

Today's Fishkeeper

JANUARY 2005

£3.25

PASSIONATE ABOUT FISH

**African river
cichlids**



THREE
FANTASTIC FLOVAL
TANKS TO GIVE
AWAY

ON GUARD
Fish defences

FISH FOES
Which fish make
bad tankmates?



**Success
with corals**

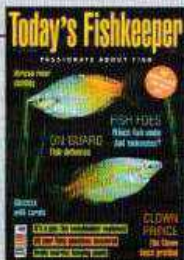


It's a gas: the swimbladder explained

All your fishy questions answered

Trade secrets: keeping plants

**CLOWN
PRINCE**
The Clown
loach profiled



WATERWORKS
**AQUARIST
 AND PONDKEEPER**
 The magazine for every fishkeeper - since 1989

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Cover picture by Max Gibbs: Boeseman's Rainbowfish (*Melanotaenia boesemanni*)

Welcome!

As I am writing this, out of the corner of my eye I can see our new office fish tank bubbling away in the corner. It's been up and running for a couple of weeks but we added the first fish today: three Cardinal tetras and three Pygmy corydoras. Two of the Pygmies have disappeared under the bridge (the decor had nothing to do with me) and the other one is shoaling with the Cardinals. Here's me thinking he was going to do his duty and clean up all the debris at the bottom of the tank. However, I used to have a Jack Russell that thought it was a lurcher, so this is obviously common throughout the animal kingdom...

Speaking about fish and their tankmates, Mary Sweeney takes a look this month at fish that make bad tankmates. With the help of her "old pal" Marc Weiss, she has come up with a list of light-hearted 'bad tankmates'. Among my favourites are 'Do not keep Balloon mollies with Needlefish' and 'Do not keep Devil fish with Angelfish'. I'm sure there will be many of you out there with your own bad tankmate combinations, so if you're feeling up to the challenge drop me a line with your inspired ideas - just for fun of course! However, as well as a funny side, this article also has some real-life no-nos, so to avoid carnage turn to page 14.

If you're into cichlids, and so many of you are, you will be glad to see that both Erwin Schraml and Juan Miguel Artigas Azas are covering them this month. I don't know about you but I'm a real fan of seeing fishes' natural habitats and these features satisfy on all counts.

All that's left for me to say now is have a very happy and prosperous New Year. I coerced the team into having a festive group photo (it took some doing I can tell you).

Here's to 2005

Christina



Left to right: Rachel (and bump), Michele, Darren, me, Mark and Karen

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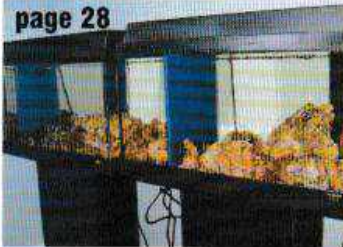
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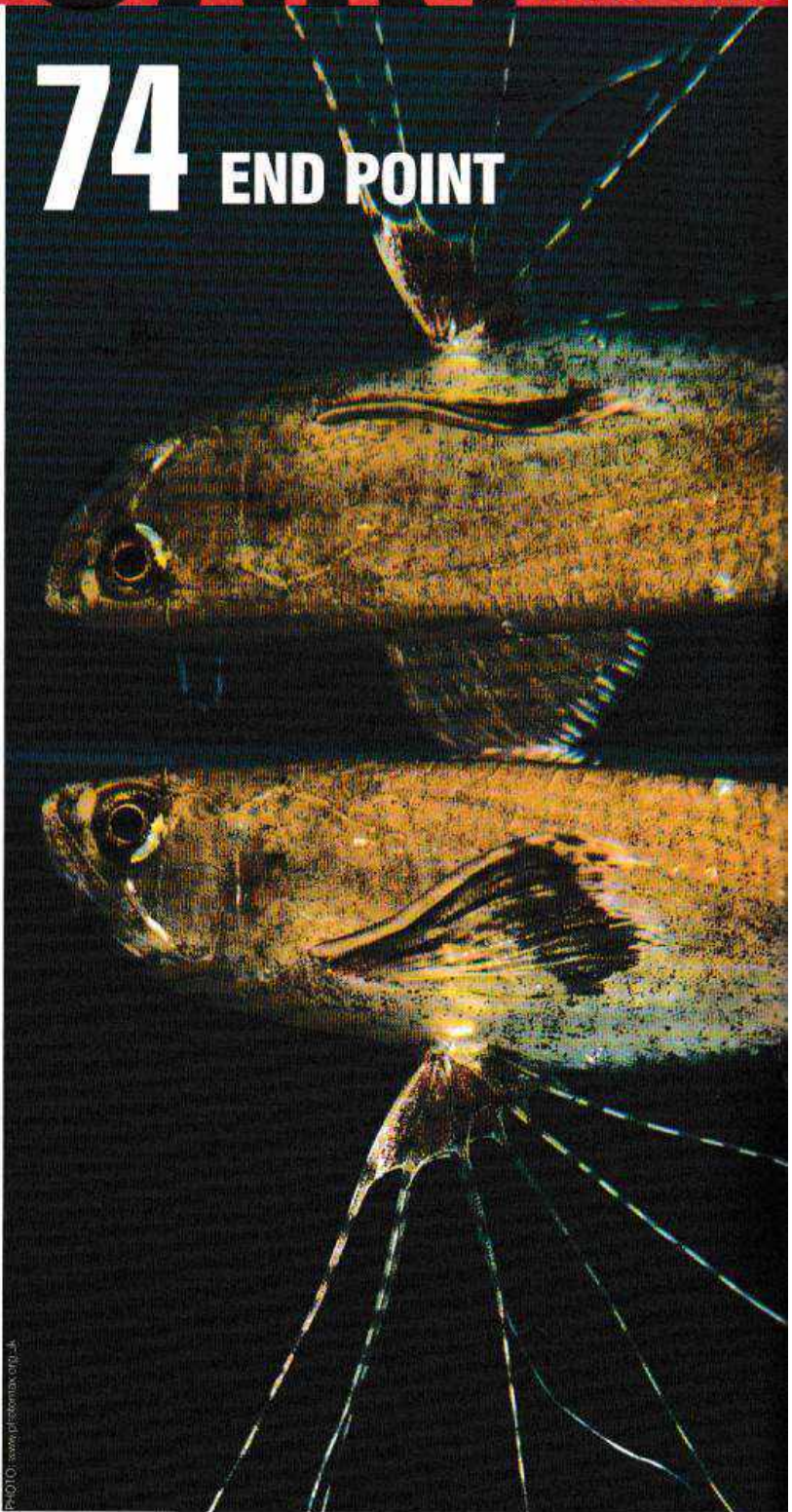


PHOTO: www.pistonmax.org.uk

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Starting Point...



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

These two Penguin fish (*Thayeria oblique* top and *Thayeria boehlkei* bottom) are very similar but the difference can be clearly seen in the extension of the black bands



PHOTO: www.fishbase.org.uk

Highly recommended



PHOTO: www.fishbase.org.uk

Fish farms in Asia and Florida, in particular, supply the majority of fish that are kept in our community tanks. Improvements in packaging, technical advances and swifter transportation have led to the survival of many new species from the wild. This means that there is greater choice of species available which can create problems for the beginner as, the wider the choice, the easier it becomes to make a mistake. Size, unfortunately, is no indication of nastiness and much damage can be caused by small species. I have known larger occupants of a tank to be blamed for the murderous behaviour of a relatively small species. The beginner is well advised to stock with 'bread and butter' fish to start with. These are the fish widely sold through the trade and found in aquarium outlets and general ID books. These are the community fish that I introduce in the column each month and come highly recommended.

The characin family is a very large group which are thought to go back to Mesozoic times when Africa and South America were joined and dinosaurs were alive. They all have teeth which can be used to great effect by aggressive species and size doesn't come into it.

Why not pick up a penguin or two?

However, let's take a look at some peaceful, community characins (and there are many of them).

The Penguin fish and the Bloodfin are peaceful community characins that will live happily within the normal range of temperature, hardness and pH.

The two Penguin fish species, *Thayeria oblique* and *Thayeria boehlkei*, are very similar in size and temperament, reaching 8cm in length and having a striking black tail. They eat all foods and make very good community tank mates. In the earlier

imported *Thayeria boehlkei* the black band extends from the operculum, down the body to the tip of the tail and swims with head pointing slightly upwards. *T. obliqua*'s black band, however, is shorter and runs from the tip of the caudal to just behind the dorsal. The black bands are features that make these Penguin fish stand out.

Great community fish

The Bloodfin (*Aphyocharax anisitsi*) is a lovely silvery fish which has blood red in the caudal, anal and pelvic fins. This fish looks at its best in a small school. Tolerates a wide temperature range 72-81°F although it's happiest in the middle of the range. This is a very hardy fish and can live for a long time, I had one that lived for 10 years in a community tank in the lounge.

So you have hard water

This is water which has a high concentration of calcium and magnesium and in nature is found in water flowing over rocks which contain high levels of these minerals. Aquarium water is supplied on tap and its softness or hardness depends on which part of the country you live in and the source of the water supply to your home. You can have water flowing from your own home tap that can be totally different from the tap water of someone who may only live a mile away if their water source is different from yours. I know this because this happened to me when I was living in Lancashire. In soft water areas your washing powder will last longer and many soap bubbles rise when

Don't forget to do regular partial water changes

DON'T LET THIS ONE IN

Roeboides caucae (Cauca humpback) is a small 6cm long characin living on the scales of fishes.

Introduce this one into your community tank of small fishes and it can kill all the occupants in double quick time.

The fry will even try to eat each other if enough food is not available.

Even though it is much smaller than the 15cm Buck-toothed tetra (featured in the column in an earlier issue) many of the *Roeboides* sp are of similar size and unfriendly disposition.

Highly recommended



Aphyocharax anisitsi, the Bloodfin, is good choice for the community tank



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LOST FOR WORDS

Algae removers: These scrapers are used to remove unsightly algae from the aquarium glass. The scraper blade is situated at the end of a long stick which makes for easy usage. Plastic blades are safer than metal ones as the metal razor blade type could cut through the tank sealant.

Aufwuchs: Mainly the filamentous layer of algae that grows on hard surfaces and is home to tiny invertebrates. Many species have special adaptations for ease of harvesting food. Mollies in particular feed on the tiny inverts as they love the live food within the algae.

Breeding strategies: These are different methods that fish use to breed. The most widely used being egg scattering where the eggs are widely scattered. Egg depositors place their eggs in specific places like caves, glass and broad plants. Bubble-nesters construct a nest of bubbles in which eggs are collected as they fall and placed in the bubbles. Mouthbrooders hold eggs in the mouth until they hatch and for some time after. Livebearers are internally fertilised and give birth to living, fully-formed young.

Copper: It is important to know that treatments containing copper can be toxic for some fish. Care must be taken in its use and manufacturer's instructions should be carefully read before use. Copper ornaments or any other metal which contains copper such as brass should never be used in the aquarium or fish ponds.

Holding Stations: Fish are caught in the wild in remote and scattered parts of river systems by local fishermen who are skilled and know the fishing grounds well. The catches are transported to regional holding station where they are held in large vats or other containers until there are enough collected there to send to a station near the airport for transportation around the world. (See picture below).

Mosquito larvae: These are bloodworm, black mosquito larvae and glassworms. Glassworms are not as widely used for fish but bloodworms are very popular with fish and can be regarded as a treat. They are not as nutritious as black mosquito larvae which are an excellent food for fishes and can be frozen down in times of plenty for feeding during the lean times. Frozen bloodworm is also widely used.

Pipefishes: These elongated fish are covered in bony armour and have a long narrow snout which is used to suck in food. Males have a pouch or folded skin across the stomach where the female lays her eggs. The male protects the eggs and fry. Very few of these are freshwater species.

Synonyms: The scientific name of a species is unique to that species. A newly found species is initially examined, compared to other species, classified and given its special name. Occasionally, as scientists find out more about a classified fish, the fish is renamed and the old name becomes a synonym. In reference books the current up to date name of the species will be the one used and listed underneath will be former names of the species. An example of a name changing on numerous occasions is that of the guppy where 12 names have gone into synonymy. You may not know any of the previous names but throughout its many scientific changes everyone has known it as the Guppy.



These Stingrays are being kept in very shallow basins at a holding station

washing your hands. This is a simple indicator as to whether your water is soft or hard. To obtain more precise measurements for fishkeeping you will need to buy a test kit. These are simple to use and come with full instructions.

Practical applications

150ppm is suitable for most general community fish tanks but if you water is hard and alkaline Rift Lake cichlids and many Mexican livebearers and Central American cichlids will revel in it. On the other hand if you want to keep many of the Killifish, discus and many rasboras in perfect conditions your hard water will need to be softened.

A good point about hard water is that the pH tends to be stabilised as it has greater buffering capacity (which helps to keep the

Reading the pH value of your water



After you have added the tablet and the colour change is complete, compare the result with the chart to obtain a pH reading. Hold the tube so that the colour shows up well against the white card.

Image with thanks to Interpet Publishing Ltd

How to read a test kit

The German scale of DH degrees of hardness is the one most commonly used and measures the amount of calcium carbonate in the water

1DH=17 ppm parts per million of calcium carbonate

Soft 0-75ppm
Moderately soft 75-150ppm
Hard 150-300ppm
Very hard 300+ ppm

NB: Hardness of water is usually (though not always) associated with alkalinity.

pH from falling).

Most general community fish will live in the normal parameters for freshwater tropicals. Adjustments can be made with additives but my tip to beginners is to keep those fish that your tap water is most suitable for. However, it's Sod's Law that someone who lives in a soft water area will yearn to keep Rift Lake cichlids and another who lives in a hard water area will want to keep killifish.

Bogwood and peat will help to acidify the water. Peat filter media can be used. Coral sand and Tufa rock are widely used to harden the water. Tufa is a lightweight porous rock which is suitable for the hard water aquarium.

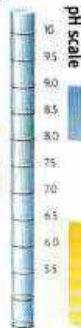
Some plants will just not tolerate hard water but here is a list of a few: *Hygrophila polysperma*, *Myriophyllum aquaticum*, *Vallisneria spiralis*, *Sagittaria* will do well in alkaline conditions and *Cryptocoryn wendtii* flourishes in my hard alkaline water. ■

PH TOLERANCE IN FISH

Tropical marine fishes thrive in a fairly narrow pH band of 8.1-8.3



Most community tropical freshwater fish thrive in a pH range of 7.0-7.6



Rift Lake cichlids are happy at a pH of 8.0-9.0

Fish from acidic waters prefer a pH of 4.5-6.5

PHOTO: WITH THANKS TO ALBERT PUBLI-PHIS

10 golden rules of fishkeeping

READ UP FIRST

Before buying your first aquarium it pays to read up all you can about fishkeeping.

- Some manufacturers provide free beginners' guides to keeping fish.
- Most aquatics stores stock a range of inexpensive books on fishkeeping.
- Today's Fishkeeper* experts are on hand with help and advice, and sections of the magazine are devoted to beginners.

THE AQUARIUM

1 Within reason, buy the largest aquarium that you can afford.

Small tanks and bowls (below 15 litres capacity) are prone to water quality problems. Recommended minimum sizes:

Goldfish: 15 litres

Freshwater tropicals: 30 litres

Marines: 90 litres

2 Every aquarium should have a filter, even goldfish tanks. Your aquatics store can help you select a filter that best meets your aquarium's needs.

3 The aquarium should be up and running for a couple of days before adding fish. It's tempting to introduce fish straight away, but be patient!

Tip: Fish may jump, so select an aquarium that comes with a cover!

THE WATER

4 Proper water conditions are the key to healthy fishkeeping. Fish vary in their requirements for water temperature and pH – so read up about the needs of the fish you intend to keep. Routinely check the levels of soluble wastes in the water by testing for ammonia, nitrite and nitrate – using simple test kits. Detectable levels of ammonia or nitrite indicate a filter problem.

5 Before buying fish, consider the following:

- How large will it grow?
- Can my aquarium accommodate the fish when adult?
- Will it live in harmony with my existing fish?

Goldfish, tropicals or marines? Newcomers to the hobby should choose either goldfish or freshwater tropicals. Only consider marine fish when you have gained lots of experience with freshwater species.



Select your fish carefully.

Not all the fish seen for sale will be suitable for your aquarium. Some grow too large and others are aggressive or difficult to keep.

d. Does it require special water conditions or special foods? Beginners should avoid difficult-to-keep species.

e. Should I buy just a single specimen, or a pair, or a small group?

The staff at your aquatics store can help answer these questions, or consult a book on aquarium fishes.

6 Add just a couple of fish to your new aquarium. Then wait two or three weeks before adding a few more – if space allows. Introducing too many fish at once may cause a water quality problem that could harm your fish.

7 Stocking levels: For freshwater tropical fish we recommend about 25cm² aquarium surface area per 1cm length of fish. Goldfish need about 75cm² of surface area per 1cm length of fish, and Marine fish need about 125cm² per 1cm of fish. Calculations should be based on the length of the fish when adult. A 15 litre aquarium will house a single goldfish.

THE ROUTINES

8 Feeding: Feed your fish two or three times a day. At each feed, give only as much as the fish can eat in a few minutes.

9 Water changes. Regular part water changes are vital for your fish's health.

- Freshwater tropicals and goldfish: change about 10-20 per cent of the water every week or two.

- Marines: Change no more than 20 per cent every two weeks.

Small or heavily stocked aquariums may require more frequent water changes.

10 Filter cleaning. If your filter has a sponge (or foam) cartridge: clean the sponge every couple of weeks by squeezing it a few times in a bucket of aquarium water, to unclog the pores. Avoid over-cleaning otherwise you'll wash away the friendly bacteria that inhabit the sponge: these beneficial bacteria help to keep your aquarium clean and healthy.



For your free beginners guide please call:

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or visit our website: www.aquarian.com

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Today's news

All the latest news and products from the world of aquatics

Valley Aquatics gets a face lift

2005 marks the 25th anniversary of Valley Aquatics based in Haslingden, Lancashire and a special event will be held over the Easter weekend.

In the meantime work is currently taking place to upgrade and improve the existing services by:

- Installing a brand new marine and tropical section
- Expanding the range of dry goods and equipment currently on offer for marines and tropicals
- Increasing the number of fancy coldwater fish
- Upgrading the koi section.

All this is being undertaken in a much newer and brighter unit adjoining the current building.

For further information and opening times contact Mike Donlan at Valley Aquatics on 01706 228960 or simply visit Valley Aquatics, Carrs Industrial Estate, Haslingden, Rossendale, Lancashire, BB5 4JS.

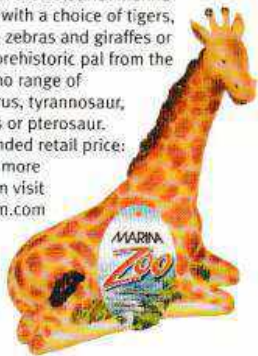
Animal-themed aquarium ornaments

Marina has introduced a range of zoo and dinosaur themed aquarium ornaments to help children create a unique underwater world in their aquariums.

These fun, kid-friendly designs are made entirely of non-toxic materials and are suitable for all types of aquariums and terrariums.

Pick from the colourful Marina Zoo range with a choice of tigers, elephants, zebras and giraffes or choose a prehistoric pal from the Marina Dino range of shunosaurus, tyrannosaurus, triceratops or pterosaur.

Recommended retail price: £2.99. For more information visit www.hagen.com



TODAY'S FISHKEEPER JANUARY 2005

THINKING ABOUT FISH?

Thinkfish.co.uk is a new fishkeeping website launched recently by our very own plant expert Peter Hiscock. Think Fish has all the usual features you would expect from a site of this size including articles, encyclopedias, fish and plant databases, and fishkeeping calculators. Other areas of the site allow users to post and reply to comments in an opinions section and chat to other fishkeepers in a forum.

If you register your details on the site you can save lists of your aquarium fish in the Think Fish Community Creator and check compatibility issues by adding new species – any problems will be flagged up with an explanation. Users can also search a map of the UK, or enter a postcode to find out details of local shops and places to visit. The site will even remember where you live so that each time you log on, any news from your local fish shop will be easily available.

Think Fish's Peter Hiscock says, "Think Fish is designed to be a central resource for fishkeepers where they can collect impartial and accurate information, chat to other fishkeepers, and keep records of their fish tank communities. We have a strong ethical stance at Think Fish and believe that educating the public about fishkeeping related issues is vital for the long-term health of the hobby. In the future we will vastly increase the site's content and aim to join forces with retailers, magazines and other organisations to promote responsible fishkeeping."



CORYDORAS ALL C NUMBERS

Aqualog have just launched a new book called *Corydoras All C Numbers*. There are many books available which cover Corydoras, but this is the first to deal with those that are yet to be scientifically described and are known only as C Numbers. The book covers all C Numbers up to C 132 and every entry has an accompanying photograph. It is available from Tropicalfishfinder at a price of £13.99. You can buy online at www.tropicalfishfinder.co.uk or alternatively call the order line on 020 8297 4199. Tropicalfishfinder currently stocks over 60 different book titles devoted to tropical fish.



AllClear has moved

Did you have any problems getting hold of AllClear Water Purifiers between November 1-12? Ann and Richard Telford hope not but, as we all understand, moving and the installation of new 'phone lines is not always an easy time.

AllClear's new office and workshop are now fully open, up and running ready for the 2005 season. "We're so pleased that moving time did not happen in the middle of the show season, we were holding our breaths over that possibility," said Richard.

After settling in to their new peaceful home their next task is to rapidly build a temporary koi pond and filter system in the garage. Then planning and building their koi's permanent pond.

AllClear's new contact details can be found in their adverts and on their website www.allclearwaterpurifiers.com
Tel: 01359 253 679

Swallow's new corporate image

Swallow Aquatics is adopting a new racy 21st century corporate image designed by high-flying young manager Gavin Marlow.

Gavin (aged 26) is manager of the group's Gravesend outlet and, once the family-owned company board agreed to make changes, Gavin drew up a plan to triple the size of the Kent shop and give it a completely new look.

The move followed earlier major changes and expansion at Rayleigh, Swallow's giant flagship headquarters in Rayleigh, Essex, and East Harling, the company's aquatics/garden centre site in East Harling, Norfolk. And also Colchester, where Swallows made substantial changes and, like with the rest of the group, increased the range of fish, aquatics plants, hard and soft corals – and their large range of dry goods.

But in Gravesend Gavin wanted to go one step further. Like the rest of the group he wanted to change and increase the range of fish – including a dedicated discus section – plants, and dry goods.

And he also wanted to improve the image of Swallow Aquatics.

Gavin put his plans to Group Managing Director Nick Seaby for approval and, after board agreement, he was given the go-ahead. He then set about tripling the size of the shop with input from Martin Woolley and Peter Dawson.

Mr Seaby said: "Swallows will continue to look for innovative ideas and search the world for the best fish, plants and dry goods. We are fortunate to have a progressive and forward-thinking management team and we will continue to support their ideas whenever it is practical and possible."



SPECTACULAR SUCCESS IN USA



Spectacular Aquariums, designer of the world's first maintenance-free aquarium background filter, has just returned from the US after a brief marketing tour introducing its unique products to American retailers.

Managing director Simon Adderley said: "The response was staggering. Our whole range, from the filters through to the Aqua-doctor aquarium treatments, were received with great enthusiasm."

So much so the largest pet product retailer in the USA has agreed to stock the Spectacular range of products."

The 850 store deal is the biggest contract yet for the company.

Simon continued: "It just shows how ready the market is for our new approach to aquarium care. Our products are based on the simple philosophy that everyone has busy lives and the traditional labour intensive system of aquarium care just doesn't fit any more. Spectacular Aquarium's background filters take about 10 minutes per year to look after. Aquarium care doesn't get any easier than that."

tropicalfishfinder.co.uk

The easy way to find your tropical fish

What's new?

A few interesting fish to mention this month. For the anabantoid enthusiasts, two gourami species have been available that we have rarely seen in the shops. The first is *Betta picta*, which is a



mouth brooding betta that originates from Southeast Asia. This is a fairly small betta reaching a maximum size of around 6cm.



The other betta available at the moment which you will not see that often is *Betta imbellis* which is

another relatively small betta from South East Asia.

Moving on to Australia, for those of you interested in gudgeon, *Mogurnda adspersa* has turned up at Natural World based in Leicestershire. In fact they have started breeding so if you

want a breeding pair this is the place to visit. The males are particularly



colourful and they will reach a size of around 15cm. They can be territorial and so ideally should be kept in a good sized tank.

A relatively newly discovered danio called *Danio kyathit*, which originates from Myanmar, has been available this month. Danios always make an excellent



display in a community tank and some of the different species are well worth seeking out.

Always buy a group of fish as they are a schooling fish and look far more impressive when several fish are kept together.

For the discus fans you may be interested in a strain called Quarter Moon that has been available at London Discus. It is certainly an interesting colour for these fish and may not appeal to everyone, but certainly looks very different to the more traditional colour variations.



Other fish available that we can only briefly mention are a rare Chocolate gourami known as *Sphaerichthys vaillanti*, which were available for the first time on TFF this month at a new shop called Fintasia Aquatics. They were also lucky enough to obtain the first Blue arowana to arrive in the country.

All of the fish mentioned here were available at one or more of the shops using the Tropicalfishfinder service at the time of writing. To find out more go to www.tropicalfishfinder.co.uk or alternatively call 020 8297 4199.

Makeover complete

Fins & Things has now finished its tropical set-up. The premises now boasts 152 tropical aquariums, eight brackish, 137 marine and 14 coldwater aquariums making it one of the area's largest aquatic outlets.

Fins & Things imports fish from around the world and is able to obtain many unusual species. Services include:

- Mobile aquarium drilling any where in the UK
- UK-wide delivery of fish or equipment
- Extensive dry goods selection
- Pond installations and maintenance
- Aquarium installations and maintenance
- Expert advice on hand.



More information can be seen on the website www.finsandthings.co.uk. Wholesale enquiries are welcome.

NEW BUFFERING BOOSTER

Water treatment specialist AquaHydrotech is launching a new, liquid kH product for 2005. AquaHydrotech kH Plus boosts the buffering capacity of water, increasing its ability to resist the sudden pH changes which can be dangerous to fish, whilst providing the essential bicarbonate which is vital for the growth and activity of nitrifying bacteria.

Its rapid action ensures that low alkalinity can be rectified immediately and, like all AquaHydrotech's other eco-friendly products, it is totally natural and safe so it can be used in the most sensitive aquatic environments.

A key feature of kH Plus is its liquid formulation which makes it easier to precisely control dosing. It's also easier to store and provides a potentially longer shelf-life than powder products as there is no risk of it hardening and becoming unusable in damp conditions. Sarah Anson, Technical Sales Manager for AquaHydrotech says: "We believe that kH Plus will become a popular addition to the fishkeeper's armoury of treatment products due to its rapid action and ease of use."



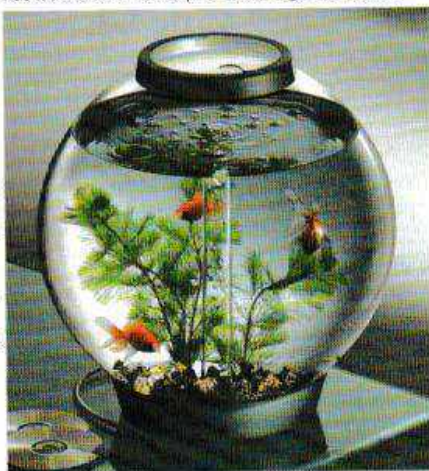
21st CENTURY FISH TANK

Traditional household fish-tanks have rarely changed in look and design over the last few years. With this in mind Pets at Home has launched its new stylish Silver Big Biorb to give this popular accessory a 21st century look for the modern home.

The innovative Silver Big Biorb is part of Pets at Home's new aquatic range which also features precision-made larger tanks.

Linda Whiting, events and PR manager for Pets at Home, commented: "Our new aquatic range fuses contemporary designs with practical features that offer ease and convenience. With goldfish lasting up to 10 years and tanks spanning over a metre in length, it's important for pet owners to shop around for a fish tank in order to achieve the right look and to help fish feel at home."

Pets at Home also takes out the hassle for beginners with its new Tropical and Coldwater Starter Kits, which contain a lighting and filter system.



TODAY'S FISHKEEPER JANUARY 2005

TFK National Show League 2004

To register your points for the *Today's Fishkeeper* National Show League (3 for a 1st, 2 for a second, and 1 for a third) you should list the shows and certificates gained at every show at which you have won awards during the 2004 season. The competition is open to all federations and associations throughout the British Isles. Joint exhibitors are allowed to enter provided that they keep their fish together.

Entries should be sent to: The National Aquatic Show League, Northside Spridlington Road, Faldingworth LN8 3SQ by January 31, 2005. The four winners will be invited to attend the prize-giving. They will need to show their award certificates for verification before the awards are presented. The date and place where awards will be presented is yet to be firmly fixed but watch this space...

NEW PHOSPHATE KILLER



A reduced phosphate concentration will allow corals and coralline algae to grow much

faster and reduce the occurrence of some toxic heavy metals, silicate and organics, which are hard to remove by

skimming, or by using activated carbon. Salifert's Phosphate Killer has a very high surface area on which phosphate can be adsorbed and it binds it strongly. Also, it doesn't leach toxic aluminium.

Salifert's Phosphate Killer is available in two sizes: 250ml with an RRP of £12.99, and 1000ml with an RRP of £36.99.

To find your local stockist please go to www.tmc-ltd.co.uk.

New Tetra Tec Glass Scraper

Tetra has launched its novel TetraTec GS45 Glass Cleaner. Specifically designed to help reduce levels of algae residue maturing on aquarium glass, the new TetraTec Glass Cleaner removes any algae build up quickly and effectively with minimal disruption caused to the aquarium.

This algae remover uses scouring devices with its hinged cleaning head for handling awkward angles, floating handle and stainless steel blade, which is protected to prevent any damage to the aquarium joints.

The novel glass scrapers can be found at major aquatic retail outlets at the recommended retail price of £5.99.

Don't let this photo fool you. Your Triangle cichlid, *Uaru amphiacanthoides*, will eat all your plants...

Bad Tankmates

PHOTO: www.fishbase.org.uk

Mary Sweeney takes a lighthearted look at which fish make bad tankmates...

Marc Weiss, discus raconteur and an old pal took my request very seriously when I asked him what fishes he thought were bad tankmates. I'm taking a big step with my reputation here, but some of these had me giggling too much to type...

Is it beneficial to put a Surgeon fish in with the Bloody parrot cichlids? Do not keep a Grasstail guppy with a Grasscutter catfish. Do not keep Stonefish with Glassfish... you get the drift.

Then, thank heavens, he got a little serious, and added the valuable information that I can always trust him to come up with. (I just have to pay the price of hearing the silliness first; still, better to hear silly quips than a sad sap any day of the week).

Combinations to avoid

Kissing gouramis peck on the sides of flat fishes like angelfish and discus and will cause their death in a short time. The

wounds often mimic a skin disease as you may not see the gourami as it pecks at the other fish. So it is entirely possible to treat for a mystery disease when it was a deadly hickey that was the problem with the fish. Plecos are also notorious for denuding the slime of discus and angelfish. It's not just Hypostomus, as many think, but the many, many new 'L' numbered pleco types are unreliable as far as that goes. Of course, having an ample supply of driftwood will sometimes prevent the problem, but at what cost is the experiment proven?

Ancistrus, however, have thus far escaped blame in this department and I have yet to witness or hear reports of this behaviour toward discus or angels from ancistrus.

Mary Bailey, as ever, has lots of good advice: Tiger and Rosy barbs and Black tetras will shred the fins of long-finned fishes. It is not their goal to eat the other fish; they are just delinquents that have to have a go at any available fin. The only things that help reduce this behaviour are

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JUST FOR FUN...

Do not keep Balloon mollies with Needlefish.
 Do not keep Walking catfish in running water.
 Do not keep Hatchet fish with Glass fish.
 Do not keep Devil fish with angelfish.
 Do not keep Wolf fish with Sheepshead minnows.
 Do not keep Snakeheads with Mickey Mouse platies.
 Do not keep Lionfish with Tigerfish.
 Do not keep a Merry Widow livebearer with a Black Widow tetra; the former will get depressed.



Above: Golden Balloon molly, *Poecilia velifera* var and Left: Silver needlefish, *Xenentodon cancila* – a potentially explosive combination!

keeping them in a spacious aquarium and a larger shoal than you would necessarily feel was required. Space and company will keep them out of trouble.

No matter how hard you may wish to keep some fishes together, there are many species that will never be acceptable tankmates. The reasons for this are not always the same. In fact, there may be far more reasons for incompatibility than one would imagine, but what will always be true is that some fishes will never get along with some other fishes in the confines of the aquarium environment.

Subtle or outrageous

The incompatibility issues are not always obvious, as in the large predator: small prey situation. With some fishes it's pretty clear they are not going to be able to be kept in the presence of each other no matter how nice you are to them.

Sometimes the predator is one generally thought of as a 'gentle' and 'nice' fish and is often picked upon itself, like discus. There aren't many fishes that can be kept well with discus unless the tank is very large and the discus very few. Keeping discus with Cardinals and other tetras of similar size is not just a prey thing: Discus will oft times kill the tetras by biting off their little heads

in the middle of the night. (Personal conversation, Mary Bailey).

It's always good to study up on new acquisitions instead of simply buying new species and hoping for the best. Unfortunately, it's not always easy to find out which fishes are good comrades for other species. Many authors are afraid to take a stand because there are always exceptions of one kind or another. Everyone has a tale of two male bettas who got along just fine. Well, everyone who knows bettas knows that male bettas do not get along with each other. Maybe one didn't swim straight, who knows? Maybe the tank was so huge they never met each other. Also, some female bettas are better looking than others, and just maybe there were really a male and a female in that tank, and finally, there are always exceptions, almost. Then there's the fact that female bettas always get along, not so. Female bettas can take a dislike to one another, just like any other fish. No, they don't always get along. Also male bettas need to be initially watched with other fishes. Sometimes they single out a certain fish or species and decide to hate it. Meanwhile you can't ever find another male betta that feels the same way about others of that species. It's another "go figure it out" moment, and we have many of them in the fish life.

Bully fish

Aggression and stress will undermine the health of any fish, no matter how large or healthy it was when you placed it in the tank. Even though the aggressive fish may be smaller and not have any chance of eating the fish it's bullying, the larger, but passive fish will be undone by the daily challenge of living with aggression. A good example of this is discus with any active, pecky tetra. Bully fish may not challenge the other fishes head-on, but may not allow the others to eat, school, or even have their own territories.

Lee Finley, book reviewer of note and long-time catfish expert has this to add to our list from his days in the retail trade: "the customer(s) that wanted a nice school of neons and/or cardinals and then one of those active, always swimming, silvery black spotted catfishes with the long barbels, *Pimelodis pictus*. Pictus and small tetras...a big potential no-no."

Keep fish that are meant to shoal in groups of six or more. Without the companionship of their fellows, they will not look as good as they should and they will slowly fade away to nothing. It's stressful to be alone when you're meant to live in a crowd. It's the old "safety in numbers" thing and these fish really do need to live in numbers.

Frontosas don't do well with smaller Tanganyikans. Typically, the aquarist buys a small, 6-7 cm Frontosa, not realising how big it is going to get. It's bad news to mix any longitudinally banded *Melanochromis* sp. with any other similarly banded fish. The stripe pattern is like a red tag to a bull.

Freshwater crabs and freshwater fishes aren't tankmates; they're food, one for the other. Yes, they live together in nature, but generally one predate on the other, and in

the aquarium there is no escape. The same situation exists in trying to keep freshwater lobsters and shrimp, especially with large cichlids like oscars. An expensive meal for the fish. Turtles are not to be trusted with fishes, especially not the baby softshell types of turtle. The same goes for African clawed frogs, albino or not. They may be cute, but they eat your fish.

Most non-mbuna Malawi cichlids with mbuna, or vice versa. Aulonocaras are

particular victims, also *Cyrtocara moorii* and *Dimidiochromis compressiceps*, actually are very shy fish.

Fry eaters

Killifishes are verboten in tanks where you are trying to breed anything. They are most persistent in hunting fry. Plecos and open-brooding cichlids are not good together. The

Don't mix other similarly banded fish with the Auratus cichlid, *Melanochromis auratus* - this will cause fighting



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plecos love to eat the eggs at night.

White Clouds (*Tanichthys*) and anything really tropical are not good tankmates, because the temperature is too high. White Clouds go well with hillstream loaches, which are also sub-tropical.

Pike cichlids are bad tankmates for just about any other fish, including a potential mate, that is less than 90% of its own size. A number of catfishes will also happily consume a fish half their own size, or larger.

Rams and poeciliid livebearers aren't good tankmates. Rams don't thrive in hard alkaline water, livebearers don't do well in soft acid water. It is impossible to provide for both in one tank.

Uaru and plants. There will be happy Uaru and no plants.

The 'Central American cichlid bloodbath' is well known by experienced hobbyists. They were so cute when they were little. Then they grew up and became gang members. Much like urban sociology, this is the general result of not understanding that if you cram several large cichlids into an area smaller than the territory one of them would hold in the wild, there's trouble coming.

There is so much more to the compatibility discussion, I know I've just touched the surface here, but scarce as good information on the subject is in the hobby, I hope I've helped save some fishes and will add to the list in future articles. Best fishes. ■



The *Pimelodis pictus* catfish are a no-no with small tetras

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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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

Tetra UK Ltd, PO Box 271, Southampton SO18 3ZX

Q&A Tropical



Please can you tell me how I can breed Hatchetfish (especially marbled) and Cardinal tetras?

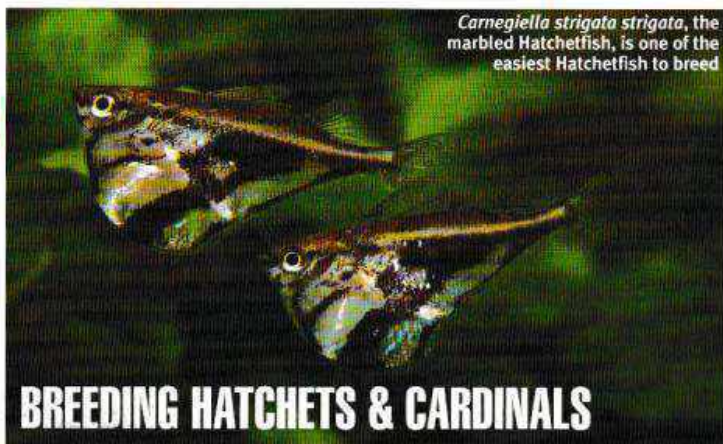
I have kept the Cardinals successfully for a long time with RO water, although occasionally I have to treat them for fin rot etc.

Mr Chaudhuri, London



Records of breeding most Hatchetfish are thin on the ground. However, the Marbled hatchetfish

Carnegiella strigata strigata is one of the easier ones to keep and breed. These fish love fruit flies and mosquito larvae and should be fed with these when conditioning for breeding. After conditioning they will need to be spawned in a breeding tank. This will need subdued lighting and water should be soft with a pH 6.5 or less.



Carnegiella strigata strigata, the marbled Hatchetfish, is one of the easiest Hatchetfish to breed

PC/OTD: www.photofish.org.uk

BREEDING HATCHETS & CARDINALS

Some floating plant will be required. Parents need to be removed after spawning or they will eat the eggs. The eggs hatch within three days. When the fry are free swimming they will need infusoria as a first food and will be big enough to take newly hatched Brine shrimp a week later. Cardinals are rarely bred by home breeders or even commercial fish farms, most are imported from the Rio Negro area of Brazil. They are not the easiest of species to breed and success does not come easily. These fish come from the rainforests and breed under the canopy where they are found in small heavily shaded forest streams. A breeding tank with dark sides away from direct light needs to be set up with a waterlogged peat substrate, for the water needs to be very soft with a pH below 6, temperature

about 26°C. There should be a clump of plants or spawning mops. The fish should be conditioned on live foods before placing in the breeding tank where they should not be fed. If they fail to spawn they should be removed and another attempt made later. After spawning remove the adults and cover the tank with black covering material to keep as much light out of the tank as possible as the fertilised eggs are light sensitive and the embryos can die if lighting is not dim. Young fry are also vulnerable in this way. Infusoria or a liquid fry food are needed for the first 10 days or so, being careful not to overfeed and pollute the tank. Cardinal tetras are very challenging fish for a fish breeder.

Pat Lambert

Advice on keeping cichlids



I have kept tropical fish for five years and would like to now progress onto something a little more challenging, and cichlids particularly interest me. What I would like to do is simulate a cichlid community system with the possibility of breeding in the future.

My tank details:

Tank: Juwel Rio 180

Substrate: Sand approx. 2in deep

Aquascape: Mixture of bogwood at one end and slate rock at the other

Plants: Dwarf anubias, Water wisteria, Black amazon swordplant.

Fish stock: seven Neon tetras, three Penguin tetras, 10 Silver tip tetras, four Glowlight tetras, three Bronze corys, three platies.

Water Parameters: pH- 6.8, KH- 3, GH- 7, NO2- 0, NO3- 0

Tank temperature: 26C

Tank maintenance: 10% water change weekly. Sand surface cleaned twice weekly and stirred monthly. Filters cleaned fortnightly. Pre-filter changed monthly. Charcoal filter changed monthly.

Types of cichlids I would like to keep:

Central American cichlids: *Cichlasoma salvini*, *Cichlasoma meeki*.

Herotilapia multipinosa.

South American cichlids: *Aequidens pulcher*, *Laetacara curviceps*,

Apistogramma cacatuoides.

1. Would the filtration system that is supplied with the tank as standard suffice?
2. Is a charcoal filter required and how long do they last on average?
3. Is my sand substrate too deep or should I use a different substrate?
4. Should the aquascape be of one type across the tank either bogwood or rock?
5. Is my tank too overstocked to keep cichlids?
6. What would be the best quantity to keep of cichlids and in what ratio i.e. one male to three females or one pair?
7. Should I use a reverse osmosis unit?
8. Can you suggest any other fish that will be suitable for a community tank with cichlids?

Dave Rossall, via email



In response to your questions:

1. If your tank is 180 litres, you should double the internal motor filter at least. Because cichlids will stir up your sand and a good filter will keep the water clean.
2. To tell you the truth, I'm not using any charcoal in my tanks. I only tend to use it to clear the water if I've used medication.
3. The depth of your substrate is not too important - you can keep it at 2in or deeper. And I would use fine sand, but it depends on what kind of cichlids you end up with. If you make the sand an inch or two deeper it makes it easier to plant the plants.
4. Your type of aquascape is ok. You can use

more bogwood and rocks on each side like you plan to do. I would also put a bogwood across the middle of the tank, so the cichlids can use it like a divider or a border.

5. When adding cichlids I would advise you to keep one type of Tetra and take the other fish away. You could also add some Platies maybe, because they swim at the surface.

6. About the cichlids you want to put into the tank - I would suggest the South American cichlids and buy at least five or six small ones of each of the listed fish.

I would not mix South and Central American cichlids, because of different temperaments. The reason for buying five to six small ones is that they will choose a partner for spawning and when they have made their own choice, it usually works well from the first time of spawning. So when the fish have established a good pair (or pairs), you can sell or giveaway the rest of the fish to a friend. And when these extra fishes are taken out of the tank, they won't be harmed.

7. No need for that - your water parameters are good, so is the temperature. I would only suggest changing more water, up to a third. The cichlids eat more and so there is more waste created too. The surface of your sand does not need to be cleaned twice a week and not necessarily stirred each month. The cichlids will dig up the sand, and this is where a good internal pump will help you.

8. I could suggest other fish to keep with your cichlids, but I would rather keep the cichlids and some tetras and maybe platies.

Aif Starsberg

WHERE DID YOU GET THAT BOGWOOD?

Could you tell me what substrate was used in Peter Hiscock's article in the November issue of *TFK*. It's the full width bottom photo on page 62. Also where did he get the wood roots from? I have been looking for bogwood roots like that for a very long time.

Zealah Gibbs, via email

Large roots like the one used in the featured tank can be hard to come by. I have often purchased roots like this one without even having a tank to put them in, on the basis that I might use them at a later date! I bought that particular piece of bogwood from Walsoken Aquatics in Wisbech (01945 584456) although if you are quite a distance away you might simply need to ring around a few local shops. Although most shops may not stock these large

pieces (they take up valuable sales space), they may be able to obtain them if you ask very nicely! The wood is around 90cm long and cost me about £40.

The substrate was a cheap version of the iron and nutrient rich laterite, and works just as well in my opinion, and is called Aquaclay 'Ground' which is made by Unipac Pet Care and distributed by D-Pac Limited. This particular product is relatively new on the market and so again, if you ring around, you might find that some of your local shops already deal with this supplier and will be able to get you some. I used a 10-litre bag, which is more than enough for most aquariums and paid just under £15 from Maidenhead Aquatics @ Peterborough (01733 211825).

Hope this helps, perhaps I'll do an article on decor for planted tanks – keep an eye out!

Peter Hiscock

PHOTO: PETER HISCOCK



Choosing the right tank decor can add so much to your aquarium

Unexplained fish deaths

I bought a Biorb and had it set up for a week before adding my first fish (three leopard danios) on Saturday. Last night my first fish died and another has died today. The remaining fish is swimming round the edge of the tank continuously and I am not sure what to do. What

do you suggest and when would I be able to add another couple of fish? I have carried out water tests and these have been fine so not sure what is causing them to die. Claire, via email



This sounds quite disturbing. To lose your fish so soon after introducing them points to either severe stress (from the move, journey and change in environment) or to acutely toxic water quality. Water tests in a new aquarium not containing fish will generally show 'good' conditions as there is no pressure on the biofilter. Furthermore water test kits only analyse the common 'fishkeeping' parameters. You should take one of the following steps:

1. Put the loss of your first fish down to stress from the journey etc. and look at introducing some other fish (the danios may have not been in tip-top health anyway), making sure you get them home as quickly as possible.
2. Strip down the tank and start again. But by doing this, you will never learn whether it was an acute toxicity that caused your initial problems. What does your retailer have to say about the fish he sold you dying so quickly?

Ben Helm

Today's Answers Expert Panel

Alf 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

Bernice Brewster

Koi and ponds

Val Davies

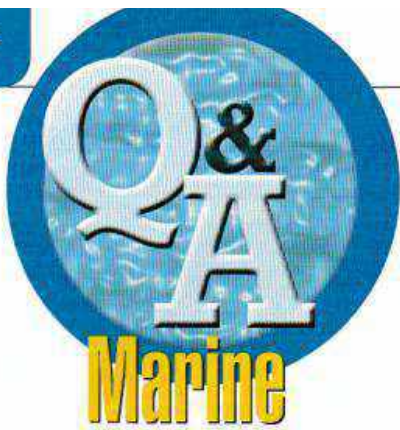
Reptiles and amphibians

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@todays-fishkeeper.com



Andrew Caine answers your questions

DO I HAVE AN ANEMONE PROBLEM?



Q In the November issue of *TFK*, on page 66 titled *Under the Microscope*, the photograph used to show green forms of cyanobacteria overgrowing live rock caught my attention. On the piece of live rock there are some forms of anemone growing. My question is could you please identify them, as I have large numbers of the same appearing in my tank. Are they a potential problem, and if so how do I control their spread. My tank consists of fish, soft corals and some inverts.

C. Brashier, via email

A The anemones you have are a wonderful beast yet, you are correct, they are a serious pest in the aquarium. Aiptasia or glass anemones will spread like wildfire and when they start to touch corals they will sting them and can kill. So it is a shame but you must get rid of them all, and there are many ways in which to do it. However, do not be tempted to go in there with a sharp stick and try to gouge them out, as if ripped off pieces fall they can regenerate into another anemone – this is more common if the pedal disc or foot is ripped. You can inject them with all manner of things such as calcium, Kalkwasser or vinegar all to limited effect. Two products are on the market Joe's Juice, which should win an award for the name, and Eimi-Aiptasia a TMC product, these are much better than the previous remedies, however, a few applications will be needed before they are finished off. The best way is to employ the services of animals which will eat them yet be reef safe enter the Copperband butterfly (*Chelmon rostratus*) or a small army of Peppermint shrimps (*Lyssmata wurdemanni*) and these will consume the pests, it may take a while but go they will.

How often should I clean my skimmer?

Q Having kept tropicals for over eight years I felt it was time to start with marines. So I purchased an already existing set-up (a Rio 180 fish-only system). I updated the skimmer to a Biostar turbo floator (the old one was a wooden air stone). How often should I clean out the cup as the ones in my dealer's shop have black/brown sludge in theirs and mine has only very light brown particles on the bottom of the funnel?

Also, could you tell me how often should I clean out my external filter (an Eheim 2217)? It is filled with Siporax sintered glass, two sponges and some ab Anti phos.

Wayne Evans, via email

A The skimmer you have is ideal for your size of aquarium, however, they can take a while to 'run in' soon it should be producing a good waste. Clean the cup every two days regardless of what is collected in the cup. The solid brown/black waste that is deposited on the inside of the riser tube in the collection cup will over time reduce the bubble formation up the tube thus reducing the efficiency of any skimmer, so the rule of thumb here is clean every two days.

Now to the external filter, the thing that most people hate to open and clean, so it gets left to run and run, big mistake. Most people will be horrified to read that you should clean them out at least every two weeks. They collect solid particles in the pre-filters. This, if left, will reduce the flow thus reduce the efficiency and increase the toxin residence time in the aquarium water. Also, many of the solids are organic in nature so if left will rot down increasing the dissolved organic, nitrate and phosphate levels in the water. All of this increases physiological stress on the inhabitants and increases food for algae growth. So clean them every two weeks and your system will thank you for it. I realise this is more work but the more effort you put into maintaining your system the better it will be.

COMPATIBLE COLOUR



I am in the process of setting up a marine tank and I want it to be the centrepiece in my sitting room. I would like as much colour and variety as possible and the species that have caught my eye are tangs, dwarf angels and butterflies, also some gobies, wrasses etc. Any ideas or help would be much appreciated.

Sarah Barnes, via email



When we are asked for compatibility advice we really need the species name as fish groupings such as 'tangs' is too vague - many tangs will kill each other, yet the same tang will live happily with another tang. However, with your list I can give you some pointers. Compatibility is the most difficult area in marine aquatics, we really do play the percentage game as we are dealing with individuals, with different behavioural traits. Too many people study the equipment that is required for marine aquatics but forget to research the animals they intend to keep. Five minutes of observation is worth 100 hours of reading. Look at the individual and how it behaves towards others in the shop. Floating it in the bag at home with the lights on will often see a response from your fish to the new proposed addition. If you notice any aggression, take it back, don't think it will be OK! If all seems well turn the lights off for the acclimation and release it, then leave the lights off for at least one hour.

You can stock with wrasses and gobies, but make sure that you purchase small fish, not small fish in the shop, but small fish when grown up. A good example is the Twin spot wrasse, *Coris aygula* often seen in shops at 5cm costing around £30. What many don't realise is that this beast will grow to 120cm. Blennies are also a good buy - the Bicolour blenny, *Ecsenius*



The colourful Flame angel. If you want to stock Dwarf angels, keep to one or two species at the very most

PHOTO: THAMES TO GUEST HOUSE, ENNIS PHOTO PRINT

bicolor, is a cracker and good value too. Most small wrasses, blennies and gobies are good community fish. If you want to stock Dwarf angels, keep to one or two species at the very most - good choices are the Coral beauty, *Centropyge bispinosus*, and the Flame angel, *C. lodicules*, which will often share the same aquarium in harmony.

The golden rule with tangs is to never mix species of the same genus. The Yellow tang, *Zebrasoma flavescens*, and the Sailfin tang, *Z. veliferum*, will fight to the death, yet you can introduce a small shoal of four Yellow tangs in the same aquarium, if introduced at the same time. Stay away from Butterflies until you are more experienced.

Mantis shrimp set-up



I have fallen in love with the Mantis shrimp. I have heard they can be kept in an aquarium but please can you advise on how to keep them.



Odontodactylus scyllarus, the Mantis shrimp is great to keep in an aquarium at home and it is a very simple set-up. The range of species that you can keep is quite vast.

I will base my answer on a highly esteemed mantis keeper, my good friend Gareth Shore. We call his set-up the 'Gareth Method' as it is so simple - rather like himself! Basically, it's a small 60 x 30 x 30cm aquarium constructed

out of 10 or 12mm glass; a single T8 tube for lighting, a Maxijet 1200 powerhead and small 50w heater protected by a Juwel filter housing from a Rekord 60. In this he places 8cm of medium and coarse coral gravel, mixed broken scallop shells as a substrate 2-3 kg of liverock. That is it! No skimmer is required as each tank only contains one shrimp with very little waste being produced. Gareth performs a 10% water change weekly.

Their behaviour is absolutely fascinating with the burrowing and running around and swimming of these beasts.

They do become a real pet in every sense of the word as they soon become accustomed to your presence and learn about feeding time

very quickly. Gareth always says it is a bit unnerving when he is eating breakfast with these little eyes watching his every move. They are brilliant animals but do read up a bit more as some can grow very large indeed, and do not forget that they can have the power to break your fingers hence the common name thumb splitter. There is a great wealth of information on the internet just type in Stomatopod on a search engine.

Odontodactylus scyllarus, the Mantis shrimp



PHOTO: www.photomax.org.uk

Star Letter Prize from

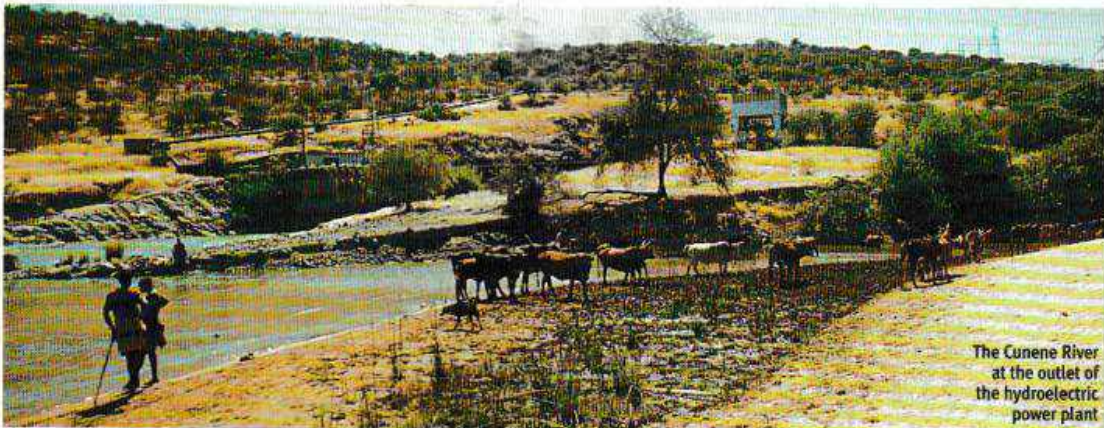
AQUA MEDIC



Modern Coral Reef Aquarium books, written by Alf 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.

In search of cichlids part 2

Erwin Schraml visits a river in Namibia and discovers some interesting species...



The Cunene River at the outlet of the hydroelectric power plant



Synodontis sp. "Cunene"



Brycinus lateralis

Only a stone's throw away from 'Hippo Pool' (as featured in the September issue of *Today's Fishkeeper*), is the outlet of the hydroelectric power plant. Here at low-water periods, the Cunene is a real river with a gentle current. The Cunene is no Amazon or Congo, but beneath Ruacana it is comparable to a Bavarian influx of the Danube in summertime.

At this location the coordinates are 17° 24' 18.2" S; 14° 13' 00.6" E at 772 m height above sea level. Immediately behind the outlet of the power plant, a dead arm of the river is found, which is likely to be used for cattle watering. To get to the river's main arm, one must wade at first through ankle-deep water which later becomes waist-deep. Not that I'm really scared of water, but I don't get excited about skin contact with the small *Bilharzia* germs or big green swimming reptiles. With luck, most of the fish can be caught from the bank and with our cast-net this should be successful over some distance. On the other hand, I am so great a fish enthusiast, that I will quickly forget all my misgivings if I hear a call like "I've got a funny *Synodontis*". And there I stand a few minutes later on the other side, with wet jeans, just to get a view of the capture.

Synodontis sp. 'Cunene'

The number of *Synodontis* species which are known from southern Africa is quite manageable, and for the Cunene just five of

*Labeo ansorgii**Serranochromis thumbergi* (female)*Thoracochromis buysi**S. robustus jallae* (male) in front and *S. thumbergi* (female) in the aquarium

them are recorded. However, the stately specimen caught by us is not attributable to one of these known species without further examination. The pattern corresponds most closely to *Synodontis thamalakensis* Fowler (1935). No record exists for this species having been found in the Cunene, it occurs further east in the Kavango. This species has, however, markedly shorter whiskers in the upper jaw, which are greatly papillous at the front edge and they also have a membrane at their basis. Our animal did not show such structures, also the ebony colouring of the barbels is striking. Since there is no species with quite such a combination of characteristics in the Cunene, it could be, that we had caught a scientifically unknown catfish. It is too bad, that we left it for the saucepans of the youths which were interestedly watching us, because the living fish was too large for us to take it with us.

Brycinus lateralis (Boulenger, 1900)

This alestid was the most abundant of all fish that we found here in the current of the Cunene. With almost every net throw several of them were caught in the meshes. In contrast to the quiet Hippo Pool, we found larger specimens (*B. lateralis* reaches up to 14cm). According to literature, the species is caught in considerably greater numbers by fishermen for food and so we were not surprised that the herdsboys, which were observing us, each took home a single piece of 'Saradina', as they called it.

That this species should occur frequently with similarly patterned barbels (*Barbus trimaculatus* and *B. poechii*), cannot be confirmed by me for this part of the river, because here we caught no barbels.

Labeo ansorgii (Boulenger, 1907)

The 'Cunene-moddervis' is found here at the outlet of the hydroelectric power plant in its typical habitat, flowing water with rocky riverbed. It will reach approx. 27cm and has the particular characteristic star-shaped skin tubercles on the snout. No literature could be found as to whether this is a secondary sexual characteristic of males, however this can be assumed, as this is also the case in other carp-fishes. To my knowledge, the function of these tubercles has not yet been described. *L. ansorgii* is a relatively slender species, which is well adapted to the fast flowing waters. In younger specimens a narrow brown stripe from the end of the operculum down to the caudal fin base is visible but is hardly detectable in larger animals.

Thoracochromis buysi (Pentth, 1970)

Sometimes it is not easy to distinguish this species from *Sargochromis coulteri* without examining the animals more closely. The illustrated female has a relatively short snout and has additionally some very small,

reddish egg-dummies in the anal.

To delimit it from a *S. coulteri* females with perhaps only a very low body depth, one can count however the number of scales in the lateral line (*T. buysi* has here 32-36 scales, *S. coulteri* only 30-31). Other counts, such as fin-rays are in most haplochromines not meaningful and intersect chiefly also in these two species.

Serranochromis thumbergi (Castelnau, 1861)

This species does not appear to be easily distinguishable from *Serranochromis robustus jallae*, but only *S. thumbergi* occurs in the Cunene (its further distribution area includes indeed also to the east of it the Kavango, the upper Zambesi and Kafue, as well as the Lufira-Lualaba and Zambian Zaire system, where it overlaps with that of *S. robustus jallae*). *S. thumbergi* should remain more slender than *S. robustus*. Males should have an olive brownish body and their scales should have in a rusty red kernel in the centre. The lower half of the head and the belly should be brightly creamy coloured, the ventral fins yellow, dorsal and caudal fin olive with yellow points, the anal fin sooty yellow with orange egg-dummies.

Males of *S. robustness gall* (the nominal form *S. robustness robustness* occurs only in Lake Malawi and the upper Shire River as well as in the Rue River in Malawi and in Swaziland, where it was transferred) are

coloured olive to dark green, have a dark olive median stripe and also olive coloured fins with yellow points therein, the anal fin has orange coloured egg dummys.

Unfortunately, we could catch only females of *S. thumbergi*, which have displayed, like most *Serranochromis* species, only a greyish brown. An animal, which was found as a juvenile fish grew up in my aquarium and in only one year grew from 3cm to over 20cm by a feeding with food flakes, cichlid sticks and frozen bloodworms. Six months before my Namibia journey I selected out of an import of *Pseudocrenilabrus* sp. "Kofue" a single baby fish of a *Serranochromis* species. This animal, which was caught along with the *Pseudocrenilabrus* in the Kafue river in Zambia, has grown up to a stately male, which I consider today as *Serranochromis robustus jallae*. As the comparison shows between these two individuals, head and body shapes as well as the variably distinctive bands are almost identical. It can be seen that *S. thumbergi* has a tail fin that looks like it's cut off straight, while the tail fin is rounded in *S. robustus*. For a while I hoped that both fish were the same species, this was supported when an accomplished mtDNA analysis showed that both clustered out together. But according to the description of coloration in Skelton (1993) males of *S. thumbergi* don't get the dark green colour, which is a feature of my specimen. First experiences in the aquarium show, that these large *Serranochromis* species kept in spacious tanks are very interesting to monitor and are clearly more peaceful than *Thoracochromis buysi*. But *S. Thumbergi* should reach 35cm, *S. robustus* even up to 45cm. Whether they can remain socialised later like now, with other, smaller cichlids and *Synodontis*, without considering these as prey, remains to be seen. I am especially worried for my *Synodontis*, as they are, according to the literature, preferred prey of mature *S. robustus*. Already the big male (it has now grown up to 30 cm) occasionally fixes its eyes on an aquarium co-inhabitant, and its expression gets a bit contemplative, themed like: "wasn't there something the small fish are made for..."

Serranochromis macrocephalus (Boulenger, 1899)

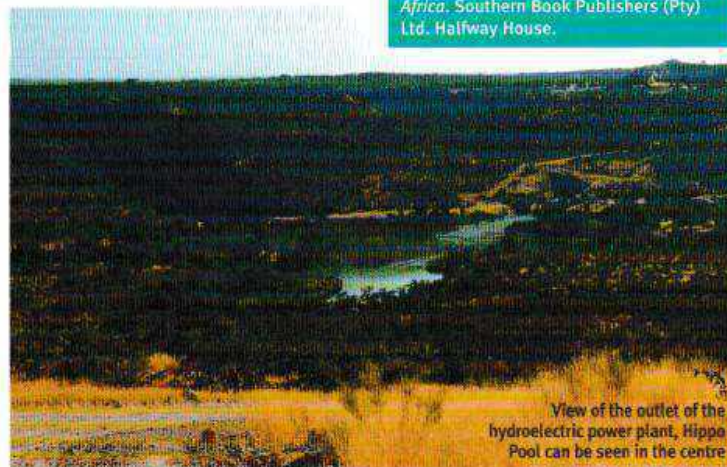
A further predatory cichlid from the Cunene, Kavango, upper Zambesi and Kafue river, as well as from the Kariba reservoir are these 35 cm species. In nature these piscivores don't live only on mormyrids and barbids, which they take from the ground, they also eat insects and other small organisms. It is therefore more useful to consider them carnivores. We caught several specimens of *S. macrocephalus*, but again only females and possibly a young male. A photo of a



mature male is published in Lamboj (2004). One of the caught animals showed upwardly directed eyes, similar to those in some Chinese telescopic eyed goldfish. Upon closer examination one could see that the back of the eyes were filled with gas. In the fins of this specimen there were gas embeddings in the membranes. Had this animal passed the turbines of the power plant and was hurt there, or did it show a disease? Unfortunately, we found no juvenile *S. macrocephalus* and so we could not take this species along for the aquarium hobby. According to Skelton in nature *S. macrocephalus* breeds during spring and early summer at low water levels, before the annual tide comes. The females lay relatively few large eggs, which they hatch in the buccal cavity. Sexual maturity should begin after two years and the animals should become five to six years old.

All the aforementioned fish originated from the main arm of the Cunene, almost directly behind the outlet of the hydroelectric power plant. They were caught altogether in a cast net.

The shallow water of a dead arm of the river, which had a rather muddy ground, was the nursery of *Thoracochromis buysi*.



View of the outlet of the hydroelectric power plant, Hippo Pool can be seen in the centre

S. macrocephalus head with out-coming eyes of the sick specimen

Beside some small barbids and a juvenile of *Serranochromis thumbergi* they were almost exclusively in the sweeps of a dip net, which we made from the bank. These animals were exactly the right size (between 2-4cm for us to take with us. Without feeding and about 80 percent water changes twice a day, they endured for almost a whole week.

Our hopes of finding, in the streaming part of the Cunene, the cichlid species *Thoracochromis albolabris* and *Orthochromis machadoi* which we expected to find in this area, unfortunately were unfulfilled. Therefore we decamped the next day and pushed along further downstream, to the Cunene River Lodge. ■



These fish are of the right size to take them home for the aquarium

References:

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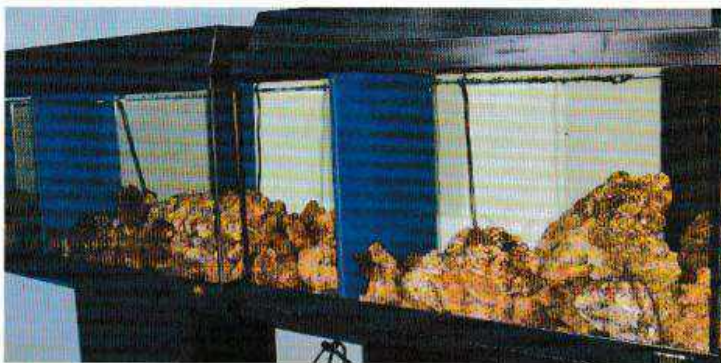
With the experimental tanks up and running, **Andrew Caine** looks at the first species to inhabit the tanks

The experiment begins...

Wow, what a month! I've been leaping around like a deranged Mexican jumping bean, and all because of bugs. It's all been worth it though as now we have our two little experimental aquaria set up. I would like to add that we're behaving like aquarists here, not scientists. It's an experiment for total enjoyment and good fun, and we're treating the two aquariums like any home hobbyist.

Two Juwel Rekord 60s were used for the experiment. One third of each tank was divided as a cryptic area (described in last month's issue), filled with salted RO water, then the pump and heater were turned on. Live rock was placed in the main areas of the aquarium, and live rock that had been kept in dark sumps for over a year was put into the cryptic area. The lights were then turned on and we started to add around 10ml of concentrated phytoplankton from Phyto-Aqua, to one aquarium each day. Apart from water tests, evaporation replenishment, and a 10% monthly water change, that's all we are going to do with them.

What will happen next is unknown. It could be a total waste of time, but I hope we will develop life in the aquarium. What life and how much is what I'm interested in, and that's why my wife describes me as a 'sad little man!'



The two experimental tanks

We are hoping to see not only a diversity of species, both algal and animal, but also a succession of life forms as one species dominates then is out-competed by other species. We will be documenting the experiment as it goes along and publish the results as and when we get them.

The skin of sea squirts looked like a pixel image, made up of hundreds of pigment dots

Remember, the whole point here is to try and explain why it is important to develop these species in your aquarium as they will act as food for your corals and fish. It will also highlight why it is important to add live phytoplankton into the marine living reef.

Severe close up

Last month I told you about a microscope that can fit to a glass wall, i.e. the front or side of any aquarium. The company are called Ogles and the product is called the 'mesoscope'. Barry Reynolds came to demonstrate the product. WOW! I looked at a base of Acropora and discovered 16 species of algae and animal – some I am sure had not been described by science. The skin of sea squirts looked like a pixel image, made up of hundreds of pigment dots, and to look down the exhalant siphon was mind blowing. This brings a whole new dimension to marine aquatics – throw away that hand lens and see what you are really keeping. Not a piece of kit for everyone but for those who love the biology it is well worth the £265 price tag.

What good fortune this piece of equipment was developed in time for our little experiment. We will be able to take fantastic photographs of the bugs and algae that we hope to develop. So I suspect my wife may be right... I am a sad little man, but a very happy sad little man!

Dactyloptena orientalis, the Flying Gurnard, may not be brightly coloured but it's interesting nonetheless

A fish for you



DACTYLOPTENA ORIENTALIS, FLYING GURNARD

If you're like me and have a penchant for the unusual (you should see the wife!), this fish is one of the better choices. Yet, as always, it's a choice that should be thought about before introducing it to your aquarium. We do see them occasionally in the trade and it is a real shame as most will end up in situations unsuitable for their needs and finally perish. However, as with all animals, create the correct environment and you will be rewarded with years of pleasure from this fantastic fish.

Ok, so it's not the most colourful fish but what it lacks in coloration it more than makes up for in how it behaves. The pectoral fins have been enlarged with a web-like membrane stretched in between which displays many fawn spots to resemble sand coloration – great predator avoidance. These fins allow the fish to glide through the water which is truly a wondrous sight to behold. It is this very behaviour that sways people to purchase this fish and then introduce it

to an incorrect environment.

So, let's look at the environment it requires: as with all gurnards it's a sand-dwelling fish so here's our first problem... There are not many home aquariums with a large expanse of sand, by large I mean 75% of a 2m-long aquarium. Remember that this small 5cm fish will grow to 35cm when fully grown. If you don't give this beast this expanse of sand it will die of either stress or infection due to the fins being damaged. Another aspect here is they are very timid fish and will not withstand any aggression whatsoever from tankmates, so a very peaceful tank is required.

They take meaty foods from off the substrate and require small amounts but often. However, they won't feed for a few days if they find a large chunky piece of meat, which can include small gobies when the gurnard grows larger, so be warned.

A wonderful fish with great behaviour that will give you years of total pleasure if you create the right environment.

PROFILE

Family:
Dactylopteridae

Name:
Dactyloptena orientalis

Location:
Indo Pacific

Feeding:
Vitamin-enriched meaty foods

Size:
Up to 35cm

Reef compatibility:
Can eat ornamental shrimps

Tank mates:
Peaceful companions

Difficulty:
Not for the beginner, follow the rules

An invertebrate for you

The colourful *Hymenocera picta*, Harlequin shrimp

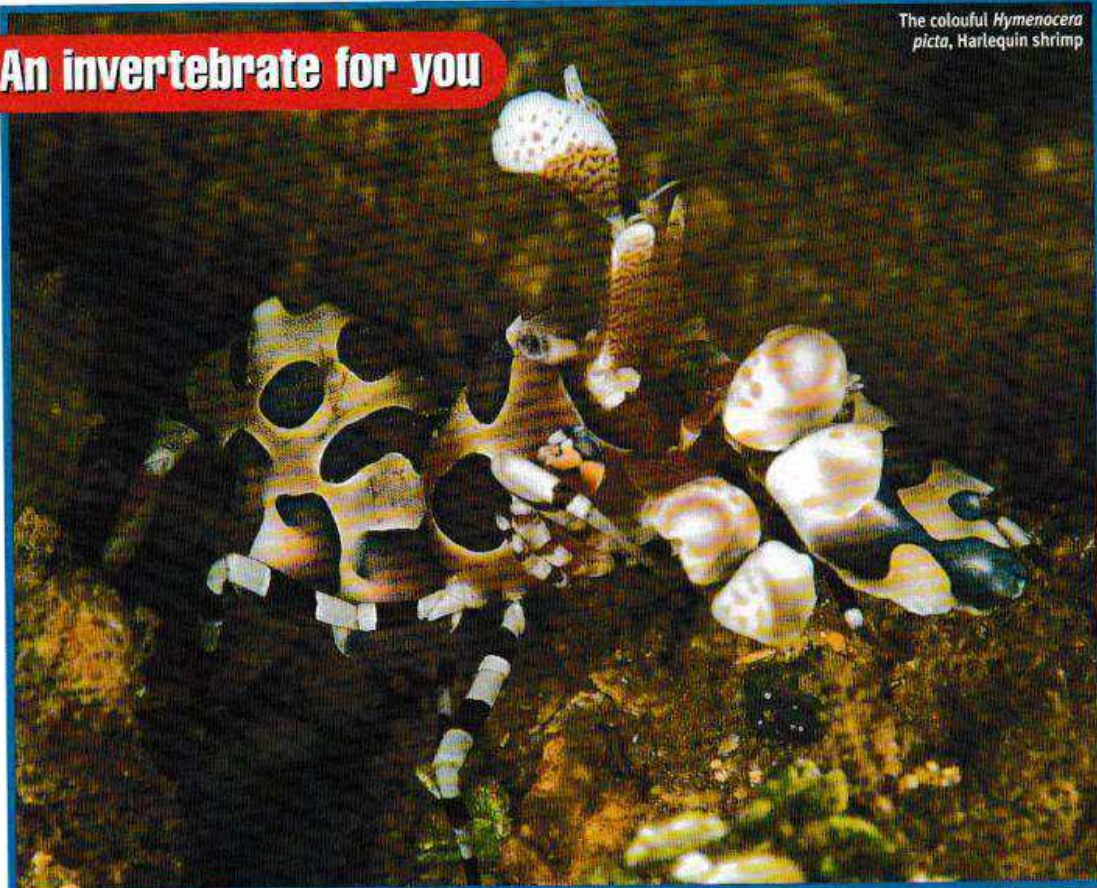


PHOTO: www.pictomax.org.uk

HYMENOCERA PICTA, HARLEQUIN SHRIMP

We have just looked at a fish that is fantastic but lacks the delightful coloration normally associated with this hobby. So let's go to the opposite extreme and observe in total wonder at how evolution produces such visually stunning sights. None highlights this more so than the totally mind-blowing, yet politically incorrect, Harlequin shrimp. And let's face it who cares about political correctness – people are only pc when it suits them.

Now, I am not going to get into any arguments about this shrimp – it's up to the potential keeper of such a shrimp to decide if they want to keep one. All I am going to say is that they only feed on live starfish. Yes, that's the catch with this beauty and to my knowledge, they have never been able to switch to aquarium food.

So how do you feed such food? Well, many aquariums have huge populations of cushion stars which are small but reproduce quickly. A shrimp in this

aquarium will thrive and the starfish population should keep up the predatory nature of this beast. If you want one and do not have such a starfish population then you will have to present this animal with its prey. It's not as bad as it seems as one shrimp will thrive on one starfish leg per month but it will eat more if given.

They're a very hardy shrimp and will live for years in a reef aquarium but, due to their small size, will fall prey to fish such as hawkfish, which are a common fish in the reef. You have to be very choosy with the fish stock, basically no risk taking. Currently there is a great shift in marine aquatics in the development of the 'nano' reef, or aquariums under 20 gallons. This beast is a fantastic addition for the nano reef due to its size. If you can find a pair it's a real Brucey bonus, but never purchase two separate ones as you will end up with only one, so it's a pair or single specimen. A great beast if you can feed it.

PROFILE

Phylum:
Arthropoda

Name:
Hymenocera picta

Location:
Indo to Eastern Pacific and the Red Sea

Feeding:
Live Starfish

Size:
2cm

Water flow:
Normal reef aquarium

Lighting:
No specific requirements

Difficulty:
Easy if all its requirements are catered for, as always very good water quality

Juan Miguel Artigas Azas profiles the genteel cichlid *Vieja synspila*, and discusses the different names it's had in the past

What's in a name?

Vieja synspila female guarding her barely visible spawn on the calcareous rock in Cenote Azul, a water well in Yucatan Peninsula in Mexico

Originally called *Cichlasoma synspilum*, *Vieja synspila* was described by Carl Hubbs in 1936. The description offered by Hubbs offers a detailed diagnosis of *Vieja synspila* against the similar *Vieja maculicauda*. Four traits were identified:

- 1) The body is slightly more slender.
- 2) The contours are less globose.
- 3) The dorsal, anal and pelvic fins are not so sharply pointed nor so pronounced.

- 4) The black caudal blotch is longer (nearly as long as head).

However, this past diagnosis is not the real problem. Few people would have any problems setting *Vieja maculicauda* and *V. synspila* apart. The real problem is the distinction of *Vieja synspila* from two closely related species; *Vieja melanurus* from Lake Peten and *V. bifasciata* from the Gulf of Mexico drainage in southern

Mexico. Especially considering the big variability of the populations of both *V. synspila* and *V. bifasciata*.

For *V. melanura*, which type locality at Lake Peten is less than 28km (in a straight line) from El Paso de los Caballos, and with some populations of *Vieja synspila* in southern Belize (limit of its distribution) resembling closely *V. melanura*, the diagnosis it is more of a problem if we consider *V. melanura* (Gunther, 1862) would have precedence over *V. synspila* (Hubbs, 1936). Robert Miller (1966) even suggests

Vieja synspila male in breeding dress in Rio Belize



TODAY'S FISHKEEPER JANUARY 2005

Natural history

Although in the natural habitat individuals of *Vieja synspila* larger than 20cm are extremely rare, in aquarium males can grow bigger than 35cm in total length, weighting over two kilograms and having very blunt fat lips, while females stay a little smaller. They exhibit sexual dimorphism with adult males developing a big gibbosity over their heads, adult females can develop a gibbosity as well, but noticeably smaller. Other than that and examining the genital papillae, blunt in females with a bigger hole and pointer in males, sexes are difficult to tell apart.

the possible synonymy of the two species. *V. melanura* differs from *V. synspila* in the 'downward slope in the caudal band' (Hubbs, 1936), in *V. melanura* being straight pointing horizontally to the eye, while *V. synspila* has a slight downward angle pointing directly to the chin.

For *Vieja bifasciata* (Steindachner, 1864), coloration and marking diagnosis includes a defined black blotch on the operculum to which the horizontal caudal band points. This blotch is just faintly visible in some adult individuals of *V. synspila*. *V. bifasciata* also has a defined 'second' horizontal black band (which gives it the specific name) between the caudal band and dorsal fin base, widening into a blotch in its middle part and running from the base of the caudal fin to the opercular blotch. In some cases, this second bar actually fuses with the caudal band, that in *Vieja bifasciata*, unlike *V. synspila*, extends farther forward (at least to the middle part of the dorsal fin) and in many cases (in particular in younger individuals) to the opercular blotch. *Vieja bifasciata* also has distinctive reticulate colour pattern on the head, which varies in extension in populations but it is always visible on the cheeks.

Vieja synspila was originally placed in the genus *Cichlasoma* (Swainson, 1839). After the *Cichlasoma* break up in 1983 (Kullander, 1983), *V. synspila* was unofficially considered part of the genus *Theraps* (Gunther, 1862) in several aquaristic publications. In 1989 the fish was put in the genus *Paratheraps* (Werner & Stawikowski, 1989) – this was subsequently changed and the fish was placed in the synonymy of *Vieja* by Robert Allgayer (1991). He argued that the new genus complied with the meristic limits given for *Vieja maculicauda* (Fernandez-Yepez, 1969). Most later authors have followed Allgayer's view.

Distribution

The distribution of *Vieja synspila* includes lowland water bodies in the eastern slope of the southern part of the Yucatan peninsula in Mexico, northern and central Belize, south to Stann Creek (Greenfield & Thomerson, 1997). It also inhabits the Rio



A beautiful *Vieja synspila* male in the aquarium of Lou Rovner in Philadelphia. Older males develop a big nuchal hump. *Vieja synspila* starts revealing its beautiful colours just after it reaches 4in in size

Usumacinta tributaries in Mexico and Guatemala. I have always found them below 200m but there are reports of them as high as 600m in clear water rivers in Chiapas (Stawikowski & Werner, 1998). Water bodies include big and small rivers, coastal marsh lagoons, cenotes and lakes.

Vieja synspila exhibits a wide geographical variation in colour, with individuals faintly coloured in yellow in southern Yucatan, to beautifully coloured individuals in Belize River, showing an extensive red area on the frontal part of the body, including the head. Individuals in Guatemala are also faintly coloured. The very red variety common in aquariums was

lost for many years, until Jean-Claude Nourissat (1991) rediscovered it in Belize River, at a wonderful place in Labouring Creek named the White Water lagoon. It has been suggested that in some areas (Like in Rio Candelaria) *Vieja synspila* lives alongside *V. bifasciata*, but I have never seen this.

Small *Vieja synspila*, as with the other *Paratheraps* types, with a few population exceptions, are poorly coloured when they are under 10cm in size.

Habitat

Vieja synspila inhabits lowland water bodies within its range. Water can rank from very transparent to murky. They are found mainly in larger water bodies like lagoons or big rivers, usually in areas with slow water flow. Mud and sandy substrate is commonly found, and driftwood is normally scattered. Water plants are present on some occasions, with plants like *Ceratophyllum sp.*, *Vallisneria*, and floating *Euchornia sp.* common.

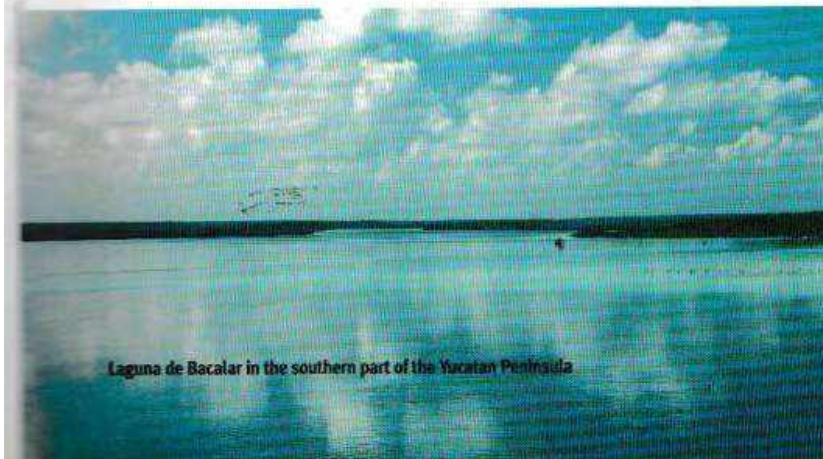
Water temperature measured by myself was between 24-28°C in Bacalar Lagoon, Cenote Azul and Belize River. The pH ranged from neutral up to around 8, and water hardness from soft, around 3KH and 3DH (Stawikowski & Werner, 1998), to the very hard water found in the cenotes, with thick calcium accumulation on surfaces. I have also found *V. synspila* in marsh lagoons around the area of Corozal in Belize, where the water appeared to have some salt content. Jean Claude Nourissat however (1991) reports them breeding in the sea!

Exotic populations of *Vieja synspila* have been reported as far as Jurong Lake, Singapore.

ETYMOLOGY

Syn = together (Latin) + pilos = spot (Greek); which is roughly interpreted as 'with contiguous spots', in reference to the fused blotches (on the rear part of the flanks and caudal peduncle) which make up the very characteristic colour feature of the species.

According to Fernandez Yepez, *Vieja* (which in Spanish means 'old woman') refers the name given to cichlids in some parts of Central America, because of the close attachment of females to their fry.



Laguna de Bacalar in the southern part of the Yucatan Peninsula

Feeding

Vieja synspila is a gregarious fish, either as young or adult; they are seen wandering in small groups near the shores of the habitat, preferably in slow flowing water under some cover, like the shade of trees. At the slightest threat, they flee away to deeper

water. When small, *Vieja synspila* is mostly a grey fish with the black caudal band strikingly visible. It is just when they reach 10cm or more that they start to show their beautiful colours. The larger the fish, the more colourful it is.

In the wild, *Vieja synspila* is omnivorous, with a large part of its diet being detritus and vegetable matter. They are known to strike a small spinner bait (Greenfield & Thormerson, 1997) and they would certainly strike a hook baited with a worm. On more than one occasion, I have observed the closely related *Vieja bifasciata* rushing to the surface when a small fruit from an overhanging tree falls into the water, eating it. The *Quetzal cichlid* is quite opportunistic. In Cenote Azul, a 90m deep cenote adjacent to Laguna de Bacalar near the Mexican border with Belize, *Vieja synspila* stays just below the terrace of a restaurant at the shore, waiting for people to throw them tortillas, bread, crackers or other edibles. They greedily go to the surface and eat them. In my aquariums, they have certainly enjoyed soft fruits like water melon, papaya and even bananas.

Breeding

Vieja synspila starts breeding efforts at about two years of age when males are at least 15cm in total length, and females slightly smaller. I have been lucky enough to observe *V. synspila* breeding in the wild on several occasions, always in the spring. They form territories around a hard surface, always as far as possible from the bottom and with a natural pit (where they later place the wrigglers) always near the nest. Males are very shy and don't usually stay around when a bigger danger approaches – like me diving! On one occasion I was able to watch the entire spawning sequence in White Water lagoon, Belize River. The pair, with red heads, bright yellow iris and striking black markings, had cleaned a small area on a sunken tree trunk inside a bed of *Vallisneria*. The female and male took turns making runs over the nest, female depositing eggs and male fertilising them. Eggs were yellowish, and measured 2.2mm in length (Coleman, 2004). I estimated over 500 eggs. When I got close to the nest, regardless of how carefully I did it, the male fled, only for the female to do the same when I got close to 1m from the nest.

In Cenote Azul I was luckier at 7m depth, being able to observe the full spawn and the female staying close to the eggs, fanning them, while the male stayed at a safe distance. On both occasions a pit was just beside the spawning site.

On one occasion a pair had the wrigglers inside a pit in the wood where they apparently had spawned (you could see the cleaned area). Presumably having more to lose, both male and female stayed close to the nest, allowing me to take pictures. Unlike other Central American cichlids only one pit was available for the wrigglers.

Vieja synspila female in breeding colours guarding her wrigglers deposited in a hole on a sunken log in Rio Belize



In Lake Bacalar I have seen pairs herding their babies on more than one occasion. Males, as in many Central American cichlids, show the general direction to the females while females stay just above their fry, guiding them with spasmodic movements of the body and opening and closing their fins. Small free swimming fish show a black longitudinal bar all across them. They feed on particles on the surface of rocks and substrate. The largest babies I saw with their parents were about 1cm in length, but I saw small about 2cm *V. synspila* in the shallow areas among beds of sunken leaves.

Aquarium keeping

Vieja synspila is an easy fish to keep in aquarium, the main challenge is to provide them with a tank which is big enough for them. I personally do not advise anything less than 600 litres and 1.8m in length, although I know of cases where they have been bred in smaller 300-litre tanks. Sand substrate, drift wood and rocks are suitable decorations, although due to their vegetarian tendencies, plants are not a good idea, unless you want to include them in the menu.

Feeding is not a problem – they are eager eaters of any regular fish food offered, although I always try to give them a good deal of vegetable matter, including soft fruits. Growth is fast if the space is provided. *Vieja synspila* is not a terribly aggressive cichlid and rarely bothers any other fish that cannot be eaten. They do fine in groups in the aquarium.

Pairs establish after they reach 15cm when they are about two years old and very stable, even for several spawning efforts. Adult pairs can be stable for years, and I have known of Quetzal cichlids reaching

over 10 years of age in captivity. The first spawning efforts are normally unsuccessful – often males do not fertilise the eggs properly. Once mature they are good parents and do not eat their own fry. In short, *V. synspila*, given the space, is a wonderful aquarium fish.

Comments

Vieja synspila is a fish with opportunities for research, as in spite of being such a popular aquarium fish, few projects have been carried out on the species. Many natural history facts remain to be known with accuracy about *Vieja synspila*, like their exact breeding season, behaviour, preferred food and exact distribution. ■

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Brief encounters



PHOTO: www.picturacopy.nl

John Dawes visits the East this month and looks at the Flower Horn decline in China and the earthquake disaster in Japan

The bubble has burst

As promised in the first instalment of Brief Encounters (November, 2004), I took the opportunity to check out the status of the Flower Horn craze during my visit to Guangzhou (China). I can now confirm that the Flower Horn bubble has burst...at least, in the 'home' of this large spectacular fish, the Far East. First, though, I'd like to take a step back before reporting on my latest findings.

The Flower Horn or Luohan (to give it its Chinese name) is a large colourful hybrid cichlid in which males develop an impressive hump on the forehead. Over recent years, these fish have been spectacularly popular all over the Far East, from where they have been exported to other regions, including Europe.

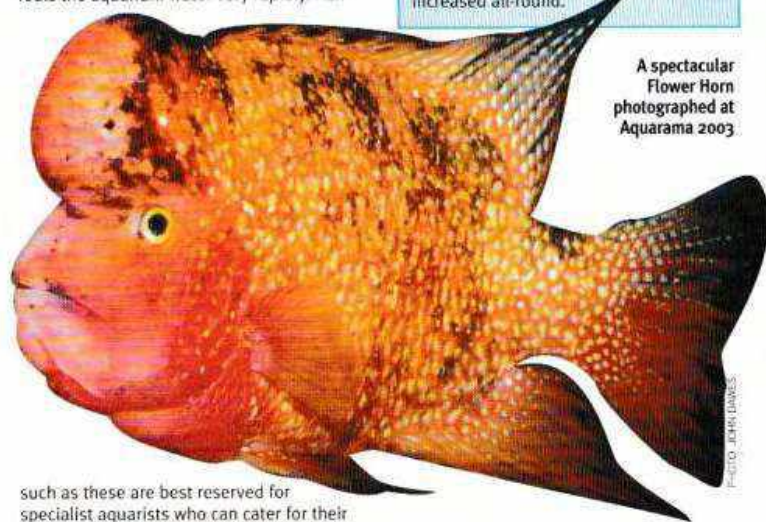
Mystical qualities have been attached to those specimens whose dark body markings appear to resemble numbers or human or godlike figures. In short, the Luohan craze spread like wildfire over the Far East and everyone, or so it seemed, wanted to own one. In the West, though, the fish has had a very mixed reception. Certainly, it has had its fans, but there has also been vociferous opposition to them, mainly because of their hybrid origins.

Their popularity in Asia has, nevertheless, been such that there was even a special section of the Aquarama 2003 Fish Competition set up exclusively for Flower Horns. Even so, at the time, I said to the organisers of the event that I wouldn't be surprised if there was so little interest in these fish when Aquarama 2005 is staged that it would be difficult to warrant setting up

a category for them in the Fish Competition. Well, it seems that I wasn't far wrong, as the paragraphs that follow illustrate.

Shop closure

A few months ago, I received a report from Singapore that at least 89 fish shops had closed in the country, primarily as a result of a dramatic decline in interest in the Flower Horn. This didn't surprise me at all because, although the fish is undoubtedly beautiful, it also has significant drawbacks. For example, it is aggressive and can grow to over 30cm. It has very specific requirements and is challenging to keep and feed. It also fouls the aquarium water very rapidly. Fish



A spectacular Flower Horn photographed at Aquarama 2003

such as these are best reserved for specialist aquarists who can cater for their needs and most aquarists, of course, don't fall into this category.

According to figures released at the time by Singapore's Agri-Food and Veterinary Authority (AVA), there were 153 aquarium shops in the country before Luohan fever really took hold during 2001-2002. As soon as this happened, the number of shops rocketed to 497 during 2002. At the end of May 2004, however, this figure had dropped to 408. At their peak, the very best fish commanded exceptionally high prices, with top specimens reported to be selling for many thousands of Singapore dollars (i.e. several thousand pounds).

Today, the situation is very different. In fact, one of my fellow judges at Aquaria China '04 (my show report will be in an issue of TFK soon), Lim Lian Chuan of Singapore's AVA, confirmed that no shops are selling Flower Horns in the country because there is no longer any demand for them.

That, of course, still leaves a lot of large hybrid cichlids in home aquaria...and elsewhere. I was concerned about the fate of all these surplus fish, since I had also received reports that they were being released into ponds, reservoirs and storm drains, with potentially devastating consequences for the native species. I was

FALLING INTEREST

■ There were 130 entries in the Flower Horn category of the Aquarama 2003 Fish competition.

■ There were 24 entries in the equivalent category at Aquaria China 2004.

■ There is now a strong possibility that the category will be scrapped for Aquarama 2005.

■ One very positive spin-off from the Flower Horn craze in Singapore is that, despite its decline, it has caused so much interest in fishkeeping in general that sales of aquarium fish have increased all-round.

assured that this is no longer occurring, since the government, being aware of the threat, has now passed a law banning the release of these fish. As anyone who knows anything about Singapore will know, when laws are passed in the country...they are observed and enforced. So, we may now be in a situation where the problem may gradually disappear over time...that is, if those specimens that have already been released don't begin to breed like flies (reports concerning the relative fecundity of these hybrids vary enormously).

Earthquake disaster for Japan's koi breeders

As reported in the TFK news pages last month, the violent earthquake that struck Japan on 23 October, 2004, had disastrous consequences that spread well beyond the general population and affected numerous industries and regions in the country. Among these is the koi-producing area around Niigata. The effects for the koi breeders have been particularly damaging because autumn is the main period of year for harvesting and buying. It is therefore the time when most



Above: The devastation caused by the earthquake and its aftershocks in the koi-producing region of Niigata has been widespread

Below: Some koi breeders have lost all their stocks and fish houses



overseas buyers visit Niigata.

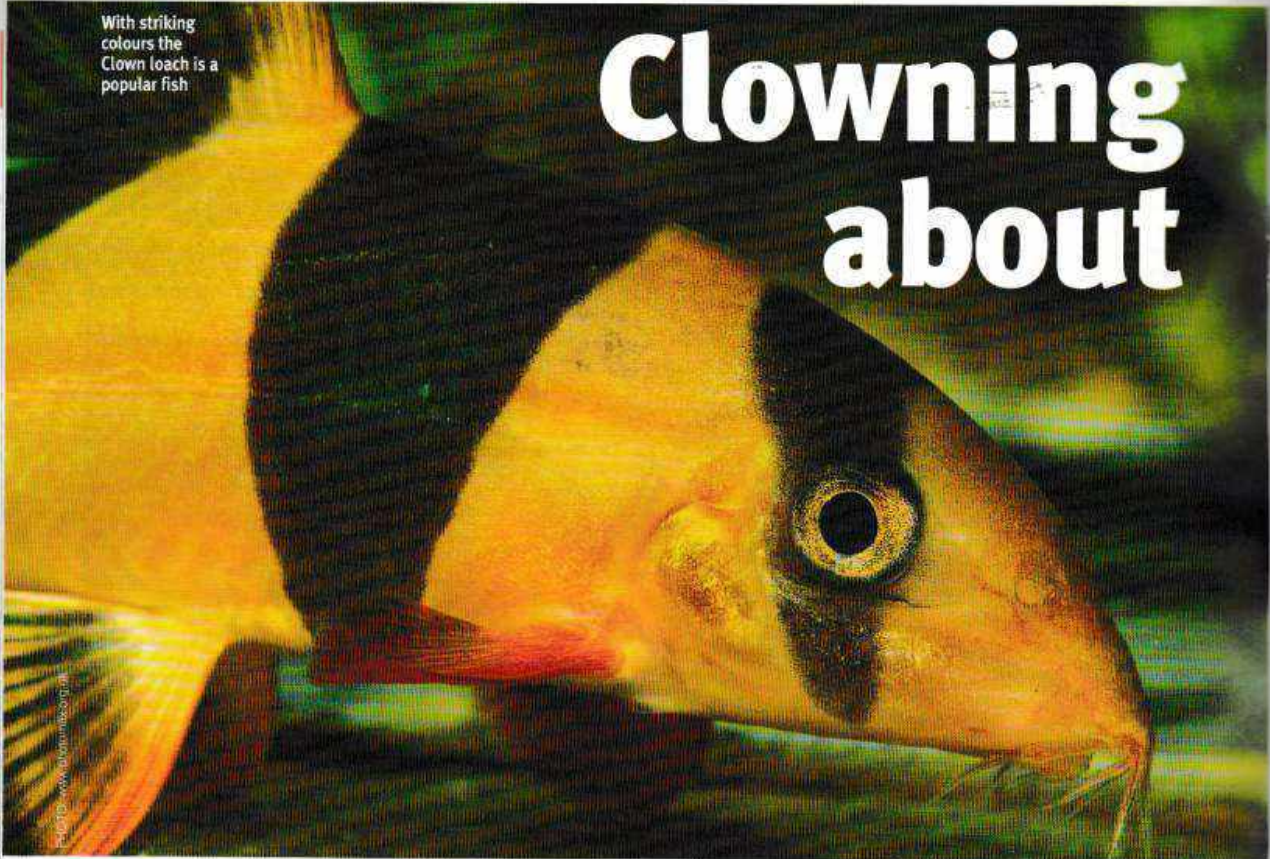
Last autumn was no exception and many of these overseas visitors were caught up in the tremors that shook the area, not just on 23 October, but subsequent to that. Indeed, as I write these lines (mid-November, 2004), I have just received news from a koi dealer, Koi- und Zierfischfarm Wohlfeld from Germany, who was in Niigata at the time of the quake, that there had been yet another tremor last week...and that the situation for the koi breeders was continuing to deteriorate from day to day.

While not every koi farmer has suffered to the same extent, all have been affected. Some, for example, were able to continue trading almost immediately, though perhaps not as normal. In other cases, although individual farms may not have suffered large-scale direct damage, the widespread disruption of electricity and water supplies, plus the virtually total destruction of some roads, meant that these farms were cut off and, thus, were not been able to operate. Most seriously affected were a number of breeding establishments (some small family businesses) which were so badly damaged that they either lost all their stocks of koi, or were, quite simply, totally wiped out.

Gordon Wohlfeld, proprietor of the above-mentioned Koi- und Zierfischfarm Wohlfeld, who, along with business partners, was selecting koi in the region for shipping via his Japanese export company, when the first tremors occurred, and who witnessed at first hand the total loss that some farmers had experienced, took a series of photographs and has kindly given me permission to reproduce a couple of them here. I extend my sincere thanks to him for giving me the opportunity to bring these disturbing images to our readers. ■

With striking colours the Clown loach is a popular fish

Clowning about



Did you know the Clown loach, *Chromobotia (Botia) maracanthus*, has a new name? **Peter Capon** takes a look at this popular fish

The Clown was first introduced to European fishkeepers in 1936 and British aquarists first made its acquaintance just two years later. Bleeker had described it for science in 1852.

For a bottom dwelling fish, this member of the Cobitidae family is strikingly coloured. We have come to expect substrate-living fish to be more sober in colouring even though their patterning might be intricate. Clown loaches are said to grow to 35cm in the wild but their maximum size in the aquarium rarely exceeds 25cm.

Originally the Clown loach was given the scientific name of *Cobotis maracanthus* by Bleeker in 1852 but aquarists it has been known to aquarists as *Botia maracanthus* for many years. However, in the January 2004 issue of *Zootaxa* the Swiss ichthyologist Dr Maurice Kottelat working with the Department of Biological Sciences of the National University of Singapore when working on a new loach species *Botia*

kubotai from Myanmar (Burma) examined the other *Botia* species reclassifying several of these. The clown loach was moved to a new genus *Chromobotia* with just one species *Chromobotia maracanthus*.*

Description

The body of *C. maracanthus* is considerably thicker set than most loaches but nevertheless it is still elongated and slightly compressed with the belly profile being straight or even slightly concave. The fish sports four pairs of barbels and the dorsal fin is set further back than the origin of the anal fin. The body ground colour is an orange to red and is marked by three broad vertical transverse velvet black wedge-shaped bars on the flanks. All the fins including the pectorals are a brilliant blood red. The first black bar passes through the eye, the second is just in front of the dorsal

and the third starts in the dorsal fin and continues to the anal fin. There is a moveable spine under each eye and observation suggests that this spine is used as a defence mechanism. This spine is most noticeable when the fish is caught in a net when the stress causes it to be erected at this time it often becomes entangled in the net. The best way to disentangle the spine is simply to invert the net in the aquarium and leave this fish to its own devices. Usually the fish is able to free itself, any attempt by the aquarist to free the fish usually results in damage to the clown or more likely a severely cut finger for the fishkeeper. Adult specimens tend to be territorial and the spine is certainly used when driving other fishes away from a selected area.

Because there are several geographically separated populations there are differences which are only noticeable when fish from different areas are placed together. For

instance, fish from Borneo have a black area at the base and centre of the pelvic fins and the first hard ray of these fins is red or orange and the end of the fin is clear or smoky. In clowns from Sumatra the pelvics are all over red or orange. Also in Borneo fish the last dark stripe continues into the caudal peduncle whereas those from Sumatra show some of the red colour from the tail extending into the caudal peduncle. Chromobotia from Kalimantan usually have a more intense red coloration. The loach will sometimes take on a faded grey look when stressed by poor water conditions.

Coming from the Malayan archipelago and particularly Borneo and Sumatra, most specimens prefer a temperature in range of 23-30°C. Feeding is no problem as they will accept the majority of good quality flake and tablet foods although they have a preference for the usual live foods. Our subject is particularly fond of snails and will search out even the Malayan Livebearing snail that lives in the gravel provided that the fish is not over fed. Strictly speaking this is a nocturnal fish but they soon learn that feeding takes place during the daylight hours and, adapt accordingly.

Playing dead

When first introduced to the community tank they are timid and need plenty of cover in the form of plant thickets and rocks, but after a while they settle in and overcome their shyness. Clown loaches have a most unusual habit of resting in the most peculiar poses. It is quite common for them to rest on their side often wedged under a rock ledge or in a vertical position balanced on their tail in a corner. In these positions they cause much distress to their owners who naturally believe that they have gone to that great aquarium in the sky. When a net is brought into action to retrieve the corpse the supposedly dead fish suddenly springs into life and swims off to another resting place.

Whilst most loaches spend almost all of their time on the floor of the aquarium, *C. maracanthus* can be quite active in mid-water particularly if in company with several companions of their own species. As far as other species are concerned the clown is peaceful except to other bottom dwelling species which occupy the same territory. Like many other loaches, clowns are sensitive to pollution and also to sudden changes in water quality. To overcome this it is advised that regular small water changes be practiced rather than the occasional large water change. The recommended pH range is 6.0-7.5, water softness of 5-15 dH.

Breeding

The Clown loach has been bred under aquarium conditions from time to time but as far as can be determined they have yet to be regularly spawned in Europe. There have

been reports of a clown aged 18 years that spawned regularly in Germany but there was no record of successful rearing. In the mid 1990s a UK aquarist had a spawning after a large water change. The pair swam up to the surface emitting clicking sounds. Next morning there were yellowish eggs scattered all over the tank and the adults were actively seeking out the yellowish eggs and eating them. The adults were removed and the fry were fed infusoria and fine dry food. The young grew at a fast rate and were 2.5cm long in just six weeks. The only difference between the sexes apart from a greater plumpness in the female, is said to be that the male has the tips of his caudal slightly curved inwards whilst the females are straight.

Fish farms in Thailand are breeding Clowns but whether this is using pituitary gland extract is not clear. I have, in the past imported juvenile Clown loaches, presumably originating in Thailand, which were under 2cm which only showed dark bars that only extended about half way down the body. The bars extended over the rest of the body after a few weeks further

As these fish don't have scales you have to be careful with treatments



PHOTO: THANKS TO AQUARIANE

BEWARE TREATMENTS

The body is scaleless and some authorities suggest that this the reason for the ease with which the clown loach contracts white spot. When treating a specimen that has contracted white spot, great care should be taken if treatments containing dyestuffs, such as malachite green or methylene blue, are used as it very easy to give an overdose to *C. maracanthus* with dire results. It is safer to use cures that do not contain dyes, and many cure manufacturers now print warnings on the labels where the cure is likely to be harmful to the clown loach.

growth. It is interesting that the juvenile Marine clown (*Amphiprion ocellaris*) when still of a similar size also exhibits this half-barred pattern. ■

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A peaceful fish, the Clown loach gets on with members of its own species, although adult specimens can be territorial

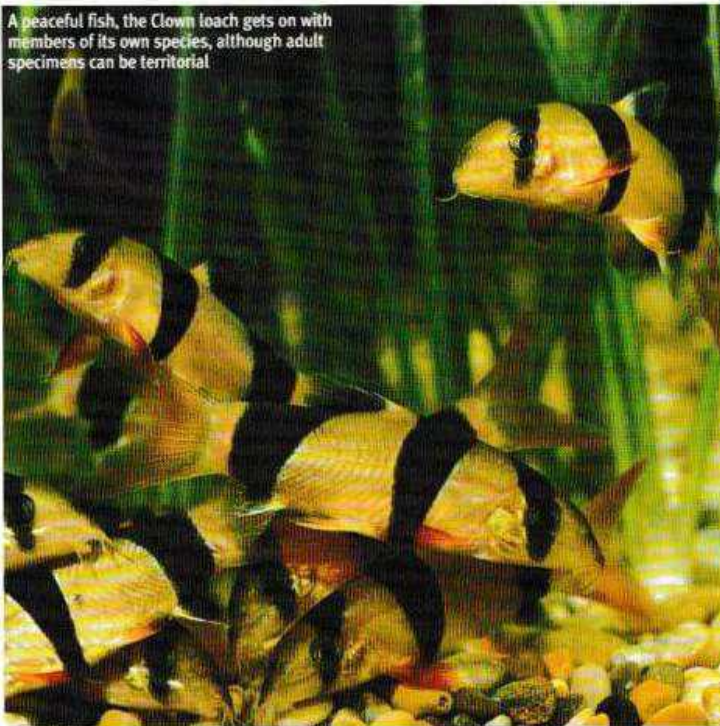


PHOTO: WWW.CHROMOBOTIA.ORG.UK

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Sat 29th

Sun 30th

Mon 31st

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Dick Mills interviews John Egan about his fishkeeping hobby and how it developed into successful showing

It's show time!

If you make a habit of going to fish shows, you're bound to notice a small, select band of people who go there too for a very specific purpose – to win! The sheer logistics of how they manage to do it, week in, week out, is almost mind boggling and you begin to wonder how they organise their lives in order to sustain the winning habit. We decided to find out by talking to one of the top exhibitors – John Egan of Port Talbot Aquarist Society, winner of the FBAS Supreme Championship in 1996 and runner up in three more Supremes since.

"I started keeping fish when I was quite young – and followed the usual progression from goldfish to tropicals. I saved up my pocket money and travelled into Cardiff on the train to buy fish." John clearly remembers when it suddenly got 'serious'...

"Along with an old chum from my schooldays, I visited an exhibition where his father was showing fish. I got hooked immediately and the father, the legendary Dick Perkins of the Black Swordtails fame, was kind enough to let me have some fish. Soon, equipping myself with some secondhand tanks, I was ready to take on the world!"

An eye for a fish

But how did he develop an eye for a good fish? "It was by using my eyes," says John. "I watched all the others and learned from them. Remember, this was in the days when fish were generally shown in 'show-jars' rather than small all-glass tanks. I quickly appreciated that fish that were exhibited in tanks tailor-made to suit their characteristics looked much better, and they attracted better points too. Presentation was a key feature from that moment on."

Whilst John admits to trying most species over the years, he also found that it paid off to specialise in fish that suited his local water conditions. "Our soft water was ideal for characins, for instance, and I soon shied away from hard-water species such as Rift Valley cichlids and livebearers that might need more attention paid to water conditions, although I do make an exception for my favourite, Central American cichlids."

What's his fish house like? "I have around 24 tanks in a space-heated environment: electric tubular heaters controlled thermostatically. The tanks have an unusual furnishing pattern in that only three-quarters of the base is covered by substrate. The rest is left clear, the gravel being held in place by



John with one of his show-winning fish, *Cichlisma guttulatum*, from Central America

a low glass divider. This is to facilitate cleaning up any leftover foods and I can easily see if I've overfed at any time. Filtration is designed for individual tanks and may be under-gravel, internal or external power filters depending on species."

Talking food, what do John's fish get? "Well, obviously I'm not short of flake food but I supplement this on alternate days with high protein granular food of different sizes to suit the different sizes of mouths I'm feeding. I also feed frozen Bloodworm and I regularly buy several 'sizes' of earthworm from British Worm Breeders."

Maintenance

And tank maintenance? "I'm very methodical in that I keep a book in which each tank is numbered and has its own entry page, so I can keep track of what's what. I change water in each tank – about a third – at least once a week for the larger, heavier feeding fish such as my cichlids, but the average frequency for smaller fish is between a week and 10 days. This keeps the pH reasonably high, as it's likely to drop quite quickly due to my heavy feeding regime. There are reservoirs for water changes in the fish house ready and this comes in handy when it's time to collect fish for shows. I said earlier that I do make specific changes to the water for my big cichlids: I use a high calcium content substrate material in my filters to buffer the pH, there is no substrate as such in their tanks."

So what's your routine before and after shows? "A couple of days before each show, I

prepare a shortlist of 'possibles' by comparing the condition of what I've got against the classes in the show schedule. I generally take around three or four polystyrene boxes full of show tanks and fish to each show. I fit all the empty (cleaned!) show tanks in the boxes first according to what I think I'll be taking. On the night before the show I catch all those fish that I know might be difficult to catch in the morning, and bag them up ready. I also turn on the heaters in the water reservoirs to make sure the water temperature is correct. Then the next morning it's just a case of filling the show tanks and catching the rest of the fish." Surely an understatement when you consider the number of entries John usually transports to shows!

Breeding fish

With all this coming and going, do you have time to breed any fish? "Oh yes. I'm probably best known at the present time for my teams of Red belly dace. Believe me it took a lot of patience to achieve success with these fish – I finally cracked the problem after a conversation with Dr Peter Burgess: he suggested I put a rock or two in the tank. It worked! The fish spawned behind a rock on the surface of the gravel – maybe they were just shy!"

And for the future? "Well, I'm gearing up for 2005. I've just bought some young fish to bring on – naturally they're Central American cichlids – but I'm still very fond of South American characins plus my little colourful gobies, so it will be interesting to see what the new season brings." ■



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

DISCUS PROBLEM SOLVER



Discus can make good community fish – you can see them here with an angelfish and Cardinal tetras

Tips for buying discus



I have set-up a tank for discus which is now maturing, so sometime in the near future I will be stocking up with a shoal of young fish, hopefully 6-8cm in size. Can you tell me what I should be looking for when buying these fish?

C Harrison, Birmingham



When buying young discus for the first time, you will be confronted in the dealers by a variety of colours and sizes. Firstly settle on the colours you prefer – all discus, whatever their colour, will live happily together. The size of the discus you mention means they will be about three to four months old.

The criteria you need to employ when choosing fish are as follows: the fish need to be a normal colour, and by this I mean you should avoid dark ones. They should be bright-eyed and alert, and the fish's body should be circular and not elongated. Examine the fish closely for damaged or missing fins, and general ailments. Finally, when you see a shoal of young discus between 6-8cm, there will be some that will be below the average size. Never go for these fish as they will be the lowest ones in the pecking order, and consequently, will be getting less food.

Should I add peat to the filter?



I am setting up a tank for discus and this will be filtered through an external canister filter. I would like to know if it would be beneficial for the set-up if I fill one chamber of the canister with aquarium peat, as I have read that peat helps to soften the acidify the water.

Dennis Chapman, Coventry



Peat is not a medium that I recommend, although you are correct in saying that it helps to soften and acidify the water. The downside of peat is that it stains the water tea coloured due to the tannins it releases and fills the water with very fine particulate matter which annoys the fish and makes them itch and scratch. Although I don't recommend peat for use with discus, it did appear to help when I was working with wild-caught specimens. They must have felt more at home!

Fish house heating



I am thinking of setting up a number of tanks in a fish house with the ultimate aim of breeding discus. Please could you give me some advice on the best way to heat the fish house?

John Rawlinson, Bolton



As you have not said how many tanks you intend to keep, I must assume that you have discarded the idea of individual tank heaters in favour of space heating. When I set-up my fish houses a number of years ago, I toyed with various ideas such as extending the central heating, storage heaters, gas heaters etc. and finally decided for cleanliness, on electric heating. As a qualified electrical engineer, I have to admit a certain bias, but it did allow me to design the circuitry myself.

My main objective was to heat the fish house but retain control of the system. 3kw fan heaters were installed with temperature controllers, and to give me control of the system, electric timers were installed to tell the system when to turn on and off. I then had my meter changed to Economy 7 and set the timers to allow the system to run through the night at 2p per unit and not during the day at 8p per unit. This was a major saving. If you wish, I can send you a circuit diagram, but please use a qualified electrician for any electrical installations.

Is my tank large enough?



I am about to purchase a Jewel Vision 180 (92 x 41 x 55cm tank). It's the biggest tank I have room for and I wondered if it would be large enough to accommodate discus? If it is ok, how many could I keep and what other species would create a peaceful community.

Andy Hill, via email



The tank you are about to buy will certainly accommodate discus. I would suggest a shoal of six in this tank size. Tank mates for discus depend on your own personal preference, but as a general guide avoid anything that grows too large or has an aggressive nature. If you stick to any of the Amazon tetra family such as Cardinal tetras, these are peaceful and enhance the presence of the discus. I also recommend that you buy a small shoal of workers such as corydoras – they are worth their weight in gold as they clean up behind the discus.

On guard



Hatchetfish can literally fly away from their predators

From hiding to poisoning, fish have adapted many different ways of defending themselves against predators. **Kathy Jinkings** looks at some of the most common methods

Mother Nature's domain is not a kindly or forgiving place – the perils of life in the wild are many, and as fast as a species evolves adaptations to help them survive, so too their predators are escalating the arms race by becoming more efficient. As if simply not being eaten wasn't hard enough work, there is also the business of finding enough food to stay alive (often at the expense of some other hapless creature) and achieving the equivalent of passing go and collecting £200 – actually managing to produce enough offspring for one or two to carry on the family heritage of genes. With all this to cope with, it's surprising that there are any fishes at all. Nonetheless, they've managed to keep going for quite a few million years, and along the way have developed a number of tricks to help them keep going for a few more.

Blending into the background

One of the best tricks is simply not being noticed. By effectively becoming invisible, a fish can avoid being eaten and has the added bonus that its own meals are quite likely to wander innocently past without spotting the danger. Being invisible can be achieved in two ways. The first is to look like something else, something that nothing will take much notice of. A good starting point is a suit of mottled brown, which makes the wearer look like just another bit of rock or river bottom. A mottled brown Bristlenose catfish plastered onto a mottled brown rock or piece of wood is practically

unnoticeable unless it moves. The basic theme can, however, be improved by modifying the body shape. The Whiptail catfish, like the Bristlenose members of the South American Loricariid sucker-mouth catfish family, are not only generally brownish, but strongly resemble bits of twig. Their bodies are long and thin, and in the aquarium they will often be found lying along pieces of bogwood, looking like just another offshoot. The Whiptails are gentle and unassuming aquarium inhabitants, who just want to be left alone and avoid becoming a meal. Two other practitioners of the 'looking like something brown' method are somewhat less innocent. The Amazon leaf fish, *Monocirrhus polyacanthus*, is popular only with aquarists who prefer novelty to beauty. An aquarium with leaf fish appears to contain only dead leaves, and not much else as these are voracious predators. The 8cm body is flattened ventrally, and shaped exactly like a leaf with the 'stalk end' being the mouth – which can open astonishingly wide when anything swims within striking distance.

The butterfly fish, *Pantodon buchholzi*, goes for the 'general bit of floating rubbish' look. Resting at the surface of calm waters in Africa, it looks like something not only very unappetising but also very harmless – an illusion that costs dearly for those who approach too closely.

Of course, being unobtrusive can be a disadvantage. While it is desirable not to be spotted and eaten, it is somewhat counterproductive if your potential mates also swim on by without noticing you. Sometimes a fish just has to be seen, whatever the risks. To maximise the chances

of getting a mate at the right time, and minimise the chances of being eaten most of the time, many fishes have 'spawning colours' – they are brightly coloured for only very short periods. Other fishes may change shade to blend into a slightly different coloured background, darken when frightened, or 'fade' at night. All these colour changes are possible due to cells in the skin called chromatophores. These contain pigment which can either contract, reducing the colour or causing it to

When you first buy Neon tetras they may shoal together, but as they get more confident they will disperse



disappear entirely, or expand. These changes can be extremely fast, and a fish can change pattern or colour almost instantaneously if the occasion arises.

Flight or fight

If you can't hide, then you'd better run. Most fish are extremely adept in the water, but unfortunately so are the hungry fish pursuing them. A few fishes have developed a method of removing themselves from danger quickly – through the air. The hatchfish of the Amazon are attractive little fish often seen in aquariums, where a tight fitting lid is highly recommended. The fish is flattened ventrally, with a huge 'keel' at the front, to which some serious musculature is attached. When danger threatens, these muscles can move the pectoral fins with sufficient force not only to launch the fish through the air but to prolong the flight by beating the pectoral fins. The Marbled hatchfish, *Carnegiella strigata strigata*, can travel up to 10ft like this, which isn't bad for a zin fish. The acknowledged expert of fish flight is the Flying fish, any one of several marine species of the family Exocoetidae. Some species can reach 45cm, but most are around 30cm long. Their pectoral and pelvic fins are extremely large, and can be used as 'wings' for gliding flights, while the lower lobe of the tail is enlarged to act as the 'motor' – speedy sideways motion allows the fish to gain height, so that flights of up to 100m can be achieved, up to a metre above the water.

Rearing a family produces its own problems. Not only do you have to be obvious to lure a mate, but once successful the new family need to survive long enough to produce their own offspring, thus

continuing the species. A lot of fishes go for the redundancy option – the numbers of eggs and fry are so great that the law of averages ensures that at least one or two will make it – and only one or two are necessary, perhaps out of thousands.

Others put more effort into each individual offspring, and produce less. The livebearers keep the fry inside until they are at least capable of making a run for it if danger approaches. Others try to find a secure place to keep the eggs – a small cave or cranny, or in the case of many gobies a sealed burrow where they are unlikely to be found.

The fishy arms race has been going on a long time, and is still continuing

Some cichlids carry their eggs, and young fry, inside their mouths where they are safe. Unfortunately, every good idea has someone who'll take advantage, and in the case of the mouthbrooding cichlids this is the cuckoo catfish, a name applied to several members of the Synodontis catfish genus. When the cichlids spawn in Lake Tanganyika, so do the catfish (snacking on a few cichlid eggs as they do so), and the catfish eggs are sucked up by the female cichlid along with her own progeny, so that they too can hatch in the safety of the female's mouth. Sadly, as so often in life, this isn't just a defence mechanism – the ungrateful catfish hatch before the cichlids, and promptly devour the cichlid eggs, and then each other. By the time they emerge,

ZEBRA TRICKS

Some fishes, such as some of the astonishingly coloured coral reef fish, or the apparently obvious zebra pleco catfish, look as though any predator would have them marked out from miles away. The methodology here is to vanish in plain sight – it doesn't matter if predators can see you, so long as they don't see you as a fish. The colour patterns serve to break up the fish's outline, so that although they are visible, the shape of a fish is much harder to distinguish. This is the same principle used on land by the creature that gave the Zebra pleco its name – the incredibly obvious zebra that disappears when it stands still.

there are only a few catfish, but those are well developed and have a good start in life.

Safety in numbers

Many fishes find security in company. Cichlids especially are likely to pair permanently with a spouse, giving them an extra pair of eyes as lookout, and an extra bit of muscle if it becomes necessary to defend their offspring. Other fish find security in much larger numbers. Shoaling and schooling fishes reduce their odds of being eaten, as the chances of any individual fish being picked out are reduced the more little snacks there are to choose from. The issue of choice confuses predators too – it is easy to focus on and pursue a single fish, but faced with a flashing shoal of fishes darting this way and that, to pick out an individual can be harder. Many of our aquarium fishes prefer to live in a group – they might not always swim together, but if danger threatens they soon bunch up. This is obvious when you first buy a group of such fish, like the beautiful and popular Neon tetras. For the first few days in the new tank they act as though tied together with invisible strings, but as they become used to the new environment and less nervous the group becomes less tightly packed, and may not even appear to be a group at all.

Symbiotic behaviour

Some fishes find safety in an alliance with a member of another species – not even a fish at all. The marine clown fishes (*Amphiprion* sp.) are well known for their alliance with anemones. An anemone will have its own particular clown fish, who can rest in safety among its stinging tentacles, safe from any danger that passes by. In return for this protection, the clown fish performs cleaning duties around its host, increases oxygenation by its activity, and lures would-be predators into the anemone's fatal embrace. The watchman gobies, as



discussed recently, pair up with a shrimp. The two spend the day feeding together, in permanent physical contact with the shrimps antenna resting on the goby. If the goby spots danger, then it flicks its tail to give the alert, and the two retreat into the safety of their burrow. The shrimp repays the goby's early warning service by performing building and maintenance jobs on the burrow. Making yourself useful is a good way to win friends, and the cleaner wrasses (*Labroides* sp) have established safe passage for themselves with a number of fishes that would usually be predators with their valet service. The wrasse waits at its cleaning station, and the larger fish visit specifically for a clean-up. The wrasses can pick off skin parasites and even clean inside the larger fishes' mouths, without fear of harm. Sadly, once again there's a fish who's ready to take advantage – the false cleaner fish, *Aspidontus taeniatius*, looks very similar but abuses the trust of the larger fish by feeding on their scales, fins, or mucous. Fortunately experienced fish learn the difference, and the hard working cleaners are still sacrosanct, while the impostors are pursued.

Aggressive tendencies

So far the defences we have looked at are mostly passive, involving keeping out of trouble as much as possible. Sometimes though, aggression is the best form of defence, and a fish who is known to be dangerous is unlikely to be bothered much. Sharp implements are always useful in a fight, and quite a lot of fish have some impressive weaponry. Teeth are good, of course – sharks don't get a lot of hassle, apart from other sharks on occasion. There are plenty of other places a fish can carry arms, though. Even the skin can be a weapon. Several fishes, including the suckermouth *Pseudacanthicus*, have bony protuberances on the skin so sharp they can draw blood. A 'concealed' Loricariid weapon appears in the form of the interopercular spines, which are a nasty set of sharp hooks that swing forward from behind the gill plate. They also have stiffened, locking fin rays, a feature shared by the *Corydoras* catfish. If you are a fish in a crevice, it is useful if you can't be hauled out by your tail and converted into dinner. It's better to lose a tail end than the rest of you. To enable them to hang on, the dorsal and pectoral spines are immensely strong, and have a very clever locking mechanism that, once in place, requires no effort from the fish to hold the position. The fins can manually be locked in place even in a dead fish or skeleton. This has the effect of turning the fish into a little crampon, that cannot be dislodged without breaking the spines (easier said than done). Of course, if all else fails they can leave a legacy to others of their species by making themselves such an unpleasant meal that the predator won't



The Puffer fish's poison can be deadly, so handle with care

be tempted to try again – not much use for the individual, but as a species a working defence. A goldfish that I once had spending a couple of days in a tropical tank while its own abode was being spring-cleaned learnt this lesson the hard way. It wasn't that big a goldfish, so how it managed to fit a *corydoras* into its mouth is a mystery. Getting it out again, however, was even less easy. The goldfish was spotted trailing clouds of blood with the end of a tail hanging out of its mouth, and inspection proved that the hapless *corydoras* had, as its last act, punched outwards with the pectorals and dorsal, spearing the goldfish three ways. This goldfish did survive, after lengthy and fiddly efforts with nail scissors, but I suspect such an experience, if not fatal, would put any fish off *corydoras* for life.

Pure poison

Some of the rays are not only physicists, but chemists as well. The stingrays are just one of many species of fish who use poison as a deterrent. In the stingray's case, this is administered by a spine which sticks up from the tail – in just the right position for an unwary foot to be planted on it. Most people who have been stung by a stingray do recover, but if the chest or stomach is punctured then death is a distinct possibility. Stingray poison can be treated by heat – the puncture site should be immersed in water as hot as the patient can stand, which neutralises the poison. Those who have been stung by a stingray can expect a whole host of nasty symptoms, including cramps, sweating, nausea, paralysis, and difficulty breathing.



The Lionfishes spiky defences are there for all to see

The stingray is, however, a rank amateur in the poisoning field when set against the puffer fish. The flesh of these, and related species, contains the poison tetrodotoxin. A hundred times more potent than the poison of the black widow spider, and 10,000 times more than cyanide, this is a serious chemical defence. The same poison is also used by the Blue-ringed octopus and some jungle frogs. So when a puffer-fish puffs, this is by no means an empty threat. It doesn't do it much good, however, against the Japanese, who are familiar with the pufferfish as a table delicacy called Fugu. It is extremely expensive, as it needs to be prepared by an expert to remove all the lethal poison from the fish. There have been many instances where the expert was not expert enough, and the Fugu proved to be a last supper. Apart from providing food for thrill-seekers, however, the pufferfish poison is proving useful, with controlled use. Brazilian fishermen have been reported to use it for tooth ache, and now tetrodotoxin is gaining repute for use in painkilling drugs. It works extremely quickly, within five to twenty minutes, and is non-addictive, so is likely to be even more widely used as an alternative to morphine based painkillers.

Many other fishes use poisons to a greater or lesser extent. The Liver or Asian Stinging catfish, *Heteropneustes fossilis*, is occasionally seen in the aquarium hobby,

and is armed with stinging spines on its pectoral fins. A fish rather more common among aquarists is the Marine lionfish. This is popular because it is extremely beautiful. This is a fish that has no need to hide – among the beautiful fins lurk spines, each barbed and extremely sharp and each armed with a poison gland. When the neurotoxin is injected into a predator, paralysis results, including paralysis of the heart, killing the fish. For humans, lionfish venom is not usually enough to kill, but the related stonefishes are a more deadly prospect. Well camouflaged, they lurk in shallow waters, often clinging to rocks. Anyone who treads on, or puts a hand on, one is injected with a protein that causes shock, breathing difficulties, local paralysis, and, as if that wasn't enough, agonising pain. The venom can be denatured by heat, so once again immersion in very hot water is recommended, followed by antivenom as soon as possible. Most people do survive stonefish stings, but it is another matter for any hapless marine predators. *Synanceia horrida*, the Estuarine stonefish from the Indo-West Pacific, has the dubious distinction of being the *Guinness Book of Records* most venomous fish.

Masters of disguise, physicists, chemists, flight engineers – the fish have developed an astonishing array of ways to stay out of trouble. But of course the predators just have to get better too, to keep up. The fishy

SHOCK TREATMENT

Anyone who has ever had an electric shock will know that it is not a pleasant experience, and certainly one most people would prefer to avoid. Indeed, the Amazon Indians also prefer to avoid it, which is why the electric eel is one of the most feared fish in the Amazon. The electric eel, *Electrophorus electricus*, is capable of delivering an electric shock strong enough to stun a horse. The bigger the eels get, the bigger their 'battery' gets and the stronger the shock they can produce. 500V was measured from a 1m specimen, and the eels can grow up to 2.5m. The electric discharge is used for both hunting and defence. Although the electric eel is the most accomplished fishy generator, the electric catfish, *Malapterurus electricus*, and the electric ray, *Torpedo nobilliana*, are just two of the other species who are capable of delivering a shock as a deterrent.

arms race has been going on a long time, and is still continuing. When the amphibians left the sea, it is easy to think of the fishes' story as having been told, but nonetheless those who stayed are continuing the process of getting better and better at being fishes. ■

This Black spotted cory is a bottom dweller that blends well into the colours of the substrate.



Photo: Media/John

Today's Surgery



Our resident vet, **Lance Jepson** MA VetMB CBIOL MIBiol MRCVS, looks at the swimbladder and the possible problems it encounters

It's a gas

The swimbladder is a gas-filled internal organ found in the majority of fish species and although it has the word 'bladder' in it, it has no connection with the kidneys or anything else in the urinary system. Its job is to alter the weight, or more correctly the density of the fish, such that a fish is able to maintain its position in the water column with a minimum of effort (and therefore energy expenditure).

Fish have a problem – their muscles, internal organs and skeletons are all heavier than water and therefore fish have a tendency to sink due to gravity. Swimming therefore takes more energy, but unlike birds, fish do have an advantage – water is much denser than air so it is easier for fish to develop ways to overcome this and achieve neutral buoyancy (where the fish neither sinks nor floats). Fish have overcome this problem with three main strategies:

- Using gas to alter their density.
- Using oils. Oil floats on water because it is less dense, so some fish such as the true sharks store large amounts of oil in their liver. This reduces the density of the fish and allows it to achieve neutral density.
- Live on the bottom.

Swimbladder disease can be confused with:

- Internal tumours. These can impinge on and deform an otherwise normal swim bladder.
- Enteritis. Gut disorders can lead to gas formation in the bowel that unless passed will alter the balance of the fish.
- Diseases affecting the brain. In particular if the parts of the brain concerned with balance are diseased then the fish may be unable to maintain an even keel.

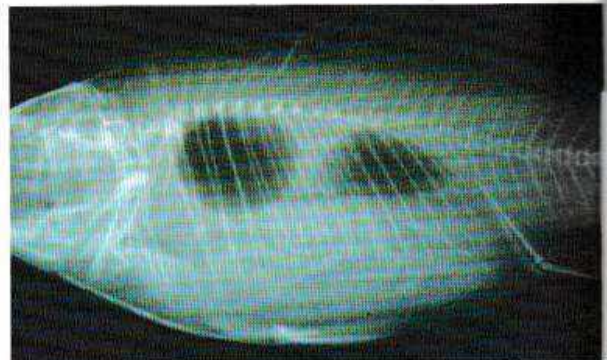
Using gas would seem to be the best way of reducing overall body density because gas is the least dense option – but there are problems with using it. The main difficulty is that as external pressure decreases, gas expands and as pressure increases, gas is compressed. This is a real problem for fish that inhabit deep waters where treks between the shallows and depths can expose a fish to wide external water pressure differences. There is only so much space inside a fish's body cavity and significant changes in the volume of the swimbladder cannot be tolerated so a fish must be able to get gas both into and out of its swimbladder quickly. When deep-sea fish are brought quickly to the surface the gas in the swimbladder expands to such an extent that the swimbladder first swells and then ruptures. Gas escapes into the body cavity and continues to expand, compressing and displacing the internal organs. In some cases the fish's stomach can be pushed out through the mouth of the fish by this gas. Such fish need rapid decompression by releasing the gas if they are to stand any chance of survival.

The gases

We've mentioned 'gases' a great deal – the gases found in swimbladders are largely oxygen, carbon dioxide, nitrogen and water

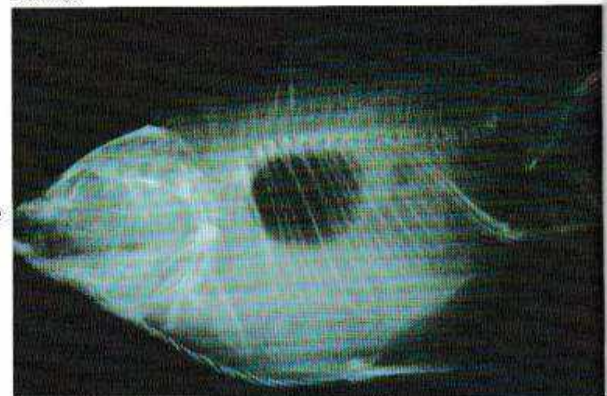
vapour. In particular it is oxygen that is secreted into the swimbladder because for various physiological reasons this can be controlled most readily. Even with physostomes that gulp in atmospheric air, the gas found in swimbladders is very different in its makeup from that air because of uptake and secretion by the retes.

It is likely that temperature plays a significant role in how the swimbladder works, effecting both how the gases behave and the cellular enzymes such as carbonic anhydrase that are involved. This is probably why in winter, koi will be seen to lie on their

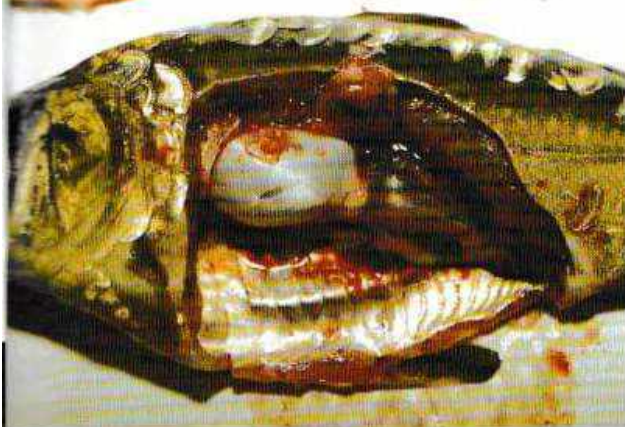


Above: X-ray of a normal goldfish. Both parts of the swimbladder are roughly equal size

Below: X-ray of a fan-tailed goldfish. The front chamber is too large, the back too small



Typical two-chambered swimbladder in a carp



The pneumatic duct of a koi

side and lurch across the bottom of their pond in a heavy, uncoordinated fashion.

The size and shape of the swimbladder varies a great deal between fish species. In trout it is a single, streamlined sac-like organ. In koi and goldfish it is a two-chambered structure divided into front and back sections that partially communicate. In catfish it is often three-chambered – two compartments lying side-by-side at the front, and one in the middle behind. In all cases the swimbladder lies beneath the spine although its relative position may vary – for example the swimbladder in seahorses lies towards the 'neck' area. This is further forward than is seen with other fish but is perfectly logical for a species that has evolved an upright posture. Bottom-living species of fish such as loaches and hawkfish either have very small swimbladders or they lack them completely.

Other functions

Depending upon the species, the swimbladder does have other functions. As an example it can be used to generate sound by vibrating its walls with special muscles. Anyone who has kept an emperor angelfish (*Pomacanthus imperator*) will have heard its low frequency grunting, a noise issuing from its swimbladder. Other species use the swimbladder for just the opposite function – for hearing. In this case external noises will cause the walls of the swimbladder to vibrate as the sound wave arrives at the fish. This vibration can be detected and interpreted. In the cod and many other fishes there are extensions of the swimbladder up to the back of the skull where it is thought that vibrations can stimulate the inner ear of the fish. Other fish go much further. The Ostariophysii – a group of fish including the carp and catfish – possess a hearing system known as the Weberian apparatus. This is a system of bones analogous to the tiny bones in our own ears, which transmit vibrations picked up by the swimbladder to the inner ear.

Swimbladder diseases

With the exception of fancy goldfish, disorders of the swimbladder are probably not that common. Swimbladder problems can occur due to problems with the organ itself, problems with the pneumatic duct if present, or due to other diseased organs impinging on it.

Swimbladder disease of fancy goldfish

Goldfish are physostomes, and the swimbladder is divided into front (cranial) and back (caudal) sections. The swim bladder lies just above the central point or axis of the fish, and the buoyant effect of the gas it contains is spread equally on either side of this point. The body shape of a normal goldfish is relatively elongate, but fancy goldfish have a much more spherical body. The altered body shape induced by selective breeding also causes the internal organs to become slightly misplaced, and in particular the development of the swim bladder can be affected to the extent that one or both sections of this organ fail to develop properly. This leads to unequal buoyancy around that central pivot, which in turn causes a rotation such that the head will have a tendency to tilt either up or down, and the fish must work to correct this. The abnormal positioning may also affect the normal functioning of the pneumatic duct. With full blown swimbladder disease, the fish either floats at the surface or sits on the bottom. Otherwise, the fish will appear healthy and will feed. With floating fish, there is a risk of ulceration of the parts of the fish that may be repeatedly exposed and dried out above the water surface. This condition is difficult to treat. For 'floaters', surgical insertions of counterweights into the body cavity have been performed.

Swimbladder torsions have been described where part of the swimbladder

twists at a point along its axis, not unlike what you have to do when making a balloon animal! This will, at the very least, affect how the swimbladder is able to function and if diagnosed, would require surgery to correct it.

Spring Viraemia of Carp (SVC) is a viral infection of carp that will occasionally present as an inflammation of the swimbladder. Infected fish are unable to balance properly. In rare cases swimbladder disease is due to bacterial or fungal infections, and these may respond to treatment. If swimbladder disease is seen in species other than fancy goldfish, then these causes are much more likely. ■

PNEUMATIC DUCT

In the embryonic fish, the swimbladder develops as an outpouching of the gullet (oesophagus). Some fish maintain a direct connection between the oesophagus and the swimbladder that is called the pneumatic duct, and it is the presence or absence of this duct that allows us to divide those fish with swimbladders into two groups. These are:

Physostomes. These fish have a pneumatic duct and are able to fill and empty the swimbladder by gulping in air at the surface and directing it into the swimbladder. Characins such as tetras are physostomes.

Physoclists. These fish do not have a pneumatic duct. The wall of their swimbladders house discrete patches of blood vessels called retes. These retes have a very good blood supply and it is from the blood that gases are both released into and absorbed from the swimbladder. Most marine fish are physoclists. In some physoclists the larvae do have a pneumatic duct that allows them to fill the swimbladder for the first time at the surface, but this connection is subsequently lost as the fish develops.

Some fish such as the conger eel, koi and goldfish, possess both.

OK, so you've got your fish pond but how can you attract more frogs, toads and newts? **Ben Helm** shows us how to build a bog garden

When building a pond, we generally have a good idea as to how we want it to look when completed. Our pond size will determine how many fish can be stocked and the pond's shape and design will be a guide as to how it should be planted. Deepwater plants such as lilies, water Hawthorn and oxygenators such as Elodea and Hornwort are relatively straightforward to plant, difficulties however, can arise when planting marginals. These are the plants that prefer their feet to be wet, but their flowers and foliage to be proudly displayed above the water. There can be a tendency for us when planning a pond to include marginal shelf, but only one that is gin wide (more water for the fish) and we can fall into a trap of lining our plants in a tight, regimented row along the narrow ledge that we have left ourselves. Hardly appropriate or in keeping with the overall informal shape and design of our pond. (If

we buy a prefabricated fibreglass pond then we have no option but to accept the marginal shelves we're given – not that we have to use them!)

Unightly baskets too, if we are not careful, can soon protrude, proud of the water, again spoiling the appearance of our 'natural' pond.

There is another way however, of preventing our marginal plants from appearing as though they are in a military procession, head to toe on a shelf, and that is by planting them in a bog garden.

A bog garden is a dedicated area where many of the plants that are regarded as 'marginals' can be planted in three dimensions, giving natural, broad swathes of lush planting.

There are many benefits to be gained from creating a bog garden.

■ Ideal for encouraging wildlife. A bog garden presents a damp and moist haven for many different types of wildlife. Amphibia such as newts, frogs and toads adore bog gardens as they compliment their lifestyles. These

Common frog

**Build
a bog!**



moist-skinned visitors cannot afford to stray too far from their life-saving water yet enjoy a life out of water. What better place for them to 'hang out' than in your bog garden? A bog garden will warm up quicker than a pond giving these cold blooded tenants conditions they will not want to leave. They will also find comfort from the cover afforded by the lush green undergrowth and use your semi-aquatic garden as a safe place in which hibernate.

■ A bog garden presents you with a bonanza planting opportunities. Firstly, by electing to create a bog garden, many more plant varieties present themselves as available for your selection. Bog plants provide a range of different foliage in shape and colour not available in marginal plants and because their roots are warmer than their truly aquatic counterparts, they can provide earlier colour and growth prior to the pond plants coming to life.

A bog garden offers great planting versatility compared to a narrow planted marginal shelf in a garden pond. Through careful plant selection and construction of the bog area, it is possible to conceal the join between the pond and the garden. A bog garden should be regarded as a marshy no-man's-land that allows the pond to blend in with the established plants in the truly terrestrial planted borders. This creeping colonisation of a bog garden is further encouraged by not having to plant specimens in mesh baskets or containers. Where these may have curtailed a plant's aspirations to spread in a pond, plants in a bog garden are given a free-range lifestyle, colonising and spreading through your moist organic paradise in the way that nature encourages.



Smooth newt

■ Finally, a bog garden allows you to break one of the rules of keeping koi, and that is designing a pond that incorporates plants. As koi are notoriously inquisitive fish, any plant (especially if offered in a basket of soft aquatic soil) will be investigated, sampled, and usually up-rooted. By adding a bog area around parts of the pond's perimeter, aquatic planting is made possible while keeping them out of temptation's way.

The construction techniques are very similar in either situation, the only real difference being that a bog garden attached to a pond requires more precision when preparing the levels of the pond. This will guard against the pond draining into the bog garden. When constructing a bog garden as an integral part of a pond, it makes sense where possible to use the same piece of liner.

Raising the liner to within an inch or so of the water's surface between them, and concealing the raised pond bed with a barrage of cobbles will give the impression that the bog and pond merge into 1 body while keeping the water in the pond at bay. Also, you'll have to ensure that there is an impermeable barrier placed between the soil in the boggy area and the adjacent 'dry' garden soil. Otherwise, water will be drawn up out of your pond, giving you the impression that your pond may have a leak.

If constructing a stand-alone bog garden, it is advisable to make the bog area lower than the surrounding ground and the adjacent pond so that rain water will naturally run into the boggy area.

Methods of constructing a bog garden

Essentially, there are two options when considering a bog garden. Each requires the use of a flexible liner to allow you complete freedom when designing and constructing your own, novel bog area.

1. A bog garden as an appendage to a garden pond, that may well be designed and constructed as an integral part of the pond.
2. A 'stand-alone' bog garden or marsh plant area unconnected to a pond and completely fish-free.

Pond vs bog garden

Similar materials are used for both a garden pond and bog garden, but the two contrasting features are created by using the material in two different ways. While every effort must be taken to protect the pond's liner with underlay, the same is not necessarily true for the bog garden.

The excavation for the bog garden should

STEP-BY-STEP GUIDE TO BUILDING A BOG GARDEN



Step 1. Old pond liner or carpet can be used to line the hole



Step 3. Add a layer of shingle



Step 5. Trim around the liner to make the edge neat and add slabs or turf to join the bog garden to the pond



Step 2. Make a few holes in the bottom



Step 4. Fill the hole with soil and rake it level



For a bit of colour plant a Flag iris in the wet soil

resemble a shallow basin where the sides fall gradually towards a flattened bottom. The basin should be about 2ft deep and lined with pond liner (unless you are fortunate enough to live on clay-rich soil). Now comes the equivalent to pond sacrilege – piercing the pond liner! Unless the membrane that keeps the soil moist in the bog area is pierced, then soon enough, the deep soil is likely to become completely water-logged and anaerobic, with the rotten eggs phenomenon leading to poor plant growth. To avoid this, several initial fork holes should be made in the bottom of the liner to which is added a layer of coarse stone chippings. These will help to keep the holes clear and aid drainage. At the hole-making stage, if in doubt as to how many to make, always make fewer than you feel as extra holes can be made later on if needed, making it possible to seal any excess holes should too many be made in the first place.

The lined hole should then be given its source of life, a generous bed of well mixed, light and organically rich soil. Avoid compacting it and gently fill the depression with water to soak the thirsty soil. The bog garden can be left a day or so to check how well it retains moisture and only then, planted with a range of complimentary bog and marsh plants.

Planting in the bog garden

The beauty about planting a bog garden is that we have complete freedom as to where to place our chosen plants. Bog plants are by their nature tolerant and adaptable and will soon colonise and spread through what is a very favourable and fertile substrate.

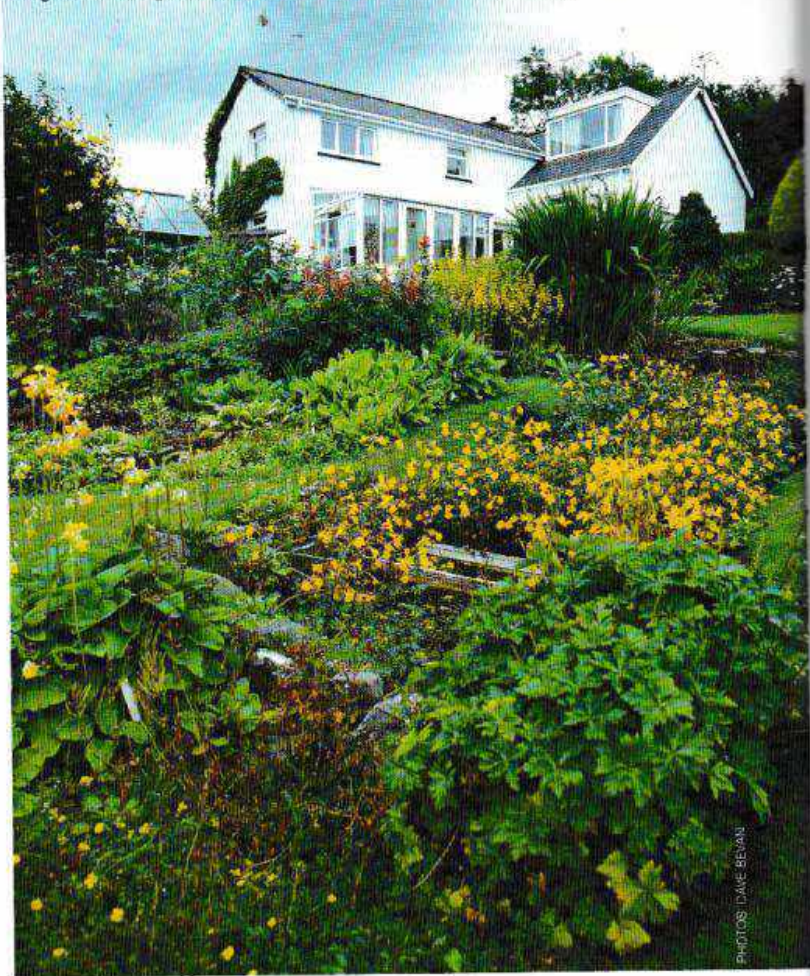
You can try to include a graduation in the planting scheme by placing the taller plants towards the back while lower, sprawling plants will be more effective in the foreground. Furthermore, those plants that are quite tolerant of drier areas of a bog garden can be planted to the margins where they will blend with the drier terrestrial borders.

Bog plants

The early flowering Globe flower (*Trollius europaeus*) and Marsh marigolds (*Caltha palustris*) will serve to brighten up the foreground of a bog garden. The Marsh marigold will soon cover any areas of bare soil with its rampant growth, especially when unhindered by a basket. Further splashes of colour can be added with primulas, available in many colours and shapes, from the red-hot-poker shaped *P. vialii* to the more delicate *P. bulleyana*, both early to flower. A scattering of the more delicate lanterned fritillaries can also add some movement in a gentle breeze.

A particular fan of the moist conditions is the Arum lily (*Zantedeschia*) while the

A bog area can look great in any garden



PHOTOS: DAVE BEVAN

closely related hosta (*H. sieboldiana*) will tend to grow quite large, providing generous cover for any amphibian

inhabitants. Other plants that can serve as a backdrop include the tufting Cotton grass and any number of Iris varieties. ■

SLUGS!

If your experiences with hostas are anything like mine, you'll know they're slug-magnets. But by growing them in a dedicated bog area, or adjacent to a pond, you'll probably benefit from providing the ideal habitat for frog and toads – which are your own, home-grown biological control.

The periphery of the bog area can be planted with varieties that will blend in well with any bordering terrestrial vegetation. Possible candidates for this role include the tall and Iris-like *Phormium tenax* and the spreading Meadowsweet (*Filipendula*) which may well choose to dip its feet either side of the bog garden. A superb backdrop of ferns (*Matteuccia*) would complete the effect.

A bog garden can provide wildlife with a valuable haven and allow you to enjoy the benefits of a wildlife pond while keeping a well stocked garden pond. Compared to the construction of a garden pond, a bog garden is very low-tech with a leaky liner and some suitable soil the only prerequisites. As long as the potential problem of a bog garden drying out is addressed (through careful design when adjacent to a garden pond) then a marsh area should thrive to become a lush green oasis enjoyed by all, including the garden wildlife.

Discus galore... and plenty more

Andrew Collins, of Tropicalfishfinder.co.uk, pays a visit to London Discus and discovers that there's a lot more to the shop than its name suggests

London Discus is one of the many shops that rarely gets a mention when, in fact, it should. The shop, which is based in Ilford, Essex, has been owned and run by Sam Abishagan for the last two years. The name of the shop suggests that they only deal in discus, but in fact they carry a wide range of tropicals and cater for most aspects of the hobby. Their speciality is, however, discus.

Sam has been keeping these fish for many years and there is very little that he does not know about them. He regularly visits Malaysia to choose his fish and he has excellent contacts, which means top quality stock is always available.



The pictures here are of just some of the stock that Sam had available on a recent visit, including a rare strain known as Quarter moon and from the coloration you can immediately see why it is called this!

Major refurbishment

This is an exciting time for the shop, which is about to undergo a major refurbishment involving a move into marine fish and Inverts as well as a significant expansion of the discus section. The new marine section will have 20 tanks and there will be five very



large invert tanks. The discus section is due to be increased by 20 tanks. The shop currently sells mail order and also offers a full wholesale service.

The refurbishment will be taking place in the New Year and there is currently a sale on to make space for all of the new equipment and stock.

At the time of my visit the shop had a good range of discus available, including some very pretty checkerboard strains as well as snakeskin and the previously-mentioned quartermoons. I also spotted some interesting Stonefish and the most competitively-priced *Hypancistrus zebra* I have seen for a while at only £49 each for some good-sized fish. They also had a wide range of the more 'bread and butter' tropicals.

The verdict from Tropicalfishfinder is that this is a well-run shop. Sam has a great knowledge base to help novices, right through to experts and with good quality stock available you can't go wrong.

The vital statistics for London Discus are currently 72 tropical tanks and three large vats carrying a range of koi and other coldwater species, but this will soon change. They also carry a wide range of dry goods.

CONTACT DETAILS

Further details about the shop can be found on the www.tropicalfishfinder.co.uk website.

The full address and telephone number is as follows: London Discus, 701a High Road, Seven Kings, Ilford, Essex IG3 8RH Tel: 0208 599 5949

Opening hours are 10am to 5:30pm Monday to Friday (half-day on Thursday, when the shop closes at 2pm), with 9am to 5:30pm on Saturday and 11am to 3pm on Sunday.

Koi world



Bernice Brewster makes an analogy between koi and horses and it's not as far fetched as you may think...

What I know about horses, I could probably write on the back of a stamp, so I was somewhat surprised to be given a magazine about these large, 'fierce' animals. I have to admit that I do indeed use a photograph of a big pile of horse dung outside a stable as part of my talks to koi keepers. Owners of horses and other captive mammals are acutely aware of the health problems from not regularly keeping them clean, and my analogy is that whilst we are aware of the requirements of mammals, because solid waste and ammonia are dissolved in water, we are less fastidious as koi keepers.

Ammonia affects horses

Interestingly, in the horse magazine, there is an article entitled 'Something in the Air' by Dr Ruth Lawson and it discusses the problems of respiratory disease in horses. It seems that a variety of factors such as dust, fungal spores and bacteria in the straw bedding and hay have been variously blamed for respiratory diseases in horses but now it would seem these are secondary to the real culprit – AMMONIA! When the horse urinates, the naturally occurring bacteria quickly break down the urine into ammonia which becomes gaseous and pollutes the atmosphere of the stable. Poor old horse breathes in the ammonia laden air and at low levels of 10 ppm for a few weeks, the immune system becomes less effective at controlling the disease-causing organisms. Hey! Does this sound familiar?

Whilst we may not be dealing with horses, if we expose our koi to continuous low doses of ammonia, they start to also become affected by the secondary bacterial and fungal disease. So, whilst I may have happily used slides of piles of horse poo to make a point, the parallels are much stronger than I first envisaged. I should also point

out that research on the effects of ammonia in horses is still much in its infancy – perhaps we koi keepers could tell the horse folk a thing or two about ammonia!

Testing for ammonia

If course, a lead to any matter relating to water quality always reminds me to caution koi keepers to continue testing the pond water through the winter months. It's often at this time of the year the filter will become clogged or cease operating efficiently and the joys of trying to sort the filter out on a bitterly cold January night. Do remember that all of the ammonia test kits are temperature sensitive, which means that either the pond water should be allowed to warm to a comfortable 20°C before testing or allow the reagents a period of at least an hour to develop at temperatures of between 3-15°C. The colder the pond water, the longer the reagents will take to develop any colour.

Anyone with a passion for koi and horses can find the article mentioned above in: *Equestrian Monthly*, November 1994 pp 43-47.

All that remains is to wish all koi keepers a pleasant, successful and ammonia free 2005! ■



PHOTO BY DAVID BEVAN

Above: It is important to test for ammonia, especially when first setting up the pond

Below: OK, when it comes to size fish are more discreet, but ammonia is ammonia...



Ponderings

Dave Bevan's monthly round-up of all things 'pondy'

Visit your pond

In the depths of winter there is little to do or see around the pond and in fact a visit on a dull damp January afternoon can be quite depressing.

However, regular visits are important because the local predators will be quick to

realise that all is quiet round the pond and a spot of daylight fishing may well be productive. At this time of the year a large part of the pond's surface is open, which coupled with semi dormant fish, would provide any of the predators with an easy meal.

These days herons, otters and mink may turn up during a hard winter with devastating results for the fish.



Water vole

DAVE BEVAN'S FISHKEEPER JANUARY 2011

MAKE ROOM FOR 'RATTY'

There was a time, years ago, when the water vole or Ratty as he is affectionately known as was a common sight on our rivers, streams and even ponds. As you walked along the bank on a quiet afternoon there would be a quiet, but distinct, 'plop' as it dived into the water.

Loss of habitat, pollution and predation by the now established mink has reduced their numbers by around 90% in the last 20 years.

Usually brown in colour, although in some places they are nearly black, they are about the size of a small brown rat but differ in that they have a blunt rounded face rather than the pointed face of the rat. Whilst they will do no harm to the pond inhabitants, they eat large quantities of plant material and in a small pond would seriously deplete the pond side vegetation particularly during the winter months.

Unfortunately, they burrow into the bank both above and below the water line but if you have a large wildlife pond or natural stream in the garden then they would be a great addition to the local fauna. These days, however, you are more likely to attract the unwelcome brown rat, but before reaching for the poison or trap just take the time to check out the newcomer.

COMMON EEL FACTFILE

Species	Common eel (<i>Anguilla anguilla</i>)
Other names	None
Other forms	None
Size	Males 30-50cm. Females 40-100cm
Weight	Up to 5kg
Availability	Occasionally found in specialist fish keeping outlets.
Habitat	Tiny elvers swim upstream and settle in small ponds and streams. When they reach maturity they travel out to sea to breed.
Identification	Tiny transparent elvers move up river to become yellow eels with a yellow belly, brown back and snake-like in appearance.

Common eel



When they reach maturity some years later they turn a silver colour before returning to the sea.

Pondfish value An excellent candidate for the small wildlife pond where it may breed given the right conditions.

**GAS BUILD-UP IN PONDS**

If you stand and watch the water surface you may notice bubbles rising periodically to the surface. This is not oxygen or even air but a gaseous by-product produced during the breakdown of plant material.

Here plant material can rot under anaerobic conditions (in the absence of oxygen) and one of the gasses produced will be methane or, in certain circumstances, hydrogen sulphide.

Produced in small quantities there is nothing to worry about as these gasses escape to the atmosphere. However, should the pond become covered with ice for long periods these gasses can build up below the ice with disastrous consequences for the fish or wildlife:

Water hawthorn

Originally from South Africa it is also known as Cape pondweed. A deep-water plant the water hawthorn (*Aponogeton distachyos*) represents excellent value for money as it is one of the first to flower each spring, continuing through into autumn. Provided it is planted in water of around 90cm deep it can withstand the worst of our winters. Whilst it is best in the full sun, it can also tolerate a reasonable amount of shade.

The tuberous rootstock can be contained within a planting basket and once established will send up bright green oblong leaves which float on the surface providing shade for the fish below whilst helping to control algal formation. The flowers which are white with a dark chocolate-tipped stamens are arranged in two opposite rows and give off a vanilla-like smell.

Look out for the yellow flowered species *A. desertorum* which is occasionally available but is more prone to frost damage than *Aponogeton distachyos*.



DIG A TEST HOLE

Under most circumstances using a pond liner is the easiest, cheapest and most versatile pond option. That is unless you have a naturally high water table, particularly if there are springs in the area.

What will happen? All may be fine until there is some heavy rainfall and then your liner will start to leave the sides of the pond and balloon upwards as the water pressure from below increases.

One solution is to dig a sump adjacent to the existing pool but not too close as to cause subsidence. The new sump should be deeper than the existing pond and lined with blocks or bricks to prevent wet soil from slipping. Install a pump with a float switch which turns on the pump when the water rises but you will have to make sure there is somewhere to discharge what may be a large quantity of water without causing a problem elsewhere.

Alternatively, you might be lucky enough to have found a spot where a liner is not necessary. Dig a test hole near by and if it remains full of water even in dry weather then you may be able to dispense with the liner.



Escapee mink

The feral mink which are now firmly established in our countryside were originally imported into this country to be farmed for their fur when fur coats were in fashion. Fashions change and whilst a few inevitably escaped many were released by well meaning, but sadly, poorly informed people who did not give a thought for our own native wildlife which has to try to live with the consequences.



Mink *Mustella vison*

Check your UV

If you had a green water problem last spring then a UV filter will help to control it. They are essential in any pond with a tendency towards overstocking. It will not solve the problem and in order to maintain clear water it must be fitted in conjunction with a pump to circulate the water and some form of mechanical filtration to remove the flocculated algae.

Apart from ensuring that water is circulating through the unit, efficient working depends upon the UV light passing through the water and this can be impeded by a faulty or inefficient tube or scale build up on the quartz sleeve.

Before the season gets underway check out the UV unit.

- When was the tube last changed? If there is no pale blue glow from the unit when switched on at night then a new tube is required. Check the manufacturer's recommended tube life and change if it is close to life end.
- Changing the tube can be quite difficult on some models but the Hozelock Cyprio unit featured below is very easy.

Step 1 – Disconnect electrical supply, undo screws in tube assembly and remove.

Step 2 – Remove old tube and replace with new – do not touch tube glass.

Step 3 – Carefully replace end cap assembly.

Step 4 – Use a screwdriver to remove the end caps.

Step 5 – Carefully push the quartz sleeve back and remove rubber 'o' ring.

Step 6 – Release sleeve from ring at opposite end and carefully remove the sleeve.

Step 7 – Clean the external surfaces of the sleeve using an acid based cleaner to dissolve the scale.

UV tubes can be changed with unit in situ but when working on the sleeve it is best to take the whole unit to a flat safe surface.



SCALE BUILD-UP

If your pond is alkaline then there will probably be some scale build-up on the outside of the quartz sleeve. With the Hozelock unit having removed the tubes for checking you are almost halfway there. It is not a difficult job but you must follow the manufacturer's instructions, replacing seals as recommended if the unit is to remain trouble free.

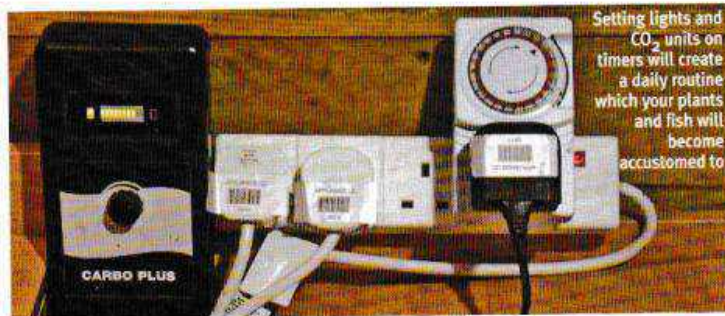


Want to know some hot tips and tricks to make the best of your planted aquarium? **Peter Hiscock** gives away some of his trade secrets



Scavenging fish, such as this cory, will help to redistribute waste and keep the substrate clean, so you don't have to disturb the plants as often

Tricks of the trade



Setting lights and CO₂ units on timers will create a daily routine which your plants and fish will become accustomed to

Understanding the basics and having the right plants and equipment will help you towards a successful planted aquarium, but to get that long-term edge, you need to have a number of tricks up your sleeve. There are many little nuggets of knowledge available if you search for them and ask enough questions to fellow fishkeepers and shop staff. In the case of these articles, it is often difficult to include these tips and tricks, as they may not fall under a particular subject. This month however, I will avoid any particular subject and simply provide a collection of useful tips in a random fashion, which hopefully will be useful in your pursuit of the planted aquarium.

Removing debris build-up

In a well-planted aquarium, it is difficult, and often detrimental, to regularly disturb the substrate with a gravel cleaner, and siphoning often results in the accidental damage to plant leaves. The solution is to cleverly position a few small filters or

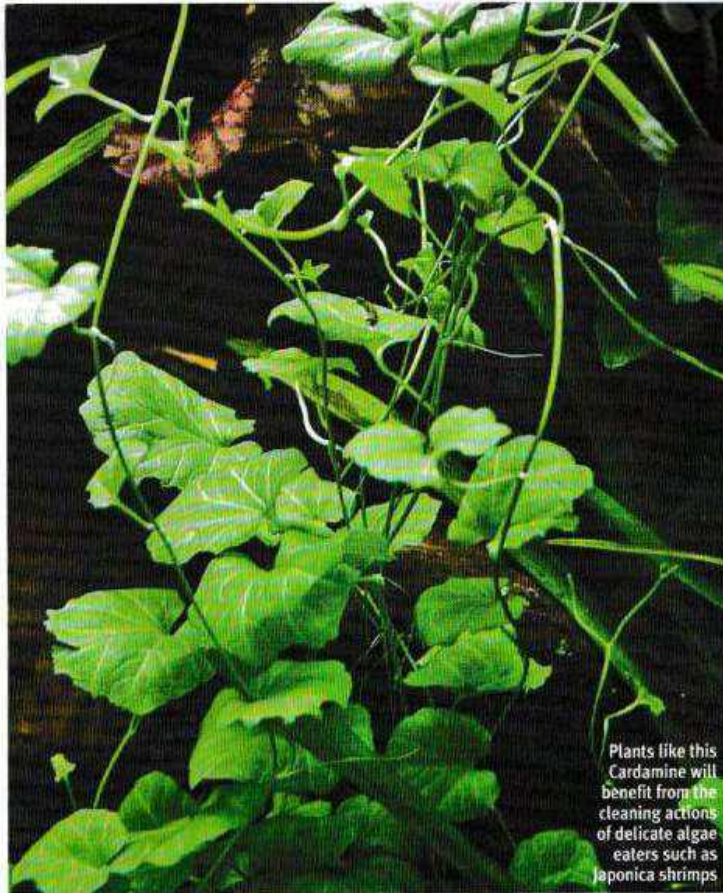
powerheads (with pre-filters) to create a water current in the areas where mulm builds up. This will redistribute the debris to areas where it is more likely to be removed by the main filter. The gentle flow of water will also benefit the plants by shifting water borne nutrients around. A team of small loaches or other scavengers are also very good at disturbing the top layers of substrate.

Use timers

If you use a CO₂ unit which can be switched on or off via electrics, set it on an automatic plug timer. This may seem common sense but the trick is when to set it. During the first hours of light there is plenty of CO₂ in the water from fish and plant respiration overnight, and in the last few hours of the day the plants can use up whatever is left in the water. Therefore, you can quite easily cut up to six hours out of your CO₂ dosing time, saving you money in refills. Set your CO₂ to come on a few hours after the lights, and to switch off a few hours before.

Water changes

In the pursuit of ideal water conditions, more and more fishkeepers are resorting to using pure forms of water to use in their aquariums. Whilst it is true that tapwater contains all kinds of nasties that can be dangerous to our fish, it is also one of the best sources of plant nutrients available. In a well-planted tank, regular small water changes (about 10% a week) will give your plants a boost whilst the plants will remove the nasties that are harmful to your fish.



Plants like this Cardamine will benefit from the cleaning actions of delicate algae eaters such as Japonica shrimps



Additives and treatments can be very useful, but should be added with care - overdosing can harm your plants

CUT DOWN YOUR USE OF CHEMICALS

There are all kinds of fertilisers, additives, treatments and so forth designed for aquariums and they do have their uses when used correctly. Having said this, people have been keeping stunning aquariums for years before these were available. No matter how essential a product would like you to think it is, you should consider such treatments as options and not necessities. Adding a regular concoction of treatments is more likely to hinder your plants than help them by overdosing with various substances. In a balanced system your plants should get most of what they need from the tapwater and fish waste, they may have to struggle a bit, but a restricted diet is healthier than a 'eat all you can' buffet. Providing that your plants get enough light, CO₂, and trace minerals, and there is a good deep substrate, all the nutrients they need should be provided by fish waste.

There is a common myth that plants do better in soft water, and admittedly, some do, but all plants require the minerals and nutrients, which are usually found in tapwater or mineral additives. A bit of experimentation may be required to find the best source for your particular aquarium.

Swap your carbon for a phosphate remover

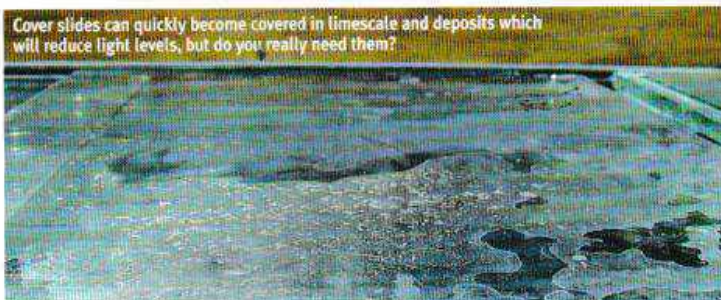
Chemical media's such as activated carbon will remove a wide range of pollutants, but they will also remove some useful plant nutrients. A large group of plants will actually do the same job as carbon, so it is not needed in a well-planted tank. If your tapwater is anything like mine however, it will contain a large amount of phosphate, which is perfect for causing algal blooms. For this problem, a dedicated phosphate remover can be used in place of the carbon. Test your water occasionally with a phosphate test kit and replace the phosphate remover whenever the test starts reading noticeable levels, in many cases following this 'as and when' method of replacement is much cheaper than religiously replacing the media every month or two.

Look after your light tubes

Fluorescent tubes, if used without a condensation tray, will soon develop a coating of limescale or algae if they get regular splashes of water. This will significantly reduce the amount of light reaching your plants. A simple monthly wipe will keep them in top condition. Light tubes should always be replaced every 12 months, even if they appear to be working fine. You may not be able to notice it with the naked eye, but after 12 months most tubes output is significantly reduced. A simple way to increase your lighting is to add reflectors, which can increase the amount of light your plants receive by about 30%.

Remove condensation trays

Condensation trays are designed to stop water from reaching the light tubes, as we all know, water and electricity do not mix. Most fluorescent light tubes now have waterproof end caps that prevent such problems, and if yours don't, you can purchase them from most shops. It doesn't take long for condensation trays to develop a build up of limescale and algae deposits, removing your condensation tray will greatly improve the amount of light that reaches your plants. This solution may not be ideal for wooden hoods, which can warp if they are constantly damp.



Keeping your light tubes clean and replacing tubes every year will ensure the best possible output

Add some Japonica shrimps

Japonica shrimps (*Caridina japonica*) really are a great addition to a planted tank, and in many cases will become your tanks unsung heroes. These little shrimps will tirelessly remove and process algae and debris, keeping your aquarium and plants sparkling fresh. The shrimps will hardly ever eat live plants, and will remove the types of algae that most fish leave behind. For very fine leaved plants and mosses, they are just about the only critters that will remove the little bits of debris that collectively hinder those plants.

Use a small grade substrate

In many occasions of plant failure, the problem is due to the substrate being too large. Large grades allow oxygenated water to pass freely through the substrate, and in the process, removing all the useful elements and nutrients that the plants depend on. Use a fine substrate of around

1-2mm, but not quite as fine as silver sand, and mix in a nutrient rich additive such as laterite based medium. If changing your substrate seems a little drastic, try using some object rooting plants, which do not require a substrate at all. ■



PHOTOS: PETER HESLOK

Test your water regularly

Test kits can be a little expensive for some budgets but most retailers will provide a water testing service for a small fee. The number of fishkeepers who never test their water always amazes me. I am not therefore, amazed by the number of aquariums I have seen experience plant and fish deaths due to bad water conditions. Even if the real nasties for fish such as ammonia and nitrites are at safe levels, it is a good bet that nitrates, phosphates, pH and hardness levels will change over time. Although plants do use up nitrates, high levels will be harmful, and dangerous to new and existing fish. pH needs to remain stable for a healthy tank but can fluctuate wildly if hardness levels drop and CO₂ is being used, especially if soft or pure sources of water are being used. It is very easy to spend money on test kits, find out your water is fine, and think what a waste of money that was. The alternative is to not spend money on test kits, and wait for disaster.

What do you need to be successful with corals?
Alf Jacob Nilsen gives a few pointers



ALL PICS BY BOOJITTE PHOTO: A.J. NILSEN

Coral considerations

It is several years since keeping corals in captivity became common amongst marine enthusiasts. Technical developments and new knowledge about coral care have caused corals to thrive and grow in the home aquarium. However, corals must still be regarded as fragile animals that need careful attention. Most corals come from the tropical coral reefs, which are ecosystems put under a lot of pressure these days. As marine hobbyist we have a great responsibility – corals are live animals and not just colourful 'stones' to play with. This

article introduces you to the most important factors to consider when you want to keep live corals in your marine aquarium.

What are corals?

This is not an easy question to answer, as there are many ways to approach the issue. However, it is a fact that some knowledge about the general biology, organisation and ecology of corals is essential to successful aquarium keeping of the group.

Corals are animals shaped as polyps that have evolved to occupy two basic types of organisation. The polyps either live alone as 'solitary corals' or live together as 'coral colonies'. Coral colonies can be small, medium-sized, large or even gigantic, and the largest colonies found in the wild are hundreds of years old containing hundred of thousands individual corals animals. Corals are found from the shallowest tropical waters to the cold waters of abyssal seas.

Corals belong to the *Phylum Cnidaria* (Nettling animals) and to the *Class Anthozoa*. These are primitive animals that do not – like most of the closely related jellyfish or hydroids – have a medusa life stage. The polyp is designed to capture food with tentacles and to protect itself with stinging cells known as nematocysts.

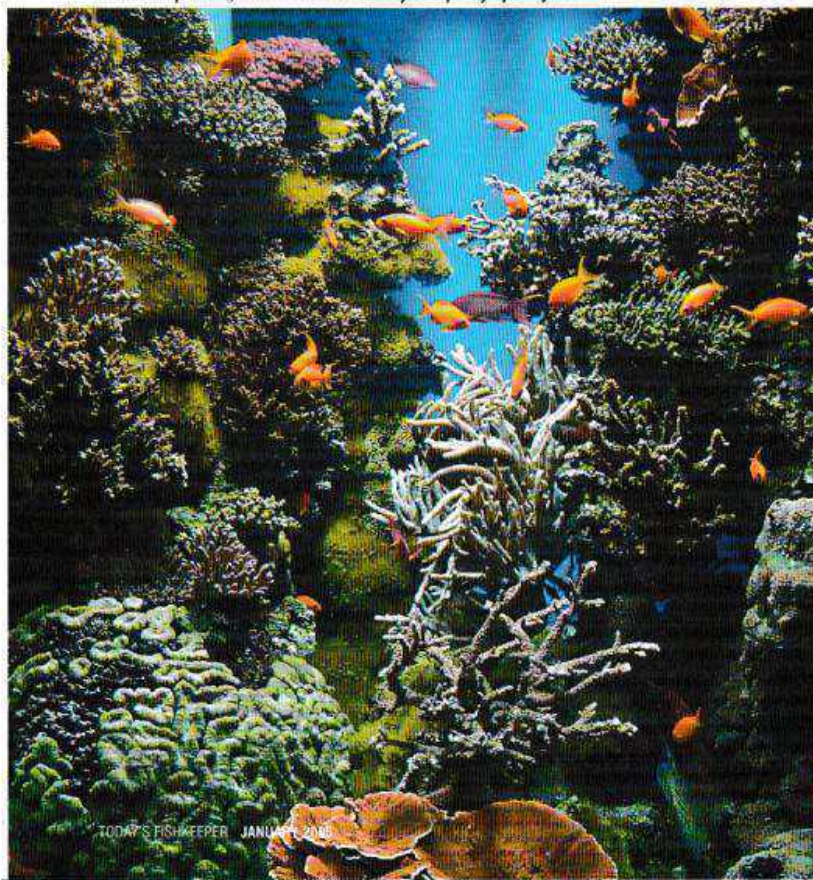
The most common corals met in the aquarium trade belong either to the order *Alcyonacea* (octocorals) or to the order *Scleractinia* (Stony corals). In these two systematic groups alone there are at least 180 genera and several hundred known (scientifically described) species of corals as well as many species that are not yet known.

Octocorals

The octocorals contains a number of sub-groups (orders). Best known are the soft corals and the sea fans. The soft corals are as the popular name suggests, soft to touch. This means that they do not have a hard skeleton and that their colony tissue can be retracted often with the result that the individual coral animals (polyps) are hidden completely. The tissue of soft corals is, however, reinforced with supporting calcareous spicules (needles). The sea fans are more rigid than the soft corals and designed to thrive in strong current. Their design makes them both flexible and strong and their tissue is filled with spicules.

Stony corals develop a complex calcareous skeleton that contains thousands of small chambers in which the individual polyps live. The skeleton is built from calcareous compounds dissolved in the surrounding water and feels very solid

A very large coral tank with a large diversity of corals, belonging to Monaco Aquarium, which runs their facility as a partly open system



TODAY'S FISHKEEPER JANUARY 2016



UV radiation increase

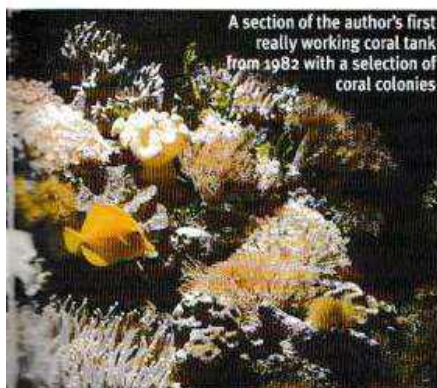
If the UV radiation for some reason is suddenly increased – by changing the bulbs, lowering the distance between the lamp and the water level or adding more lamps – expect a negative reaction among the corals. There might be a severe loss of symbiotic algae and in severe cases the coral tissue might die.

and hard to touch, but the individual polyp is soft and connected to the neighbouring polyps by a soft tissue. It is the stony corals that build the huge calcareous structures that we know as coral reefs.

Photosynthetic or non-photosynthetic?

This is an essential question when it comes to keeping corals alive in captivity. It is also yet another way to divide and group the corals.

Photosynthetic corals contain millions of microscopic, single-celled algae (known as zooxanthellae) in their tissue. These tiny, but numerous algae symbionts do – like all plants – utilise light energy to carry out photosynthesis where nutrients (sugars) are produced from water and carbon dioxide with oxygen as a bi-product. Consequently photosynthetic corals need light and are found in the upper 20-30m of reef zones, often in the upper few metres where the irradiance is intense. Parts of the nutrient generated by the symbiotic algae are translocated to the coral host. In other words... photosynthetic corals are not completely depending on capturing food as they benefit from energy supplied by their symbiotic partners. How much of the coral's energy budget that is filled this way varies a lot. In a few cases the algae contribute to all the energy the corals need to generate, while in most cases the corals need to capture a lot of plankton in addition to obtain enough energy to support the vital life functions. Anyway, the zooxanthellae is the vital factor for building tropical coral



A section of the author's first really working coral tank from 1982 with a selection of coral colonies



The stony coral *Goniopora* sp. is a typical colonial coral. Here its long polyps (individual coral animals) are expanded fully

reefs as well as for keeping corals alive and growing in the captive environment.

Non-photosynthetic corals do not have symbiotic algae and depend completely on capturing food for survival. Their food sources vary, but live plankton in many forms composes a majority of what is captured. Non-photosynthetic corals live in the shade or in semi-shaded spots such as on the underside of boulders, in vertical slopes, in caves or in deeper waters.

From an aquarium point of view, photosynthetic corals are much easier to keep than non-photosynthetic ones. So, the rest of this article will deal with photosynthetic corals only.

Light in the coral aquarium

To keep photosynthetic corals in captivity we have to deal carefully with aquarium illumination. To this group of corals 'light is life'. There are many aspects on lighting that aquarists should study, and I advise you to read the suggested titles listed at the end of the article to get detailed information on this as well as on other subjects related to keeping corals in captivity. Here are the basics, however:

Light quality

By light quality we mean how well the light that shines from our aquarium lamps compares to the natural daylight spectrum that hits the corals in their natural environments. The daylight spectrum shines from violet and blue (around 400 nanometers (nm)) to red (around 780nm). With shorter wavelengths than violet is ultraviolet radiation, and with longer wavelengths than red is infrared radiation, also known as heat radiation.

Plants absorb light because they have light sensitive pigments in their cells – this is the same with symbiotic algae. Although

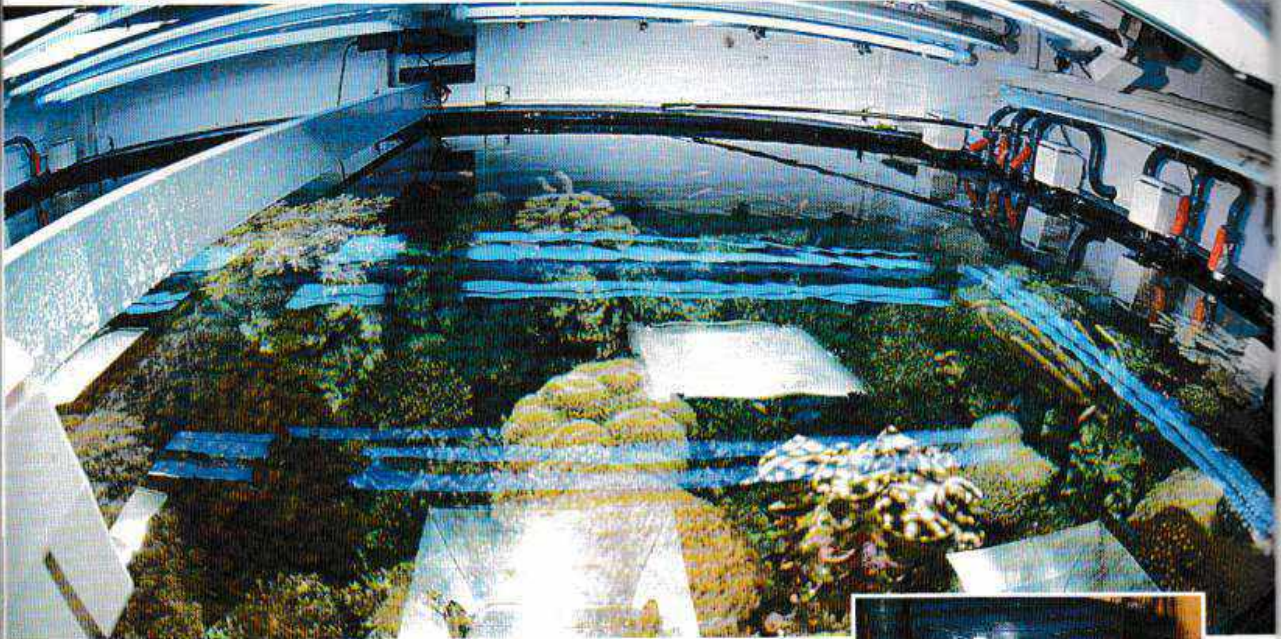
the individual pigment absorbs best in certain wavelengths of the spectrum, in some the complete daylight spectrum, from 400-800nm, is used. Luckily, there are many artificial light sources available that mimic the natural sunlight almost perfectly. Light tubes as well as metal halide lamps radiating 'daylight' light quality can easily be obtained for the coral tank. There are so many sizes, brands and types on the market that it is impossible to go into details here. Personally, I prefer a combination of daylight metal halide lamps in combination with blue-actinic tubes and/or blue metal halide lamps (giving off more blue than red wavelengths). The input of 'blue' – besides having a biological positive effect – gives a pleasant and natural look to the water column. The light period should be around 12-13 hours, including twilight created by the blue light tubes.

One should, however, be aware that most light sources also radiate ultraviolet radiation of which the short wavelengths UV-B (315-280nm) can burn corals severely. In the wild the corals protect themselves to these radiation by secreting colourful UV-protective pigments. The even shorter wavelengths UV-C (280-100nm) radiation that is blocked by the Earth's atmosphere in the wild is deadly to living tissue and will rapidly kill the corals if the colonies are exposed to such radiation. Do therefore, always keep the protective lens intact on metal halide fixtures. On the other hand the not so harmful UV-A (380-315 nm) radiation can be beneficial to the corals and can if used carefully cause the corals to develop colourful pigments.

How much light?

By light quantity we mean the amount of light that hits the surface of our aquarium. In general you need moderate to strong light to keep photosynthetic corals. As a rule of thumb I would say that for every metre of aquarium length you need one 250 Watt (W) metal halide daylight lamp if the

Metal halide lamps and blue-actinic light tubes reflect in the surface of a large coral reef aquarium in Germany



aquarium is not much wider than 80cm and 60cm deep. It is, however, a good idea to let one half of the tank be brightly illuminated while the other half is illuminated with weaker light. Another option is to let the top of the water column be heavily illuminated and to build the decoration in a way that it creates shadows towards the bottom. This will create interesting effects and will give room for coral with different requirements to light to thrive.

Also small aquariums – that is from my personal definition tanks that are less than 200-300 litres in volume – can very well be illuminated with light tubes only. Light tubes can also very well be used in larger tanks if these are not too deep. Adjusting the distance between the surface and the lamp can also effectively regulate the amount of light. Both light tubes as well as metal halide lamps lose their power and quality over time and must in general be replaced regularly, like once a year.

Adaptations to light

Perhaps the most vital thing to consider when it comes to light is the fact that the corals will adapt to your tank's light regime

Symbiotic algae (zooxanthellae) extracted from the tissue of a coral polyp



over time. The concentration of zooxanthellae, the colony shape and the colours and the amount of protective pigments of your colonies will reflect your light regime. If you change your light regime you must expect that this will cause biological changing among your corals. Act carefully and with great consideration when you alter your aquarium illumination!

Water quality

Hundreds of pages could have been written on this subject when it comes to coral care. Basically we do need relatively nutrient poor conditions when we want to keep photosynthetic corals. By nutrient poor we basically mean low concentrations of dissolved phosphate and nitrogen compounds. The reasons for wanting a tank low in nutrient are several; the natural environment (the water over the tropical coral reefs) is poor in nutrient, too much nutrient causes uncontrollable growth of various algae and too much nutrient will over time decrease pH – just to mention three causes.

How do we achieve a favourable condition? Basically by filtering the water through a protein skimmer. The protein skimmer has proven for years to be the very best method for water treatment in a coral tank. There are certainly other options, but when it comes to a relatively densely-stocked coral community aquarium, the protein skimmer is the best filter. The skimmer's secret is its ability to remove organic compounds from the water before bacteria break these down. In this way the amount of algae nutrient set free in the system is minimised.



The protein skimmer is the main filtration tool of a coral aquarium. The skimmers come in many sizes, types and brands today

Choosing a skimmer

There are many brands and type of skimmers on the market and again it is impossible to go into detail here. However, a few basic rules should be followed:

- Do not over-skim. Although there are gigantic skimmers available, use a skimmer that fits your aquarium. Ask your dealer and consult other enthusiasts.
- Do clean the skimmer regularly. Some skimmers are 'self cleaning', in any case it is important to keep the skimmer clean, especially in the tube where the scum builds up.

Diverse growth of stony corals on the Great Barrier Reef, Australia



■ The adsorbat (the stuff skimmed off) should be dark brown and containing as little water as possible. If the scum is too light in colour, it contains too much water. Reduce the water flow, increase the distance from the water level and the scum cup or adjust the amount of air.

Importance of calcium

While it is important to use the protein skimmer for removing waste products and keep the water relatively poor in nutrient, it is equally important to add specific compounds when keeping stony corals in captivity. Most important is to add calcium.

Calcium is accumulated in the coral skeletons and also in the tissue of other calcium-fixing organisms such as calcareous algae. During the last decades several different techniques for adding calcium to the marine aquarium have evolved. 'Kalkwasser' has been used since it was introduced by Peter Wilkens in Germany in the early eighties. The more sophisticated 'calcareous reactors' that use carbon dioxide to dissolve a calcareous medium have become popular during the last few years. The chemistry of aquarium calcium is complex. It is important that you – as a responsible aquarist that wants to grow the delicate stony corals – reads about calcium carefully. The topic has been dealt with in numerous books and articles, which I strongly advise you to read (see textbox).

Activated carbon

Another possible filtration that was much used in Germany, especially during the eighties and nineties, is filtration over high quality activated carbon. If the water, despite skimming, turns yellow it is a sign that complex colourful compounds have built up in the aquarium. Some of these compounds are hard to remove except by using activated carbon, which absorbs the elements. Personally, I have been using small amounts of carbon (0,5 – 1,0kg) in 850 litres water regularly with success. However, too much filtration over carbon can cause coral to bleach and react negatively. As the water gets more transparent when the colourful compounds are removed, the amount of UV-radiation that hits the corals increases. Also chemical



elements that the corals need to build protective pigments towards UV as well as trace elements that the corals generally need, can become depleted when a high carbon filtration rate is used. Observe the reactions among your corals carefully.

Helpful decor

The decoration itself can serve as an important biological medium and will help stabilise the environment if it is made from a biological medium such as live rock. From the rock tiny algae and organisms develop and over time a diverse and interesting flora and fauna of macro-organisms occupy your aquarium. At this point it is appropriate to mention yet another important factor in keeping corals successfully... patience! Let the aquarium stabilise; go through a break-in period of several months before you stock it with corals. Far too many tanks have evolved negatively because the aquarist has been impatient and stocked the tank too rapidly.

Food

While plankton is essential to non-photosynthetic corals, one may ask: "Do I have to feed my photosynthetic corals?" Certainly a wise question, but a difficult one to give a simplified answer to. It is a fact that most photosynthetic corals do eat plankton even if their symbiotic algae fill most or a lot of their energy budget. If you take a look at your coral aquarium during the night and use a torch to illuminate the coral's branches, you will clearly see how the individual polyps are expanded searching for food. Try to feed them with enriched brine shrimps or other live plankton, and you will see how greedily they capture what you offer. If you feed too much, you will probably increase the amount of algae nutrients in the system and filamentous algae will start to grow heavily. If you feed too little you might see that some of the corals do not thrive. The solution must be to feed optimally and to

learn by experience and careful observations what the organisms in your personal aquarium require.

What else?

In a few pages we can only really touch on a complex subject like coral care. There are still many things to consider, such as: How many species can I keep in one tank? How will the different corals affect one another? Which organisms must I avoid as they prey on stony corals? How can I observe that the corals grow? When and how can I take cuttings? These are just some of the many interesting questions that can be asked about the stony coral aquarium.

Two key words should be mentioned here: 'observations' and 'reading'. Only by observing what goes on in your aquarium carefully and regularly can you record how your tank develops. And only by reading what other enthusiasts have experienced before you and what scientists and amateurs have discovered, can you adjust your tasks correctly. ■

The polyps of a non-photosynthetic stony coral from the genus *Tubastraea*. The polyps are large and built for capturing almost any plankton that pass along the colony



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Frilled dragons

Val Davies looks at dragons for the more experienced keeper

Truly impressive lizards, resembling something from the age of dinosaurs, frilled dragons are native to Indonesia and tropical northern Australia. Growing to 75cm total length these arboreal creatures require spacious surroundings. Frilled dragons have a distinctive loose frill of scaly skin attached to the neck. When at rest it resembles a cape on the neck and shoulders but when erect it encircles the head and neck and in full grown males can measure 30cm from edge to edge. Together with hissing and an open mouth the extended frill is an effective warning to an enemy. The intention is to bluff either an opponent (in the case of competing males) or a predator into believing the animal is bigger than it really is. Frilled dragons are also one of several Agamids with powerful hind legs and long tail which facilitates bipedal motion – that is running on hind legs to escape danger. Adult coloration varies from slightly olive to greyish brown with light banding on the tail and marbling on the flanks. Frills can often be grey, black even yellowish. Specimens from Western Australia and Northern Territories have red or orange in the frill. Younger specimens tend to be grey with white and black marbling.

Related to the Thai or Green water dragon (*Physignathus cocincinus*) this species is found in the margins of waterways in



Adult male Australian water dragon

eastern Australian and New South Wales. It is a powerful swimmer and readily takes to the water if disturbed. Although growing to the same length as the frilled dragon, *P. lesueurii* is somewhat more heavily bodied. It has prominent but soft spines on the nape of the neck and along the dorsum, long powerful limbs for climbing and a laterally compressed tail to aid swimming. Coloration is olive to brown with a dark stripe running from the eye to the neck, darker bands on the body and a reddish chest and ventral surface. Young specimens sport darker coloration and lack the reddish ventral area.

General care

Both species are large, active creatures and an adult or adult pair will require a vivarium approximately 120 x 75 x 120cm high. Substrate can include orchid bark, potting compost, and leaf litter and sphagnum moss. Branches for climbing should be firmly fixed to avoid accidents. At least one branch should be placed near to a basking spot. As the dragons grow branches should be replaced with thicker ones – as a guide a branch should be slightly thicker than the lizard's body. A large water container, such as cat litter tray, must be provided. Since both species will use this for defecating it will need to be changed and scrubbed at least once a day. The strong claws of the adults will shred plant leaves so plastic ones can be used effectively to provide concealment (See tip below).

These are diurnal lizards which require UVB fluorescent tubes and thermostatically controlled basking lights. An ambient daytime temperature of 30°C with a hot spot of 35°C and night temperature of 24°C should be aimed for. A photoperiod of 14 hours is needed. Whilst heat mats may provide a little heat they do not create the temperatures or light needed to allow these lizards to exhibit normal behaviour patterns. Humidity levels



True pair of part-grown frilled dragons – note the difference in size of frills

should be about 70-75%. Although water evaporating from the pool will help to achieve this a daily spray using tepid water will be necessary. The dragons often prefer to lap spray water than drink from the pool. Both species have voracious appetites.

What to feed

Crickets, locusts, wax moth larvae and morios are eagerly taken. However, the last two items can be hard to digest in large quantities and are high in fat. Some advocate the feeding of pink mice, and whilst in the wild the dragons would possibly consume such a food item, in captivity these can produce obese animals. Insects should be gut loaded to increase their nutritional value and dusted twice weekly with a good quality multivitamin/mineral supplement. Young specimens should be fed daily, adults four times a week.

Wild caught frilleds are sometimes available but most specimens will be captive bred, and all specimens of the Australian water dragon are captive bred. More are available and this means the price has come down. These are large, powerful lizards but when obtained as youngsters tame very quickly. Our male frilled dragon would often leap out onto a shoulder when the vivarium was opened and contentedly sit there. ■



TOP TIP It is easy to supply terrestrial lizards with hides to provide a sense of security. Arboreal lizards also need to feel secure but larger specimens are too heavy for most plant leaves. Plastic/silk plants can be wrapped around branches and fixed to the sides of the vivarium. They can also be hung from the roof as effective aids to concealment and thus prevent stress in arboreal creatures. However care must be taken to avoid placing such furnishings too close to heat and light fittings.

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...End Point

Whenever I see a tank of these fish at a shop I wonder how many will either cause problems in their purchasers' tanks or will face a future of slow starvation due to a lack of understanding of their needs. However, if you are looking for something really out of the ordinary then these fish are well worth giving a tank of their own. It is by keeping these fish under these conditions that their fascinating behaviour can be fully appreciated. If we consider the characteristics of this West African fish then we can obtain clues as to how these fish should be kept. Firstly, the position of the mouth and the shape of the body show clearly that this fish is a surface swimmer. One look at the sizeable mouth, which resembles a drawbridge, shows that this fish cannot be trusted with smaller community companions. Thirdly, the wing-like fins show that this is a fish that is more than capable of jumping. It was the study of these characteristics that I considered when I decided a couple of years ago that I was going to set up a species tank to study these fish further. Considering their natural habitat I used a 75 x 30 x 30cm aquarium, deciding that this would be suitable for keeping a pair. Deep water is not required so the tank was only filled to a level of 20cm. The books that I read said that in the wild they are found in soft, slightly acid, water; so I was lucky in that I could use untreated Birmingham tap water. All that I read suggested that water quality was most important as any deterioration in this could lead to fin disintegration along with a loss in appetite. As they do not like too much water movement I used two small internal power filters to provide the water conditions that I required. In order to provide some surface cover I used Indian Fern as a floating plant. When I went to purchase my fish I was lucky to find a shop that had about 20 individuals for sale. By comparing this number of specimens I was able to pick out what I was certain was a male and a female. The female was much lighter in colour, with a much heavier body and shorter fins. The male was thinner, darker, with extended anal and caudal fins. The female was 10cm long with the male being some 2.5cm smaller. Indeed some reports state that the central rays of the male's anal fin form a tube while that of the female is straight. My fish would not accept any prepared foods of any kind although they would snap at frozen foods as they fell through the water. Any food that reached

Pantodon buchholzi,
Butterfly fish

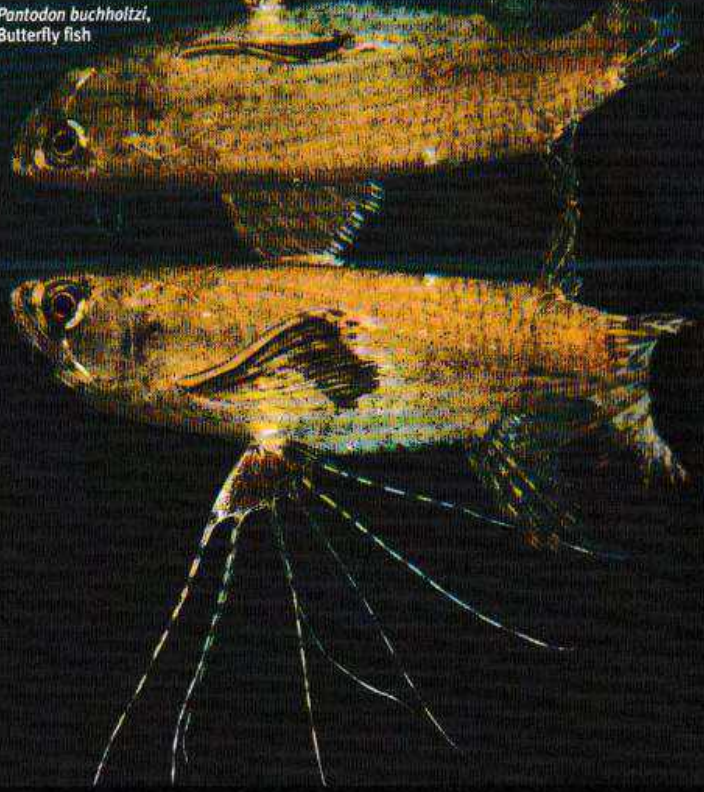


PHOTO: www.photomax.org.uk

the bottom of the tank was totally ignored. The favourite foods were surface living insects and mine relished crickets, mealworms, maggots and above all they loved jumping for flies. In order to provide a constant supply of flies I placed uncoloured maggots in a dish, which was floated on the surface of the water. It became obvious that with these fish being such good jumpers, and needing to keep the flies in the tank, that a secure lid was going to be a necessity.

Breeding

Over the two years or so that I kept these fish in this set up I never noticed any signs of either courtship or any other mating behaviour. However, there have been several reports of these fish being bred in captivity. They are supposed to spawn over a period of a number of days with the fish laying eggs each day. These eggs then float at the surface of the water and some authors scoop them out in order to hatch them in another tank. Other authors have left the eggs with the parents where the male has raised the eggs and the young in its mouth for a period of up to 60 days. The eggs are transparent when laid but over nine hours or so turn a dark brown in colour. These hatch after some 36 hours. The fry are said to be very difficult to raise. They accept newly hatched brine shrimp as a first food and regular water changes are most important.

Paul Skinner profiles the intriguing Butterflyfish

PROFILE

Name:

Pantodontidae

Scientific name:

Pantodon buchholzi

Size:

Male 7.5cm; Female 10cm

Tankmates:

Not for the community aquarium

Distribution:

West Africa from the Niger to the Congo

Diet:

Frozen: Prawn and bloodworm. Live: Crickets, mealworms, maggots and flies

Temperature:

28-30°C