in a few days.

Even in a balanced system an imbalance can occur at the beginning of the season, particularly if the fish are fed too much too early, the weather is warm and the bacterial load in the filter is slow to increase. Under these circumstances a few weeks with the UV is all that is needed to ensure the fish swim in clear water for the rest of the season.

If the pond cannot remain clear from algae without the UV then it is not a balanced system and it requires less fish and more plants to restore the balance. Whilst the system remains out of balance, water testing should become a regular feature to ensure that the levels of ammonia, nitrite and nitrate remain in the safe zone.



Green water looks awful, but it's quite easy to get rid of if you know how

Feeling froggy?

Anthony Calfo
looks at
fascinating
Frogfish for the
marine aquarium

Frogfishes and Anglers are found circumtropically, but are commonly imported from the tropical Atlantic, Hawaii and the Indo-Pacific for the aquarium trade. Most are collected small and have modest adult sizes ranging from 7.5-15cm, although a few popular species can approach or exceed 30cm. Antennarian's are called Anglerfish for their specialised 'fishing apparatus' used for luring unsuspecting fishes, and Frogfishes for their large mouths and squat amphibian-like appearance. In popular literature, the Antennarians imported for the aquarium trade are perhaps best called 'frogfishes'. The name 'anglerfishes' is generally ascribed to the deepwater denizens of the family with truly exaggerated lures.

Selection

Most Frogfishes are benthic creatures that spend their entire lives on hard substrates (excluding the adult surface-dwelling *Sargassum histrio*). They are remarkably inactive creatures. So we must look to other aspects of behaviour and carriage when evaluating new imports for purchase. Healthy lophiform fishes are 'bright' in appearance and behaviour. Their eyes should be clear and aware, shifting to follow you and other stimuli that come near them. Respiration should be slow and deliberate. Their gill slits are very discreet in an effort to conceal their presence as living aspects and ambush predators on the reef. Closing one gill while pumping the other is a possible sign of gill parasites.

Unless recently fed, these fishes should respond positively to the introduction of food or prey by stalking or 'angling' for them. If irritated, you can expect them to 'walk' away... crawling across the seafloor with modified pelvic fins that resemble feet in form and function. Although it is their nature and habit to be inconspicuous, they will break formation and evade your exploratory net handle, gentle stick, or hand in the tank at some point. Complete inactivity may indicate a stressed or sick animal.

The surface-dwelling *Sargassum histrio*



Newly arrived specimens should be permitted to settle in for a week or more, before being taken home for quarantine. Patience in moving recently imported specimens will lead to lower rates of morbidity and mortality. Carefully transfer all lophiform animals in slow, deliberate motions, avoiding exposure to the air where they may gulp in the atmosphere, or suffer under the unnatural weight of their gelatinous, scaleless bodies above water. They are slow and predictable

enough being easily caught by coaxing them to walk along ('pushing' them) into a submerged plastic bag or specimen container.

Behaviour

Frogfishes with their upturned mouths, sit on the seafloor camouflaged, braced or wedged with their frog-like feet... and wait. When potential prey draws close enough to be of interest, the famous fleshy lure-tip (the esca)

BLENDING IN

The specific coloration of individuals is no guide to identification of health or species. Their visage is ever-changing and adaptable, particularly with regard to coloration. The substrate is highly influential on the colours they show. Some species are especially variable and will match the shades of numerous benthic reef growths in colours of red, yellow, black, orange and more. They may even mimic textures like pores and exhalant openings in sponges. Some species even have physical extensions that resemble seaweed! All of this magnificent evolution testifies to their lifestyle as an ambush predator. The specific coloration of individuals is no guide to identification of health or species. Their visage is ever-changing and adaptable, particularly with regard to coloration. The substrate is highly influential on the colours they show. Some species are especially variable and will match the shades of numerous benthic reef growths in colours of red, yellow, black, orange and more. They may even mimic textures like pores and exhalant openings in sponges. Some species even have physical extensions that resemble seaweed! All of this magnificent evolution testifies to their lifestyle as an ambush predator.



Frogfish are adept at blending in to their surroundings

is utilised to draw them nearer. The esca can often be a distinguishing feature. Some species have a wormlike esca, while others have escas that resemble a small fish. If the fleshy esca is bitten off, it can be regenerated after some months. The lure-pole of an anglerfish is, in fact, a modified dorsal fin spine (called the illicium). Much like a fishing pole, some lophiliform fishes angle with the extended tip of this spine like a fisherman angles for sport. Unlike a fisherman, however, anglerfish keep their lure very near to the mouth. When prey finally come within striking distance, they draw them in with a sudden and convulsive suction produced by a rapid expansion of their mouth (a cavernous 10-fold increase in size). The action takes milliseconds and is one of the fastest recorded movements in the animal kingdom. This strategy can be described as aggressive mimicry.

Care

Most frogfishes inhabit rocky environments, but many occur on soft sandy substrates and flats. There is of course the pelagic Sargassum species too (provide natural Sargassum seaweed or a like substitute both floating and anchored for display). From all niches, though, slower water flow and quiet environments are favoured. They can regularly be spotted in the wild near piers and seagrass beds. Where modern reef aquariums need at least 10-20X water flow per hour in the aquarium, keepers of these fishes need not exceed the range. Larger specimens producing larger amounts (volume and particle size) of waste will benefit from high water flow to process solid matter more efficiently. Naturally, heavy bio-filtration

will be needed as with any predaceous fishes for the copious amounts of nitrogenous matter generated by large, heavy or messy feedings. Employ over-sized trickle/wet-dry filters and/or fluidised bed filters here.

The décor of the aquarium has many possibilities for great fun with frogfishes. Their ability to change colour dramatically and rapidly is legendary.

Artificial ornaments are taken as perches just as readily as natural substrates in the aquarium. Some aquarists have great fun swapping various coloured rocks and ornaments to see the evolving show of colour that unfurls with each change of venue as the fish moves around the tank. Provide some significant measure of hard substrate in the aquarium for all in this group. Live seagrass displays (*Thalassia* or *Syringodium*) make outstanding habitats for most species in this group overall.

Nutrition and compatibility

Interestingly perhaps, I lump 'compatibility' in with 'feeding' coverage here with this predatory family. The rules that apply to both are very simple: if it can be eaten whole, it will... and if it can't be eaten whole, it might be attempted anyway! These are simple rules to follow. Forgiving the slight exaggeration, you will do well to heed this warning, and your fishes will live longer. Antennarians will eat fish and almost any motile invertebrate. Shrimps and small bony fishes are favoured prey. Even members of their own species are fair game! The stories and legends of what

REPRODUCTION

Spawning and reproductive activity in frogfishes is fairly well documented and frequently observed. Sexual dimorphism is not apparent in most species.

Reproductive females become quite swollen and egg-laden just prior to copulation. Some frogfishes move to deeper waters to spawn, but overall they are regarded as relatively shallow water denizens of the reef. At least *Histrio*, the Sargassumfish, has been observed to spawn year around with no apparent season or reproductive cycle.

Males chase the gravid and clumsy females by 'nudging' them along and above the seafloor just prior to a brisk dash by the pair to the surface for egg release and subsequent fertilisation. Spawns are comprised of gelatinous rafts or ribbons that usually float. Both *Antennarius* and *Histrio* have been observed to spawn in aquaria, the eggs are large and the planktonic stage for larvae in some can be fairly short (25 days, Thresher 1984), although the range extends as far as two months or more. Although broadcast spawns are the rule in this group, some demersal strategies have been observed with the parental care of egg clusters upon the flanks of the adult frogfish. It's best to separate frogfishes in aquaria after a spawning event as males can become aggressive or belligerent. Frogfishes by nature are solitary animals.

Most frogfish spend their entire lives on hard substrates



some frogfish have eaten is amazing: with seabirds, lionfish and inflated spiny puffers, and more. While tankmates clearly too large to swallow whole generally will be ignored, it's best to keep only one frogfish per tank and perhaps in isolation as a species-tank.

Numerous active community fishes if not predated may in turn nip or harass lophiiforms. Not only the toothy predators but even the smaller or less predatory fishes that naturally graze upon the reef are a calculated risk: they can mistake the lophiiform animal for part of the living substrate and rasp dangerous wounds into its flesh as if it were encrusted benthic fauna! Without traditional scales, venom, spines or other exaggerated means of defence, the soft-bodied Antennarians are fairly vulnerable at large. One means of defence is to quickly inflate their stomachs with water to foil attempts by some predators to inhale them. Unfortunately, the strategy is useless against predators with large enough mouths or those with larger teeth like puffers and triggerfish. Although some frogfishes will tolerate each other, often they demonstrate intolerance except briefly during the breeding season. There is the same intolerance of other fishes in most cases.

It is much easier to feed frogfishes kept in species tanks. Active feeding fishes will steal small live feeder shrimp or fishes away before the lumbering frogfishes can get to them. Some individuals after acclimation will take prepared foods while others are slow to wean off live prey. Most however, can be trained in time to take dead meaty foods from a feeding stick. Much like other commonly 'stick fed' predators (eels, octopuses, mantis stomatopods, etc.), lophiiforms will demonstrate individual preferences for how they 'like' to be fed.

Try to always offer saltwater aquarium inhabitants foods of marine origin. Even prepared meats of marine origin are deficient in some ways if cleaned, gutted or otherwise rendered incomplete. Whole prey are best (head, guts, legs, fins intact). Shrimp, krill, and silversides are common fare for frogfishes.



This Wartskin Frogfish (*Antennarius maculatus*) is a bizarre-looking creature

HUFA rich supplements are recommended to soak thawing foods in. For live foods, maintain a proper holding tank of prey for a minimum of two weeks as if in quarantine, to avoid transmitting an infectious disease. Rely on killed prey (frozen meats) exclusively if you must. Small live ghost/grass shrimp (*Palaemonetes*) are quite good food items. Frogfishes can be observed angling with their lure day or night. Some have suggested that nocturnal prey can sense the feel or vibration of the lure at night, but at least one species of frogfish has been documented to contain bioluminescent bacteria in its lure – lending the frogfish full-time feeding opportunities.

Whether you opt for live or thawed frozen foods for your frogfishes, prey size: items that are too large although accepted are nonetheless dangerous. Offer no items larger than 20-30% of the animals total body size. Oversized prey can harm or kill greedy lophiiforms by taking too long to digest, hinder respiration and, less commonly, build up gasses in the digestive system from decay that causes the animal to struggle with buoyancy. The animal will often regurgitate

the meal later – perhaps after the lights go out and causing attrition if repeated habitually. Most marine fishes fare better with small frequent feedings. Frogfishes will only tolerate a few hearty feedings weekly with extra offerings to the smaller, younger specimens.

Disease & health

With good water quality and regular feeding, bacterial infections are uncommon in this group. Yet, new imports may show such symptoms or receptive wounds from the stress of capture and repetitive, abrasive contact with the walls of the shipping vessel. Treatment in quarantine with broad-spectrum antibiotics is effective on such fishes. Issues of gas accumulation that lead to swimming difficulties are observed in frogfishes. Although not immediately perilous, they are a source of great duress for the clumsy swimming or struggling victim (difficulty feeding, avoiding features of set-up and hardware like intakes and overflows, etc.). The two most common causes are gulping air from being inappropriately removed from water, or from being fed food that's too large. Overall, issues of disease and health are relatively uncomplicated and can be tempered by good selection, proper quarantine and dutiful husbandry of specimens in species tanks.

SUMMARY

This group can make very interesting and worthwhile aquarium guests. Their needs are somewhat specific if not challenging but their merits abound. They are fascinating physically and behaviourally, and occur in seemingly countless and changeable colours and textures. The potential for captive reproduction in Antennarians is very plausible for aquarists too.

Cutting edge



Male of *Parambassis pulcinella* and (below) female

Erwin Schraml introduces a new glassperch beauty and the real *Corydoras reynoldsi*

In the past year André Werner in Germany and 'Britain's Aquatic Superstore' in England announced the import of a glassperch species which carry a forehead hump.

The species was called 'Humphead glassfish'. Almost simultaneously this species was given a scientific name by Maurice Kottelat: *Parambassis pulcinella*. They originate from the border zone of Myanmar and Thailand, in the drainage system of the River Kwai. The name of the river is Chon Son, which is situated in the upper drainage of the Ataran River, which lies between Kayah and Phadaw in Kayah state.

Starting when they are approximately



6cm in length, the sexes can be distinguished by the forehead bump of the males. Males also appear to become larger. In the literature (also in FishBase) the standard length is said to be 8cm. However, imported specimens have allegedly reached 12cm in length.

Unfortunately, this impressive species is rather aggressive towards each other. This has brought current breeding attempts to an abrupt end. Sometimes it was the male, which wouldn't tolerate females, but the female could also be the aggressor. Perhaps this glassperch species would fare better in

the hands of people who normally keep Eastern African cichlids, as they are used to dealing with this behaviour in their fish. These fish require larger aquaria, and they should never be kept in pairs because the underdog will be agitated mercilessly.

Now it's here, the real *Corydoras reynoldsi*!

In 1997 we believed that this species had been imported for the aquarium. At that time fish appeared in the trade which were called *Corydoras 'Asher'* (first of all they went to Japan and shortly afterwards to Europe). They were very similar to *C. reynoldsi*, but the bars of this species are clearly broader and these animals were exported by Asher Benzaken from Manaus, while the real *C. reynoldsi* originates from Colombia. The body shape was almost identical and the headshape even more so. Small differences, like the relatively high dorsal fin of the males of the new form, could not be found in the real *C. reynoldsi*, but there were only very few preserved individuals for comparisons available. From the beginning most authors were cautious and chose the uncontroversial 'cf.' (lat. conferre - compare) if they came across these animals, or they chose an 'aff.' to announce the differences despite the known similarity of the species. They soon received a C number (C 64) from the DATZ editors (1998).

At the end of last year *Corydoras cf. reynoldsi* was described as a new species. Britto and Lima named it *Corydoras tukano*, it was discovered in the Rio Tiquié in the drainage of the upper Rio Negro. The authors distinguish it from *C. reynoldsi* by the broad bands, which simply means differences in the patterns. The similar



C. reynoldsi paratype



Corydoras waltmani paratype



Corydoras "Longnose Reynolds" or perhaps better called *C. "Longnose Tukano"*



Corydoras "Real Longnose Reynolds" in comparison with *C. "Longnose Tukano"* (above)

TOOTH HEAD FISH

This fish is a phylogenetic peculiarity, because it is the only representative of the family Denticipidae. This species lives in the rain forests of southwest Nigeria in slowly flowing waters (Ouémé basin up to the Niger delta and in the Mungo River in Cameroon). What makes this fish so special? As the only representative of the Isospondylii, Denticiceps has small placoid teeth on head, gillcovers and on some parts of the anterior body. Such teeth are a characteristic of chondrichthyes fish (such as sharks and skates), but hardly ever occur in bony fish. Therefore Denticiceps was regarded as a member of an phylogenetic very basic group. Sire et al. (1988) however, came to the conclusion that this represents a secondary adjustment and is not derived from the Thelodonts. There is no common name for this species known to me, perhaps because of the morphological characteristics the name 'tooth head fish' would match.

According to the present data on FishBase, this species should reach 15cm. This must be a mistake, because the fish only achieve about 5cm. At present the fish are not well-known in our aquaria. In older literature, hardly any notes can be found – they seem to have been brought along only very sporadically by tropical travellers, and could not be established because of missing broods. Aquarium



Denticiceps

Glaser has introduced this species now in larger numbers.

In its natural home this fish lives in very soft, acidic water, however in captivity they also can live in medium hard water. They need large, lightly planted basins with a central swimming area and a dark ground. The fish are obviously oxygen needy, and rarely stay still. It is assumed that the gills are permanently supplied with fresh water through a constant movement. Allegedly the normal suction pressure respiration is not sufficient and fish which cannot move will suffocate. This species very nervous and therefore it would be best to keep some dimmed light on at night, to prevent panic escape reactions. The fact

that it is a shoaling fish hardly needs to be mentioned.

In the aquarium the fishes prefer to swim in mid water and do not even go to the ground to pick up food. Small live food is preferred. This species is very susceptible to Oodinium. Temperature for housing is 20-25°C. So far, no spawning has been reported in captivity.

References: Sire, J.-Y., Stanislas, M., and A. Francoise. 1998. Comparison of teeth and dermal denticles (Odontodes) in the Teleost Denticiceps clupeoides (Clupeomorpha). *Journal of Morphology* 237:237-255.

Sterba, G. (1970): Süßwasserfische aus aller Welt. Bd.1, Verlag Neumann-Neudamm.

species *C. weitzmani* is distinguished mainly by colour pattern such as the saddle-like blotch between the two bars on the sides.

In 1998 another species was introduced by Aquarium Glaser, which was confusingly similar to them except for the long snout, at that time called *Corydoras cf. reynoldsi*. They were offered in the trade as 'Longnose Reynolds'. While *C. tukano* is frequently imported, and broods of it are available, the longnose is a rarity. It has not yet received a C-number. This longnose originates in influxes of the upper Rio Negro, and it is presumed that the shortnose comes from there. Long- and shortnose forms occur sympatrically in other species - their resemblance is probably a form of mimicry.

In January 2004 Aquarium Glaser received the real *Corydoras reynoldsi* from Colombia. The types of this species were collected in the province Caquetá at Tres Esquinas in an influx to the Rio Orteguzá, which belongs to the basin of the upper Rio Caquetá. Rio Caquetá is only about 160km from the Rio Tiquié as the crow flies. With the newly imported fishes comparisons could now finally be made with

living animals between *C. reynoldsi* and the long-known, but recently described *C. tukano*. In living fishes the great similarity is even more striking, even the somewhat higher dorsal fin in males of *C. tukano* is not all that different. Females of *C. reynoldsi* are somewhat chubby and have an even lower dorsal. I cannot understand why scientists 'conjure' a new species from such slight differences. In my opinion *C. tukano* ranks at most as a geographical variant, therefore, a subspecies.

To our delight among the imported *C. reynoldsi* a longnose-type was found, with exactly the same colour features. But what should this fish be called? The longnose-type of *Corydoras tukano* was already being referred to as *Corydoras* 'Longnose Reynolds'. Does it mean we now have the 'Real Longnose Reynolds'? Maybe it would be best if both receive a C-number.

It is not inevitable, that the 'Real Longnose Reynolds' is just as closely related to the 'Longnose Tukano', as is the case in *C. reynoldsi* and *C. tukano*. To me it looks like the 'Longnose Tukano' has a somewhat longer snout and a conspicuous

bar directly at the junction of the caudal peduncle and the caudal fin. In the 'Real Longnose Reynolds', at this junction, there is an insignificantly coloured, narrow band. However, underneath the adipose fin a more intensely coloured bar can be noticed. Well, we will soon see – surely a scientist will examine these two catfishes soon.

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 DATZ-Redaktion (1998): Panzerwelse aus Brasilien. (DATZ 51 (4): 210)
 Schäfer, F. (1997): Ein bildschöner Panzerwels erstmals eingeführt: *Corydoras* sp. aff. *reynoldsi*. (AqualogNews No. 13: 1)
 Schäfer, F. (1998): Panzerwels-Raritäten. (AqualogNews No. 17: 1)

Wonderful worms part 1

Alf Nilsen says worms make fascinating subjects in the marine aquarium



ALL PICS BY BOGART PHOTO: A.J. NILSEN



Fire worms, such as the Caribbean *Hemiodice carunculata* can cause painful stings

To many the word 'worms' is frightening. Some associate the term with horror movies where crawling worms are swarming out of dead bodies. Others think of long tapeworms that infect the bodies of humans and other vertebrates, while many immediately point their thoughts to the common 'earthworms'. Even this ecologically-important and harmless worm is feared by many just because of its shape and snake-like appearance. To me – and many other marine aquarists, naturalists and biologists – worms are fascinating and lovely animals well worth an article and closer studies in a coral reef aquarium.

This does not mean that no worms should be feared! There are some species that should be avoided as they can cause severe harm to humans. Among the species found in the reef aquarium, the fire worms, such as the Caribbean *Hemiodice carunculata* and the Indo-Pacific relative *Eurythoe complanata*, can cause painful stings.

'Worms' is a term used for animals with an elongated body, an anterior end with a head and a posterior end with a tail. This shape has evolved several times during the evolutionary history, and the term 'worms' includes at least 100,000 different animal species from at least 17 phyla. Among them are some strange creatures – such as *Lineus longissimus* that live off the coast of Norway and other northern countries, reaching a length of up to 55m! Or the tiny *Microprofula cf. ovicellata*, never spotted in the wild, but only known from aquaria, where it forms delicate calcareous tubes and builds brood chambers for its youngsters. The reef aquarium is full of 'worms', and in this series of three articles we are going to take a closer look at some of them.

Worms in the reef community

On land earthworms are without doubt the most commonly known worms. The common European species belong to the genus *Lumbricus* and *Allolobophora*. In 1881 a book titled *The Formation of Vegetable Mould through the Action of Worms* was published in England.


aquarium solutions



Our new lighting Revolution



The beautiful *Filograna simplex*

The author was Charles Darwin in this book Darwin published observations and experiments carried out on earthworms during a period of more than 40 years. He, amongst others, concludes that the earthworms live in a system of small tunnels and paths in the soil where it consumes decaying plant and animal remains and a lot of soil... And Darwin was right! The Earthworms can be very numerous, I have personally found up to 75 specimens per square metres here in southern Norway.

The earthworms belong to the phylum Annelida (class Clitellata, order Oligochaeta) a group that counts at least 3,000 species in at least 280 genera. Oligochaet worms were believed to be missing or at least very rare in marine habitats. However, since they were first discovered in corals heads at Heron Island (GBR) around 1975, research has revealed that Oligochaets are common on corals reefs, especially in interstitial habitats (living in-between sand grains).

The majority of the larger 'worms' found on the reef also belong to the phylum Annelida and to the class Polychaeta, commonly known as 'bristle worms'. Some have flat or round segmented bodies and bristles (parapodia) on each segment, other species live in colonies with calcareous tubes, such as the beautiful *Filograna simplex*. The most frequently seen species belong to the families Nereididae, Eunicidae, Syllidae, Polynoidae and Amphinomidae. Most



'Christmas Tree Worms' build calcareous tubes and live amongst corals

species are small, from a few millimeters to a foot in length, but a few can be rather big, reaching a length of several metres. Their diet ranges from filter feeders or pure herbivorous to true predators. There are also many scavengers and omnivorous species among the free-living Polychaets.

Tubeworms

Another large group of Polychaets are the sedentary bristle worms that live permanent or temporary in tubes, commonly known simply as 'tubeworms'. Nearly all of them are filter feeders feeding on bacterioplankton and/or small phytoplankton. Common families are Serpulidae, Sabellidae, Terebellidae, Spirobranchidae, Caprellidae and

Chaetopteridae. The beautiful 'Christmas Tree Worms' from the genus *Spirobranchus* build calcareous tubes and live associated with corals – they are well known in reef aquaria. Most members of the family Serpulidae have an operculum (a lid) that closes the tube after the worm has retracted, and the shape of the operculum is an important systematic character in the family.

The Polychaets occupy almost every possible niche in reef biotopes. We find sedentary filter feeders, detritivores (eating detritus), phytophages (feeding mainly on plants) and predators as well as commensally and parasitic species. The bristle worms occupy all sorts of substrates and are found in sand, among algae and sea grasses and associated with corals and boulders. There are also many species inhabiting dead coral colonies. In a large, dead coral head on the Great Barrier Reef over 100 different species of Polychaets have been found. Their associations with dead corals accelerate the bio-erosion processes, and in this way they play an important role as reef decomposers (Sorokin, 1995).

Liverock inhabitants

As aquarists, we soon discover that live rocks contain Polychaets. When buying live rocks, one always finds beautiful bristle worms left

Colourful fan-worms from the genera *Sabellastarte*

COLOURFUL TUBEWORMS

The spionid (family Spionidae) worms are tiny and often overlooked, but occur commonly on corals and on live rocks – often spotted only by their two tiny palps projecting from the surface of the rock. Easily spotted are the big, colourful fan-worms from the genera *Sabellastarte* found on every coral reef. The two dominant species are *Sabellastarte magnifica* found in the Caribbean and Western Atlantic and *Sabellastarte spectabilis* found in the Indo-Pacific. Both species are usually seen in the trade and sold under the name *Sabellastarte indica*. Many tubeworms bury their tubes deep in boulders or corals with only the crown projecting above the surface. Some of the crowns have spectacular coloration, such as in *Ananobaea orstedii* and *Notaulax occidentalis*, both commonly found in the Caribbean. Compound eyes on the radioles (individual branch in the tentacular crown) sense movements and the worms rapidly retract in their tubes when a diver or fish approaches.

behind on the bottom of the box. Some claim that such worms should be removed as they might harm other inhabitants in the aquarium. Others, including myself, claim that they are the most natural part of the reef tank and should be allowed to stay. If one should remove every organism that might be a potential killer, we will in the end end up with something like a colourful, but 'dead' 'coral garden'. Whatever we do, we will never be able to remove all the bigger Polychaets from live rocks, and certainly only a fraction of the smaller ones. During my years as a marine aquarist, I have emptied a number of tanks, big and small, and always found numerous Polychaets – some even as long as half a metres – but very rarely have I noticed any loss of other life in the tank that can be directly linked to these beautiful creatures. A very common species on live rocks is *Lepidonotus carinulatus* (Family Polynoidae) a small worm that is definitely harmless in the reef aquarium.

The number of Polychaets is clearly correlated with the amount of nutrient. On coral reefs where plankton and detritus are numerous, filter feeding Polychaets are abundant, while oligotrophic reefs house free-living species such as members of the family Eunicidae.

"One square meter of a typical Indo-Pacific reef flat might very well contain 30,000 specimens of different Polychaets"... so are there any good

reasons for removing bristle worms from live rocks before using them as decoration material in our aquaria?

Peanut worms

One of the reasons for Polychaets being so numerous found in coral boulders is linked to another group of marine worms... the 'Peanut worms' (phylum Sipunculido). The Peanut worms contain about 300 species (Barnes, 1980), and are recognised as a separate phylum. The body is divided into two sections: a relatively small, narrowed anterior section called the introvert, and a large posterior trunk. Although the introvert can be retracted into the anterior end of the trunk, it is not a proboscis, but represents the head and the anterior part of the body.

Sipunculid worms, usually in sizes from 2mm to 10cm, bore in reef rocks but how they do that is still not totally understood. It probably involves chemical as well as physical means. They occupy holes in the rocks and coral skeletons and are actually the most numerous organisms in coral boulders, and important decomposers of the reefs.

Settlement densities of 700 specimens per square metre have been reported from Hawaii (Barnes, 1980). According to Sorokin (1995) the number of Peanut worms can reach as much as 2,000 specimens per m² (equal to a biomass of 20-30 gram wet weight per

m²) on shallow reef flats, but on the contrary almost lacking in soft bottom areas (20-50 individuals per m²). Themiste, Phascolosoma, Aspidosiphon, Cloosiphon and Gollingia are common sipunculid genera associated with coral reefs. See Mather & Bennett (1993) for further information.

By drilling holes in the rocks they also make the interior of the boulders accessible to other organisms, such as Polychaet worms. Peanut worms are very common in live rocks and almost always present in coral reef aquaria decorated with this material. Although they are not frequently spotted, as they live most of their life inside the rocks, they are still present and composing an important part of the aquarium's decomposing fauna.

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Today's Surgery

PHOTO: MAX OSBORN



Swordtails of all types are prone to this parasite. These are perfectly healthy fish, but if they had the disease their fins would be clamped close to their bodies and they may 'shimmy' and scratch against objects in the aquarium



Our resident vet, **Lance Jepson MA** VetMB CBiol MIBiol MRCVS, investigates Ichthyobodo, a nasty protozoan disease which can cause serious health problems in a wide range of fish

Ichthyobodo parasite

This disease is caused by a single-celled organism (a protozoan) called *Ichthyobodo necator*, although in some older texts you will find it listed as *Costia necatrix*. *Ichthyobodo* is considered by many to be a natural commensal – that is to say a normal inhabitant of the skin that we would expect

to find in very low numbers on the skin. My own view is that this is not likely to be the case as I rarely find it whilst undertaking routine skin scrapes.

Ichthyobodo is very mobile and is able to move on to and infest new hosts by attaching to the skin (including the fins) and

the gills. This needs to be done quite quickly as it can only live for only a few hours off the host fish. If conditions are right for the parasite, such as the fish being stressed in some other way such as overcrowding or poor water quality, then the numbers of *Ichthyobodo* can increase to

Ichthyobodo necolor (*Costia necatrix*)

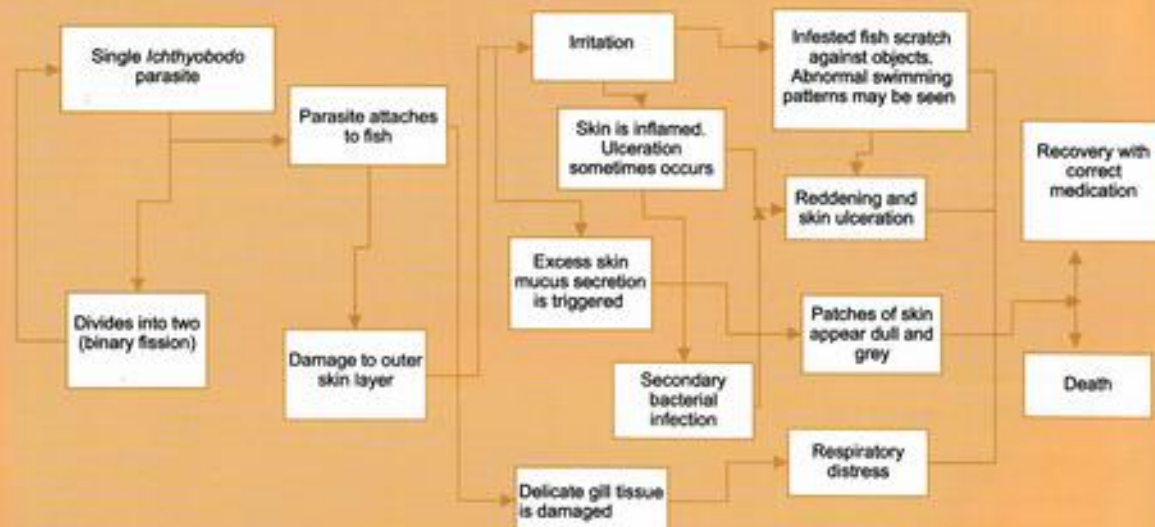
LIFE CYCLE

DAMAGE CAUSED

RESULT OF DAMAGE

WHAT YOU SEE

OUTCOME



levels where they become a problem. This can happen quite quickly as the parasite reproduces by dividing into two.

Early symptoms

Affected fish initially appear depressed. As the *Ichthyobodo* infestation develops, the fish appear to be very itchy and diseased fish will flick and scratch against objects and submerged surfaces. Fins are clamped

WHAT MAKES FISH MORE SUSCEPTIBLE?

Stressful factors such as poor water quality or other diseases lead to immunosuppression; this in turn can allow a build-up of *Ichthyobodo* numbers to a level that causes disease. High stocking densities are not only stressful, but allow easy transfer of parasites from host to host.

and held against the body; the fish commonly lose their appetite. Eventually numbers can build to such an extent that the skin becomes damaged or even ulcerated. Secondary bacterial infections can occur at these sites as a consequence. The gills are often severely damaged so respiratory signs may be seen such as heavy and rapid breathing. In some cases the gills only are affected and such fish may be found dead with no outward signs of

disease. Large numbers of deaths can occur in an outbreak. *Ichthyobodo* is able to survive temperatures down to 2°C and even at this low temperature, significant infestations have been described in hibernating carp.

Diagnosis

Species susceptibility: All species of fish are potentially susceptible. Those species that are particularly prone to infection include Goldfish, Koi, Catfish, Killifish, Anabantids, Swordtails (*Xiphophorus*) and Cichlids.

Recognisable signs of disease:

- Infested fish usually appear depressed and have their fins clamped shut.
- They may 'wobble' as they swim or even 'shimmy' – exaggerated swimming movements 'on-the-spot'.
- The colouring of the skin may appear dull in patches because the fish increases its mucous covering in response to irritation by the parasite.
- The fish will often exhibit respiratory distress.
- Progression of the problem to reddening or even ulceration of the skin is common, due in part to the activities of the parasites, but also frequently because the fish self-damage as they scratch and flick against hard surfaces because of irritation.
- Some fish may die with no obvious external signs.

Microscopy: *Ichthyobodo* is identifiable as

a small, coma-shaped parasite. It is very mobile and will be seen gyrating through the water. If attached to tissue then it will circle around the point of attachment.

Disease lookalikes: Outbreaks of *Ichthyobodo* can be confused with those of other ectoparasitic protozoa or flukes, all of which can all cause serious skin disease.

Prevention

As mentioned at the beginning, *Ichthyobodo* may be quite common and so present a constant risk should your fish become immunocompromised for some other reason. So maintaining good water quality, providing optimum foods and so on should keep it at bay. Quarantining as ever will help to reduce the risk of this parasite getting into your established collection.

TREATMENT

Treat by medicating with the standard proprietary anti-protozoan treatments. Raising the temperature to over 30°C will help to eradicate this parasite, but this will only really be practical with species of fish able to cope with high temperatures (like Discus and Fighting fish *Betta* spp). Removing all of the fish from an infected aquarium or pond for 24-48 hours may be useful as the parasite can only survive of the host for a few hours. Medicate the fish in a separate treatment aquarium.



Our resident
Discus expert
Tony Sault solves
another batch of
your problems.


DISCUS PROBLEM SOLVER




In an ideal Discus tank set-up you should have a shoal of six or more. These Turquoise Discus show how stunning the effect can be


Egg fungus

 I have been keeping Discus for just over a year and apart from the odd mishap, all have grown well to the extent that I now have a pair that are spawning. They are still in the tank with the other Discus but I will set up another tank for them soon as I realise they need to be on their own. The problem is that the eggs are covered in fungus. Is it worth setting up another tank when the pair do not seem to be fertile?
Ron Davis, Gwent

 A number of things could be causing the eggs to fungus. You do not say how old the male is, normally he should be fertile from 12-15 months old – if he is younger than this be patient as he will improve. At the temperature of 30°C the eggs should hatch in 48-50 hours. In the first 24 hours the eggs are still OK and your water quality appears fine, so try tweaking the temperature up a couple of degrees as this speeds up the hatching time and often beats the onset of fungus. You could also add one drop per gallon of a broad spectrum bactericide such as Myxazin shortly after spawning – this will also delay the fungus. You are quite correct in saying that it will be difficult for the pair to succeed in breeding with other fish present, so set up the new tank for them.

Parasite problems

 My Discus community tank has been set up for six months and everything seemed to be fine. I recently bought two small corydoras catfish and since then some of my fish have been flicking their fins and rubbing against objects. I'm sure I have introduced a parasite and I treated the tank with a course of medication for parasites but the fish are still the same. All my tests appear to be normal pH 6.5, nitrite 0, nitrate 50-100ppm, temperature 28-29°C.
If James, London

 Your fish appear to have the symptoms of a parasite infection, especially as you introduced new stock prior to the symptoms. However, this may just be coincidental as these symptoms are also caused by the presence of nitrate in the water. So before you resort to another medication, reduce the the nitrate in the water to at least 25ppm by cutting down on feeding for a few days and doing water changes with water of a significantly lower nitrate content. These symptoms may well disappear.

What equipment do I need?

 I have never kept Discus before and always thought they are a beautiful fish but hard to keep. Can you advise me on the equipment I need as I am now determined to give them a go.
Michael Johnstone, Birmingham

 Good for you. I am certain you will not be disappointed. The first thing to decide is the size of the tank to house them. I am sure you have chosen a site for the tank, so use the space available, i.e. if the space will allow a 4ft tank then use it. Also give them a depth of at least 18in – the tank needs to be large enough to house a shoal of at least six Discus as they are always

more adventurous in larger shoals.

The second item you should consider is a water purifier to remove chemicals and metals from the water before you do a water change. To facilitate this you will need a storage drum for the water, which only needs to hold one water change (a 5-gallon container should be fine). You will also need all the essentials such as filter heaters and lighting.

The tank can be fully planted with a sand or gravel substrate or bare-bottomed with rocks and bogweed to break up the open areas. If the water quality is good the fish will accept either. Good luck with your new venture and be sure to let us know how it goes.



Valiant Vallis

Peter Hiscock explains how to create a lawn in your aquarium

What better way can there be to create an underwater garden than to have a grass-bed in the aquarium? Before you start digging up some turf it would be worth looking at some easily available and easy to keep grass-like aquarium plants. Grass-like plants are ideal for virtually all aquarium designs and seem to be particularly enjoyed by the fish that inhabit them. A dense background of *Vallisneria* will be used as cover and hiding spots for large individuals or groups of jumpy Tetras and Barbs, giving them a sense of safety and resulting in improved health and colour. In the foreground, grassy plants will trap bits of food and debris and become the ideal scavenging ground for smaller Catfish such as the *Corydoras* sp. or small Loaches including Pygmy chain loaches and Khuli loaches. If there is any exposed equipment or open areas in your tank then a rampant grass-bed might be just the ticket.

A staunch ally

Apart from the infamous *Elodea Egeria* sp or 'Pondweed', the grass-like *Vallisneria* has to be one of the longest-standing and well-known aquarium plants. Such staying power can be easily understood from a number of worthy attributes. Most *Vallis* species will live in unheated or heated aquaria, and will thrive in a wide range of water, lighting and substrate conditions. To get the best out of the plant it is important to choose the right variety(s) for your aquarium. As there are a number of easily confused species of *Vallis* it is often best to identify the plants roughly by appearance rather than searching for specific plants. To give you an idea of the confusing species names, the common Straight leaved *vallis* (not the Spiral or Twisted *vallis*) is named *Vallisneria spiralis*.

Generally speaking, *V. americana* or *V. americana natans* are small dwarf varieties, *V. asiatica*, *V. asiatica* var. *biwaensis* or *V. tortifolia* are twisted varieties, *V. gigantea*, *V. americana gigantea* and *V. neotropica* are large straight leaved varieties. *V. spiralis* is the 'traditional' Straight leaved *Vallisneria*, and *V. spiralis* 'tiger' is a rather attractive thinner leaved and striped variety. There are few aquariums in which a



There are many different varieties of *Vallis* and their names can be confusing. This is Straight *vallis* but its scientific name is *Vallisneria spiralis*.

AQUARIUM CONDITIONS AND PROPOGATION OF VALLIS

Because the plants are fast growing, they will assimilate nutrients quickly and are ideal for use in new aquariums where they will remove any excess minerals and nutrients, helping to combat algae and also remove some fish waste, reducing the strain on an unmaturing filter. Once Vallisneria gets established it can spread very quickly, producing numerous daughter plants on runners along the substrate. The plants often produce small flowers on thin runner-like stems which are reputed to grow at up to 2cm per hour (!) but in most cases you will only have one sex of plant so propagation by seed is unlikely. The new plants produced on runners can be removed and replanted once they have at least 4-5 leaves. Daughter plants are a good way of replenishing older plants – constant trimming will eventually stunt growth and even cause leaves to die back. A well-established Vallisneria will withstand a bit of rough treatment though and may even be suited to survival with fishes that have plant-eating tendencies. Providing the right conditions for Vallisneria is easy and as long as moderate lighting and nutrients are available the plants should do well. It is important to take care when planting; the base of the plant can be delicate and easily crushed. The base, which is white in colour, should be just visible above the substrate.



1. Many bunched plants are supplied with a lead weight attached (left). This should be removed before you put the plants in the aquarium, otherwise it may damage the roots and/or restrict the plant's growth.
2. Removing the lead weight from the Vallisneria produces five individual plants (above), each with healthy roots. Plant them separately, leaving space between them to allow for growth.

Images from *Plants for the Aquarium*, with thanks to Interpet Publishing

dense group of Vallis would not look well suited, although they seem to look best with 'graceful' fish such as Discus, Angels and Gouramies. The plants will usually grow up to and along the surface so it is important to consider other plants which may become shaded by the floating leaves. In most cases Vallisneria are best placed along the background and sides of the aquarium, they are particularly useful for hiding equipment or blocking incoming sunlight. If placed near the filter outlet or a flow of water, the leaves will move in a desirable fashion.

Something for a shorter lawn

You could be forgiven for confusing Vallisneria plants for Sagittaria plants and vice-versa, I quite often refer to Sagittaria and some other low-growing grass-like plants as 'foreground vallis'. Sagittaria sp. are usually slightly darker, lower growing and more rigid than Vallisneria sp. The Sagittaria group contains a wide variety of

plants with very different leaf forms. Sagittaria's are naturally bog or marsh species unlike Vallisneria, which is a true aquatic plant. Like the Vallisneria, Sagittaria sp. reproduce by runners and can soon form a dense lawn across an open area of substrate, making them particularly useful for the foreground or midground areas. There are a number of Sagittaria varieties but the two most commonly used are the Giant sagittaria *S. platyphylla* and the Needle sagittaria, *S. subulata*.

Despite its name, the Giant sagittaria will only reach around 15-20cm and produces leaves up to 1.5cm thick. Good lighting and an iron-rich substrate are vital for long-term health and propagation. As with other aquarium suited Sagittaria species, the leaves in the centre of the plant are upright whilst those on the outside will curl back towards the substrate, giving a 'fountain' appearance. Sagittaria subulata has thinner leaves and has the potential to reach up to 30cm although unless the plant is overcrowded or lacking in light it is more likely to grow to around 10-15cm. This small plant is very hardy and if given a good



Similar in looks to many Vallis species, Needle sagittaria *Sagittaria subulata* has more rigid leaves and will adapt to boggy conditions as well as true aquatic environments

substrate will thrive in most water conditions and will even grow well in mildly brackish water.

Some other choices

There is plenty of choice in the foreground for grass-like plants, perhaps the most obvious is the Hairgrass *Eleocharis acicularis* which is a popular plant but can be very difficult to maintain. When first purchased the plant will appear as a dense clump of grass but can quickly rot leaving just a few lonely strands. Insufficient lighting, unsuitable substrates and floating debris build-up may well be the cause of this common problem. A better choice would be the New-Zealand grassplant, *Lileopsis novae-zelandiae* or the Pygmy chain sword, *Echinodorus tenellus* which although still demanding, will thrive in good conditions. For an even more hardy selection, although not quite as grass-like, some of the *Cryptocoryne* and *Aponogeton* species would do well. *C. sibida*, *C. parva*, *C. willsii*, *A. crispus*, and *A. undulatus* all have a grass-like quality and will thrive in most aquariums with a nutrient-rich substrate.

Although I now live in a flat, I remember being regularly moaned at to mow the grass. If only I'd thought quickly enough at the time, I could have sneaked off to tinker with my tanks instead!

WHO WILL MUNCH AWAY AT THE GRASS?

COMMON HERBIVOROUS FISH TO AVOID:

Abramites sp. (headstanders)
Distichodus sp.
Leporinus sp.
Metynnus sp. (silver dollars)
Scotophagus sp. (scats)

COMMON LARGE, BOISTEROUS OR DESTRUCTIVE FISH TO AVOID:

Bardodes schwanenfeldii (tinfoil barb)
 Larger barbs
 Central American cichlids
 Rift Lake cichlids
Pterygoplichthys/Glyptoperichthys sp.
Serrasalmus sp. (piranhas)
 Large *Synodontis* sp.



Onion plants (*Crinum thalictroides*) can throw thick leaves up over 2m in length

There are many other grass-like plants, which are well suited to the background and foreground areas of the aquarium, but none that are as hardy and adaptable as the *Vallisneria* and *Sagittaria* species. Alternatives for the background or for deep aquariums include the Onion plants *Crinum thalictroides* and the Crinkled-leaf *Crinum natans*, both of which can reach over 2m and produce thick leaves able to withstand the attentions of more boisterous fishes.



One of the very best lawn-producing plants for the foreground is the Pygmy chain sword (*Echinodorus tenellus*)

Skinks galore



Attractive Fire skink. After accidental winter cooling this specimen produced five eggs, laying them in moist substrate. Breeding was only discovered when young were seen running about and the remnants of shells found

Val Davies suggests some common skinks which are easily and relatively cheaply available all year round

Last year we focused on skinks of the genus *Tiliqua* (Blue tongues and pink tongues). As pointed out although easy and rewarding to keep they tend to be expensive and availability is variable. However, other, smaller, less expensive skinks are available for most of the year in reptile outlets.

Fire skink (*Lygosoma fernandi*)

Fire skinks are very attractive lizards from west and central Africa. Growing up to 30cm (12in) they do not pose any problems with housing. These skinks are terrestrial in habit living among leaf litter in the drier parts of the rainforest. They are crepuscular, venturing out to forage for food at dusk. Their typical skink features include a long, stout body, smooth, shiny scales and relatively short legs. The basic coloration on the back is brown broken by irregular bands of red and black flecked with white. The bands on the tail, which it

autotomous, are blue and black. Limbs are black. Unfortunately very few specimens offered for sale are captive bred, one reason being the difficulty in sexing specimens – in some cases males carry more red coloration but this is not always a reliable guide. Up to eight eggs are laid and should be

incubated in moist vermiculite at 26°C (80°F). Initially babies carry more blue coloration than adults. If purchasing look for a smaller, therefore younger, specimen. Although wild-caught they may object to handling at first but they will soon tame down.



Berber skinks are easy to care for and long lived in captivity



Eyed/ocellated skink (*Chalcides ocellatus*)

Eyed skinks have been maintained in captivity for many years with captive bred specimens sometimes available. The species has a wide distribution range from Greece, Italy, various Mediterranean islands, North Africa and Arabia. Some specimens are still imported and these tend to come from North Africa. The native habitat includes cultivated ground, patches of vegetation on coastal sands, clay walls near houses and areas of scrub. Their thermoregulatory behaviour means they prefer a patchwork habitat with open ground for basking interspersed with dense vegetation for cooling and hiding. Eyed skinks tend to avoid midday heat and in summer change their habits to become crepuscular and nocturnal. In some parts of their range they hibernate 10-50cm (4-20in) deep in the ground. In the wild, whilst insects form a large part of their diet, they will also tackle larger prey such as a lizard. They hang onto a limb and spin or rotate until the prey is stunned or dismembered.

These 30cm (12in) lizards have a cylindrical body covered with small, smooth scales giving a polished effect. Coloration is yellowish brown with small, white-centred dark spots (ocelli) which are combined with light or dark longitudinal stripes. Mating takes place in spring and after a gestation of three to four months four to eight live young are born. The young should be removed to their own vivarium to avoid the risk of cannibalism.

Berber skink (*Eumeces schneiderii*)

Every year Berber skinks are imported from North Africa although their distribution ranges further afield into the Middle East and West Asia. This terrestrial/burrowing skink inhabits areas of herbaceous vegetation near to oases, sandy hills, cultivated land and semi desert. It digs large burrows near the base of plants or between the roots of thorn bush using these to shelter from the intense midday heat and predators.

Despite the long, bulky body Berber skinks can move quickly. The background coloration is olive-grey covered with distinctive yellow

orange scales. A yellow-orange lateral stripe runs from just below the eye to the tail base. The ventral surface is yellowish white. In basking specimens which have reached their optimum temperature the background colour lightens to a greyish white. Berber skinks like variety in the diet which in the wild includes snails, lizards and fruit as well as insects. Males are larger and more brightly coloured than females. Some 5-6 weeks after mating the female lays 3-20 eggs in moist soil which she then guards. Many herpetologists have tried to artificially incubate the eggs of this species but failed to hatch them. Studies, both in the wild and in Germany, show that the female periodically urinates on the eggs which may be crucial to the developing young.

CAPTIVE CARE

All are terrestrial so a well-ventilated vivarium 90 x 38 x 38cm (36 x 15 x 15in) will house two to three specimens. A sandy substrate is ideal although for the Fire skink some 50% of the floor area should be covered by a more moisture-retentive material such as potting soil topped with sphagnum moss. *Eumeces* will climb onto low branches. Pieces of cork bark can be used for hides although reptile shops can now stock more natural looking 'reptile dens' or 'hide outs'. Temperatures for these three species can reach 35°C (95°F) at the hot spot falling

to 26°C (80°F) at the cool end. Night temperatures can fall to 19-20°C (66-68°F). In addition to a basking light a full spectrum UVB fluorescent tube should be provided for these diurnal/crepuscular creatures. The photoperiod should be 14 hours. A very light spray can be given in the morning and although the lizards may lap this a small water dish still needs to be provided. Whilst insects such as crickets, locust hoppers, spiders and wax moth larvae form the bulk of the diet some fruits will also be eaten. All should be sprinkled with a good quality multivitamin/mineral/calcium supplement.

Humid and happy

Val Davies takes a look at the various ways in which you can keep your vivarium humid

Many arboreal reptiles and amphibians occur in habitats where there is 70-100% humidity and would-be keepers of such species should aim to achieve this vital environmental parameter. When setting up and furnishing vivaria for these creatures several points should be considered. A moisture retentive substrate is essential. Whilst potting soil and moss have been the traditional choice for many years' recent additions to herpetile products include attractive, natural-looking substrates which are suitable for use in such a situation. A large water bowl also increases humidity even though many arboreal herps tend to use it to defecate in (as they would in the wild). Spraying the vivarium is another method by which higher humidity levels can be achieved but can be time consuming. Some keepers have installed misting systems of the type which are used by asthmatics. However, special herpetological models are available at a much lower price, to create a natural, damp environment.

As well as adding an attractive feature to a vivarium, a waterfall is another method by which humidity levels can be raised. Some lizards, especially anoles and chameleons, do not drink from a bowl, preferring to lap spray water from leaves. A disadvantage is that sprayed water can quickly evaporate and the creature still thirsty and so reluctant to feed. The movement of water in a waterfall often stimulates these lizards to lap at the moving liquid. As with all vessels which contain water they should be cleaned regularly.



Arboreal water dragons need humidity and warmth to thrive

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especially after deposition of waste matter to avoid the build up of harmful bacteria. A hygrometer is a useful and inexpensive piece of equipment which helps monitor humidity levels.

Heating & lighting

Heating and lighting are other important elements to consider. A heat source which creates an overall or ambient temperature of around 25°C (78°F) combined, for daytime, with a thermostatically controlled spot bulb to create a basking area with a temperature of 30°C (86°F) is ideal. Despite the fact that many of these arboreal herps spend some of the day away from direct sun in dappled shade UVB is still a crucial requirement. Therefore the vivarium should be fitted with a 5% UVB fluorescent tube. It is important to remember that unless there is adequate ventilation, the combination of heat and humidity, can create stagnant air conditions.

Vivarium furnishings

Furnishings in vivaria for arboreal creatures have to be functional as well as attractive. Branches facilitate climbing and increase the space available to the occupants. Any used from gardens etc. should be well scrubbed before use. Alternatively 'jungle vines' of varying thickness can be purchased from reptile outlets. Live plants provide lapping surfaces as well as much needed shade and seclusion and look attractive. However, heavier, arboreal creatures with strong claws, such as water dragons and frilled lizards, will soon shred and damage live plants. A wide range of sturdy, artificial plants is available. These can be fixed to branches, the sides and top of the vivarium thus providing natural looking places hiding places for the creatures.

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Koi world



Bernice Brewster digs around in some dusty old papers and rediscovers a nugget of information useful to koi (and other fish) keepers even today

Just recently, a friend asked if I had a copy of a particular scientific paper, which led to me blowing the dust off the heavy box which contains my reprints. What should have taken me at most an hour, ended up as a two day job as I took a trip down memory lane. It really didn't take me more than a few minutes to discover the box contained a mass of information, which had been put to one side and forgotten and the little gems it turned up, including one which covered allowable ammonia concentrations.

Ammonia poisoning

One of the stated facts of exposure of koi to ammonia is that it causes a condition known as 'lamellar hyperplasia'. Initially the

SALT AS A SAVIOUR

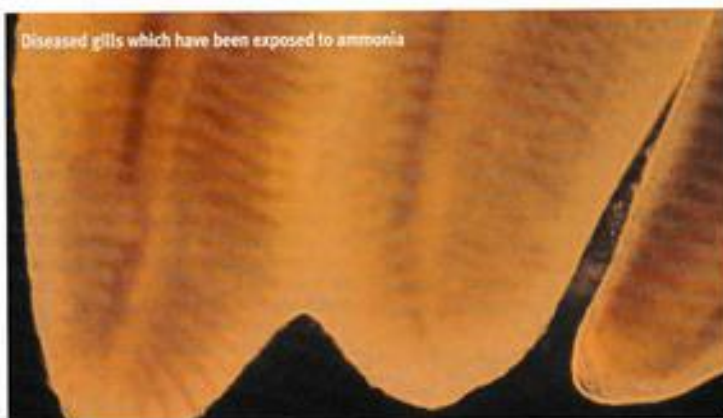
Another interesting fact that emerged from the paper was that increasing the common salt concentration of the water seemed to reduce the toxicity of the ammonia. A fact commonly exploited by many koi keepers faced with a serious ammonia pollution. It seems the trick may be in the increase in sodium ions in the water, which may be actively exchanged by the cells on the gills for ammonia ions. A neat trick.

ammonia concentration causes the koi to produce more mucus as a response but if the concentration of this pollutant continues to rise, the tissue of the gills begin to swell and then the cells divide abnormally. In healthy koi, the water and blood are in intimate contact at the surface of the gill tissue but as the cells begin to proliferate, when exposed to ammonia, the blood vessels become buried under a mass of thickened tissue and this is lamellar hyperplasia. In extreme cases, the tips of the gill filaments become fused together, a condition which is known as clubbed gills.

The paper by James Meade on allowable ammonia concentrations finds that the effect of ammonia causing lamellar hyperplasia appears to be variable. In some instances the lamellar hyperplasia was significant and in others minimal. It is important to realise that lamellar hyperplasia is not confined just to exposure by ammonia but is the response



Healthy gill tissue



Diseased gills which have been exposed to ammonia

of fish to all environmental insults.

One of the factors which had an impact on how harmful the ammonia was to the gill tissue concerned the gradual increase in ammonia concentration and the ability of the fish to acclimatise to the deteriorating water quality. In any koi pond which is suffering from high ammonia levels, those fish in the pond do seem to tolerate the poor water and yet if a new koi is introduced to this same pond, it is this fish which dies first. The new koi does not have any chance to adapt to the poor water conditions, which simply overwhelm it.

Nonetheless, I think it is better not to think about allowable ammonia concentrations but

still to regard none as the only acceptable amount of ammonia in a koi pond's water. Finally, this really was a trip down memory lane and James Meade's paper is now approaching 20 years old but nonetheless even after this length of time it is a very stimulating read.

REFERENCES

Meade, J W 1985 Allowable ammonia for fish culture. *Progressive fish Culturist* 47 (3): 135-142

...End Point



The Spotted climbing perch is one of the most attractive fish in this group

Kathy Jinkings profiles an interesting African anabantoid, the Spotted climbing perch

The Spotted climbing perch has many similarities with the Climbing perch, *Anabos festudines*, but fortunately also many dissimilarities that make it a more pleasant proposition for the aquarist. To start with, it is considerably more attractive. Although decked out in brown and black, it is nonetheless attractive with a pointed mouth, large eyes, and an all over pattern of black spots on a background that can appear gold in the right light. The male has patches of spines on the sides, especially in front of the base of the tail, rather like velcro, which require caution when netting.

A peaceful fish

Although this fish is undeniably a carnivore, and will relish any small fish (up to about

2.5cm long) it finds sharing its accommodation, it is a peaceful fish with larger, quiet tankmates. Provided it is not overawed by excessively bolsterous companions, this fish will be out and about regularly at the bottom of the tank, especially if provided with dim lighting and lots of roots and plants to swim among. If the tank is too busy or too bright, the fish will hide away and be rarely seen. The most obvious difference from *Anabas* is that this fish hails from a different continent. Unlike the Asian *Anabas*, this is an African fish from waters that range between 6 and 8 pH. Although not as hardy as *Anabas*, it is nonetheless tolerant. It also comes from faster flowing waters, as well as the stagnant pools that are usual for anabantoids. As anabantoids, these fish are able to breathe air, and can tolerate water low in oxygen.

Successful breeding

The water needs to be soft and acidic to encourage spawning, and raising the temperature slightly may also serve to get the fish in the mood. Not particularly painstaking parents, the male has been reported as sometimes managing to build a bubble nest to house his new family, but most reports indicate that the eggs are generally just scattered about haphazardly. Thousands of tiny eggs can be produced, which float, so the top of the tank needs to be kept warm. The parents will generally ignore the eggs, but it is best to remove them for hatching – as the fry gain size they

will almost certainly gain more appeal as a snack. Once the fry have been hatched and are free swimming, rotifers and then brine shrimp nauplii make good first foods. Hard-boiled egg squeezed through a cloth has also been recommended. After a month the little fish will have their spotted pattern and an appetite for anything that can be crammed into their mouths. These fish are rarely bred in aquaria, so could make an interesting project for someone with enough space. Of all the *Ctenopomas*, this is one of the most attractive.

PROFILE

Name:	Spotted Climbing Perch, Leopard bushfish
Scientific name:	<i>Ctenopoma acutirostris</i>
Size:	15cm
Aquarium type:	Species or large fish community tank
Distribution:	Zaire, Congo basin
Diet:	Live or frozen foods, small earthworms
Temperature:	23-28°C