Today's Fishkeeper

APRIL 2003 £2.95

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Welcome

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A couple of weeks ago I was watching the television (as you do) when a programme entitled Britain's worst pet shop came on. A quick run down of the people in the frame left me more than a little surprised. Firstly only two of those featured have pet shop licenses, and one of those was an aquatic outlet in a garden centre. All the rest operated on the fringes of the industry. One person was selling birds out of appalling temporary premises and another was the owner of exotic animals who went round schools talking to children about them. In the process he pulled a lizard out of a sack with such force bits of sacking went flying. All good stuff and obvious candidates for "Britains worst", but pet shop? I think not.

Anyway back to our aquatic outlet run by Steve Haswell who actually won the award for "Britain's worst pet shop". Throughout its coverage of Steve's shop nothing was ever said about the state of his tanks. Nor was it ever claimed that the outlet was in anyway substandard. I am sure if they could have found something wrong with it they would have done. Instead Steve won the award because he knew someone who could sell the undercover team a lion! Yes, you read it right, a LION! The lion was duly sold without any paper work from Basildon Zoo and Steve won his award. Fairly or unfairly? I leave you to answer that question.

Dyed corals

For years now we have been campaigning against dyed fish and on the whole had a good response from the trade. Sadly, we still see them from time to time, but few reputable aquarium shops will stock them. Dyed corals are something of a new phenomenon over here, but now the UK is being targeted as a potential market for these poor animals, we have to redouble our efforts to persuade the trade not to stock them. I am pleased to say all the aquarium shops which specialise in marines I have spoken to about this problem have been totally opposed to this cruel practice and would never stock them. If readers do come across anything like this we would like to know. Please ring or e-mail the editorial team saying when and where you saw them. We will keep you posted if anything develops on this front.

Happy fishkeeping,

Derek

Thanks to everyone who sent get well messages after I broke my wrist. It is now out of its cast and beginning to move again. The typing is still a little slow and I can't carry heavy weights yet, but it passed the main test yesterday – tying a knot in a fish bag!

APRIL inside this i

TROPICAL/MARINE/COLDWATER

MARINE

PONDS & COLDWATER

10 PRICELESS PEARLS

Mary Sweeney creates a community around Pearl Gouramis.

WANT TO VISIT THE AMAZON?

The Xingu Experience. Make your dreams come true and join Today's Fishkeeper on the trip of a lifetime visiting the Rio Xingu in Brazil. – see page 80

ssue of Today's Fishkeeper

TROPICAL

Cut out and keep
57 Rainbow emperor tetra

BEGINNERS

NEWS & PRODUCTS

page 82

PLANTS

REPTILES & AMPHIBIANS

REGULARS

KEY TO SYMBOLS:

Keep an eye out for these handy symbols to help you with your fishkeeping.

Starting Point...

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

A pair of Socolof's bleeding heart tetra (*Hyphessobrycon socolofi*).

THE HEART BLEEDS

Tetras are often featured in this column because they have many of the attributes needed for community life. There is a wide range of them readily available through aquatic outlets, so this month let's look at Socolof's bleeding heart tetra which is more commonly seen than the true Bleeding heart tetra *Hyphessobrycon erythrostigma* (the name's quite a mouthful for such a small fish). These fish are adaptable to normal aquarium conditions although, in common with many tetras, they prefer slightly acidic water. They need to be kept in a shoal where they will display their lovely coloration. They have a high dorsal, are named for the large red spot in line with and a little behind the eye, and the lower half of the body is suffused with a pinkish glow. When the fins are fully extended, as they are when tank conditions are to their liking, they are beautiful little tetras that only grow to 5cm and fit in well with a community of small fishes.

Look out for these and buy 8-10

Sharing your experiences and ideas with others is one of the great pleasures of fish keeping. You are lucky if you have someone in your household who shares your interest in the fish, and contacts through the internet are valuable, especially as distance is no object in maintaining regular and speedy interaction. There is, however, nothing to compare with meeting other hobbyists.

My first contact with other hobbyists was at a large fish show, where I could look round the fish and talk about the exhibits and about fish keeping in general. Through these contacts I joined a fish club and was very lucky in my choice. It was a lively, active club and I visited members' set-ups and ponds. We hired minibuses to go on shop tours and went on pond hunts, ever widening my horizons and deepening my interest. Visiting set-ups is always very interesting and lasting friendships can be formed in this way. There are specialist societies for Anabantoids, Catfish, Cichlids, Goldfish, Killifish, Livebearers, Rainbows and Gobies and you will find many experts in them. They also hold auctions and conventions and produce interesting magazines. Through these societies you can obtain many species of fish that you will be unable to find in the shops, and advice is readily available on how to keep and breed them. Many of their leading members write articles for this magazine. Through my specialist society I have been able to visit and stay with fellow aquarists in other parts of the world, looking at their set-ups in the real world and exchanging fish. There really is nothing like it and you can't get that kind of experience on the internet.

Today's top tip

Ensure that the lid on fish food containers is firmly replaced after each feed. Always store in a cool, dry atmosphere. Damp flakes deteriorate quickly and, if wet, should be discarded not stored.

WARNING

Never leave fish food containers balancing on the edge of the tank. I've done this and the container fell in. What a mess!

Usually sold at a small size the Red Hook Metynnis is the best known of the Silver Dollars.

DOLLARS FOR YOUR TANK

Silver Dollars are disc shaped characins and, beautiful as they are, create some problems for their owner. Red Hook Metynnis grow to about 15 cm which is a moderate size but they need large, deep tanks (at least 120 cm long) as they are almost as deep as they are long. They are very active nervous fish and their skittish behaviour can lead to a leap from tank to floor even through the smallest gap, so a tight fitting lid is essential. They are strong swimmers using the aquarium space to the fullest extent. A solitary Silver dollar becomes extremely nervous and two only tend to fight, the stronger bullying the weaker even to the point of death. Otherwise these fish are easy to keep and adapt well to a range of aquarium conditions. Planted tanks, however, will be decimated as even the bitter tasting Java Fern that is shunned by most fish will be chopped down. They need to be kept in a shoal and a shoal of these beautiful, ever moving Silver dollars is truly a sight to behold.

The Red Hook Metynnis is not a fish for the plant lover

Lost for Words

Ceramics: This refers to the variety of hollow ceramic shapes that are used as filter media. Water flows freely through them and can be used in a series of media in a filter. Easy to wash (in mature water) for reuse.

Condensation tray:- Perspex or glass sheet installed between the aquarium and the hood to minimise evaporation and prevent electrical connections from becoming wet.

Dither fish: These are fish placed in a tank with other fish to settle them down.

Gas Exchange: Carbon dioxide is given off and oxygen is absorbed only at the water's surface where air and water meet. The greater the surface area of the water, the more oxygen can be absorbed. This is why the measurement of the surface area is important in calculating the number of fish that can be kept in a tank. In waters that are depleted of oxygen, fish can be seen gasping at the water's surface in their search for oxygen.

Mature water: Water that has gone through the nitrogen cycle via filtration and contains a good population of nitrifying bacteria that eliminate ammonia and nitrite.

Pancaking: This usually occurs in flat sided fish where the fish panics and skims along the water surface on its side.

pH shock: This most frequently occurs when fish are transferred from one tank to another without testing the pH. A sudden change in pH can cause such stress to the fish that it dies.

HERE'S A PLANT WORTH CONSIDERING

***Alternanthera reineckii* is a fast growing and adaptable plant with long, narrow leaves approximately 10 cm in length. Stems need to be planted separately, about 5-10 cm apart. This is the bronze form which is a very attractive colour form but it needs good light intensity otherwise the leaves tend to be green rather than a very attractive copper red.**

DOWN IN THE MOUTH

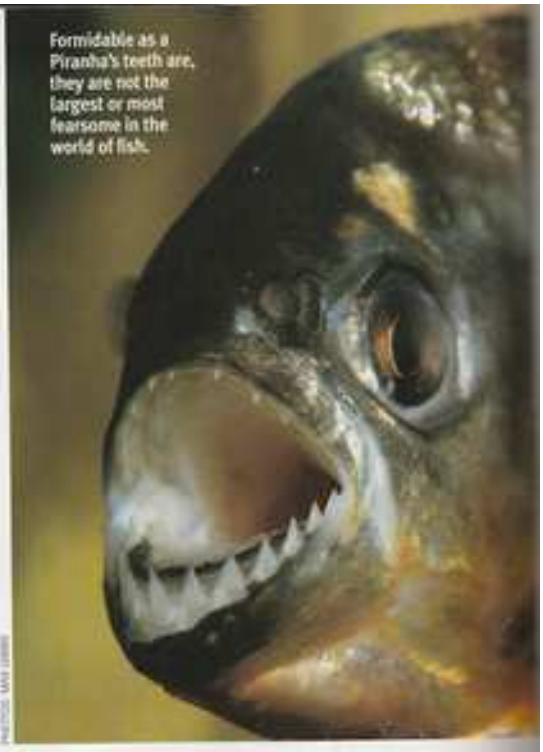
The mouth of a fish gives you a visible indication of the size and type of food most suitable for your fish. Barbs, Danios and Goldfish have toothless mouths but they have teeth in their throat (pharyngal teeth) which cut the food before it is swallowed. Cichlids and Characins have teeth that tear larger pieces into small pieces and they sometimes have pharyngal teeth as well to break food down further. The size of the mouth also dictates what foods can be easily taken in. Some Cichlids and Catfish have very big mouths.

Sucker mouthed catfishes are so named because their lips form into a suction pad for hoovering around tank surfaces. Thick lips hide the teeth of some Cichlids and the teeth are all too visible in predatory fish such as the Piranha. Under slung mouths indicate bottom feeders, upturned mouths indicate surface feeders. Carnivorous fish have sharp gill rakers as well as teeth on the tongue. Fish with numerous and closely crowded gill rakers eat small foods.

The mouth says it all!

Top of the pops' in fish food

Nowadays we are very lucky to have nutritious flaked foods readily available. Most fish keepers have busy working lives and flakes are easy to store and easy to feed. These may be convenience foods but quality flake from reputable manufacturers has been laboratory tested and contains all the ingredients to provide the fish with a staple diet. Convenient they may be, but flakes are worth their weight in gold. According to Baench 36 million fish kept in Germany consume 500 tons of flake a year! I guess that's a good indication of its popularity. Many of the fish we keep in our community tanks thrive on today's convenience foods and 'top of the pops' is flake. ■



Formidable as a Piranha's teeth are, they are not the largest or most fearsome in the world of fish.

The ten golden rules of fishkeeping

Read all about it

Take the first steps in fish keeping by finding out all you can about caring for your fish.

a) Manufacturers often provide free booklets about fish care.

b) Inexpensive books provide information on setting up.

c) Today's *Fishkeeper* experts are on hand with help & advice and sections of the magazine are devoted to beginners.

THE WATER

❶ **Testing:** Before introducing any fish to your new tank test the water for Ammonia, Nitrite and Nitrate. Safe water ready to receive fish should have zero readings of Ammonia & Nitrite and almost Zero nitrate. Test the pH, pH7 is neutral, above this is more alkaline and below 7 is more acidic. Read up on pH requirements for any fish you intend to purchase.

❷ **Temperature norms:**
Freshwater tropicals 21-27°C
Marines 26°C
Coldwater 13.5-21°C
Some delicate species have very specific requirements, read up on them before you purchase.

❸ Filtration cleans the water in your tank. Choose the filtration most suitable for the fish you intend to keep. Some species do not appreciate being blown around the tank, others that come from fast flowing waters like more turbulence. Large tropicals, coldwater and marines require larger filtration systems.

THE FISH

❹ **Stocking levels:** For freshwater tropical we recommend 12cm² of surface area per 1cm of fish.
Marines: For a fish only setup we recommend 2.5cm of fish for 9l of water and for Reef only setups we recommend 2.5cm of fish per 27l of water.
Ponds to a maximum of 250cm of fish per 4500l of water.
Measurements should be based on the optimum adult size of the species not the size at the time of purchase. **NEVER OVERSTOCK**

❺ **Knowledge:** Find out as much as you can about any fish you hope to buy before purchase.

❻ **Introducing fish:** Fish should be added a few at a time over a period of several weeks to new setups. This allows the filter system to mature.

❼ **Quarantine:** All new purchases should be quarantined for established tanks for at least two weeks.

THE ROUTINES

❽ **Feeding:** Twice daily feeds are the norm for most adult fish. Try to feed at the same time each day as this establishes a routine. Only offer as much as the fish can eat in a few minutes.

❾ **Water changes:** Freshwater tropicals 10-30% weekly
Marines no more than 20% every two weeks.
Pond fish also appreciate an occasional water change. Keep an eye on ammonia, nitrite and nitrate levels. They should be zero in a mature pond.

❿ **Cleaning filters:** These should be cleaned once a week. If they work by biological filtration (bacteria break down the waste) and have a sponge in them, this must be cleaned in old aquarium water that is then discarded. Never use any household detergent or soap on aquarium equipment or tanks.

OBSERVATION: Daily observation is the key to successful fishkeeping. Look for any abnormal swimming patterns, bullying or listlessness. See that the fish are eating well and that all are getting their share. If fish are in difficulties test the water.

Care for life

www.aquarian.com

Big news for fish

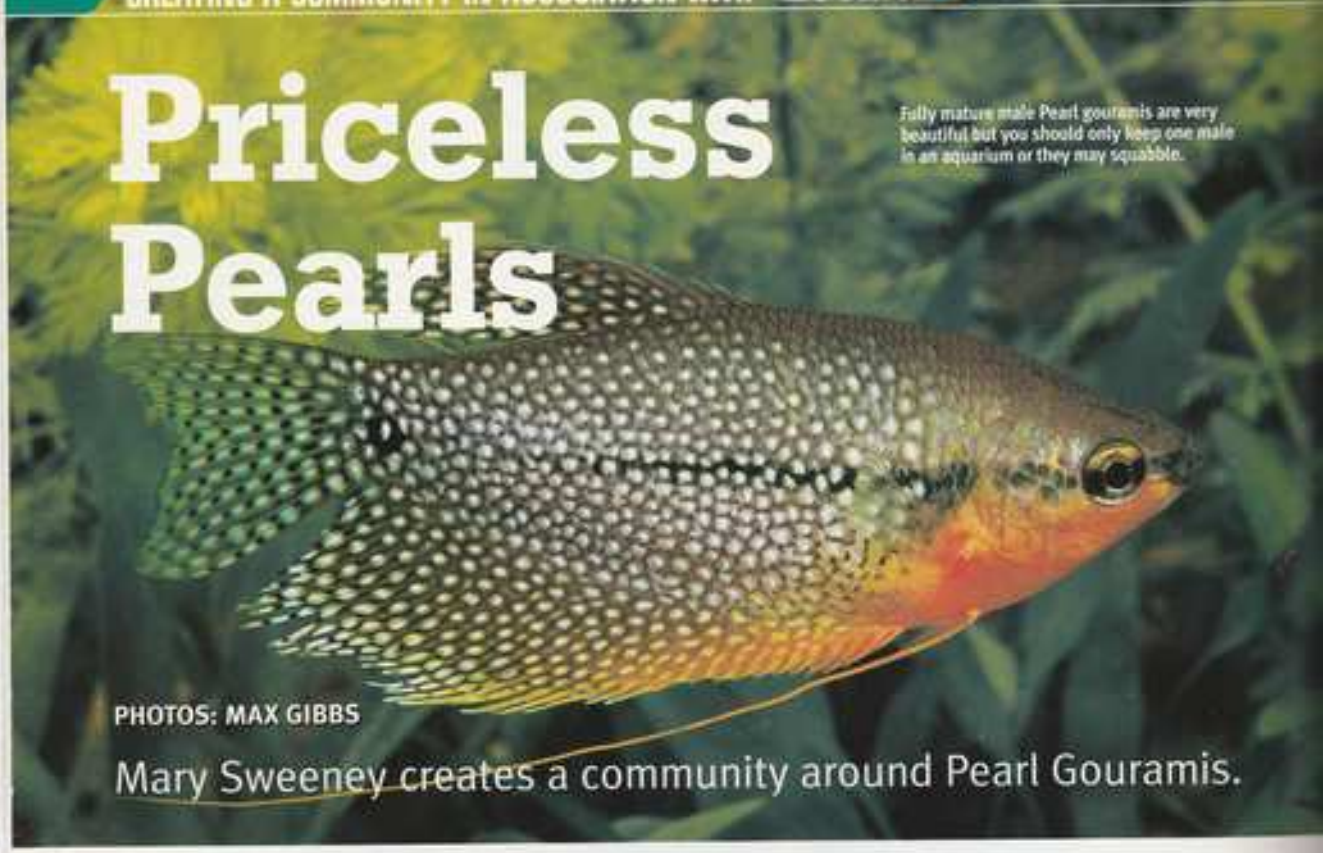
Aquarian, the UK's number 1 fish food has a new range with everything your fish needs for a happy, healthy life. From growth, colour and herbivore supplement flakes, to cichlid pellets and catfish tablets, they're all cleverly designed to target the right fish with the right food.

AQUARIAN

Successful fish keeping made easy

CREATING A COMMUNITY IN ASSOCIATION WITH Tetra

Priceless Pearls



Fully mature male Pearl gouramis are very beautiful but you should only keep one male in an aquarium or they may squabble.

PHOTOS: MAX GIBBS

Mary Sweeney creates a community around Pearl Gouramis.

Easily one of the most beautiful of aquarium fishes, Pearl gouramis are ideal community aquarium fish as well. There are few fish that give so much and ask so little.

Natural habitat

The Pearl gourami, *Trichogaster leeri*, is a native of Southeast Asia: the Malay Peninsula, Borneo, Sumatra, Indonesia, in other words right on the equator. This exquisite fish is found in the humblest of surroundings in small bodies of water that fill with the frequent rains and evaporate in between. These conditions are similar to those where other Labyrinthfishes are found as well.

The pools are generally clogged with heavy vegetation and the Pearl gourami especially appreciates a heavily planted aquarium. This is one fish that deserves to be surrounded by nice floating plants as it never destroys the plants, though it will borrow a few bits and pieces to help hold the old bubblenest together, but it is in no way destructive like some other fish whose names I will not

Singhalese fire barb (*Rasboroides vaterifloris*) come in several different colour morphs and would make an excellent companion species for Pearl Gouramis.

mention. Use a dark substrate and subdued lighting and their colours will glow.

As these are equatorial fish, the temperature should be kept quite warm. Some give a lower temperature tolerance of 24°C, but I think they fare better in warmer water, 28 or even 30°C. The lights should be on for 12 hours a day to coincide with the equal day and night lengths in their equatorial habitat. Granted, most of the Pearl gouramis we are likely to meet in the hobby are many generations removed from these conditions, but it is still a good idea to match as closely as possible the original conditions in which the fish was found.

A good tank size for the Pearl gourami (other common names include the Lace gourami and the Mosaic gourami) would be about 80 cm, but this of course would depend on the type and number of tankmates one expects to keep with your gouramis. Given the gentle nature and good size of these fish, about 12 cm, there are quite a few choices of companions. Though I have never tried it myself, I would even venture that they could be kept very well with Discus, since they appreciate warm water and a low pH. The gouramis do, however, prefer shallow water for spawning, so this makes it quite possible for them to be kept well in a high tank with low water such as one might use for a palaudarium.

IDEAL COMMUNITY COMPANIONS

There are many species that can be kept with these fish. Using Asia as a starting point Rasboras such as Harlequins, Redlines, Red-tailed or Neon rasboras make especially good companions. Another choice would be some of the small peaceful Barbs like Cumming's barb or the Singhalese fire barb (*Rasboroides vaterifloris*) will all add colour to your community. Moving away from Asia, some of the small peaceful tetras would make another good choice, with the bottom looked after by any of a whole range of Corydoras species.

One male to a tank

One caveat is that there be only one male to a group, as the males are, naturally, not fond of competitors. Otherwise, you couldn't meet a nicer fish. It is more important to make sure that potential tankmates will not bully, harass, or otherwise bother the gouramis. Their long, delicate (one could even say expressive) ventral fins are always at risk when they are kept with nippers like Tiger barbs. They are especially beautiful when kept with a large school of Cardinal or Neon tetras. The colours are electrifying. The Pearl gourami tends to stay near the top of the tank, which leaves plenty of room below for a compatible assortment of bottom-dwellers, Corys and the like.

The Pearl gourami is not only one of the most attractive, but also one of the hardiest and easiest to keep of any of the fishes generally kept in the aquarium. It has only one 'Achilles Heel,' and that is its soft body. Pearl gouramis are physically delicate and can sustain a bit of body damage in shipping or netting. Keep an eye out for a touch of fungus after a move and treat it before it has had time to invade and poison deep tissue.

Like other fishes of the family Belontiidae, the body is slender and elongate. The ventral fins, often called "feelers," are long and thin and get a lot of

There are a whole range of Corys that are suitable for this aquarium but Adolpho's cory is an attractive species which would feel right at home.

WATER CONDITIONS

Pearl gouramis do well in water with low pH. A pH of 6.5 is ideal, but these fish are so cooperative that they will even tolerate water with a pH of up to 8.5. I would exercise caution and take some time for acclimation if transferring the fish from, say a shop tank with low pH to a home tank with a higher pH value, but otherwise there should be no problem. It is very convenient to meet a fish that can adapt to your water chemistry rather than trying to change the water chemistry to suit the fish. Slow water movement is preferred, especially around spawning time, and a sponge filter powered by an adjustable air pump is ideal. Having the ability to slow the airflow to a minimum for spawning is quite an asset.

This pair (the male is the lower fish) are not in full breeding condition yet but another week of feeding up should have them in peak condition and ready to spawn.

use. There is a black line that runs from the lip to tail and is punctuated with a black dot. The body is covered with iridescent pearly spots on bluish-brown background. The breast of the male, from just under the mouth to the anal fin is a soft red that becomes fiery red when he is in spawning mode. This is just one of the many beautiful features of this fish, and many people who are uninterested in spawning the fish still keep females with the male just to have him hold this colour most of the time. In adult males, the anal fin develops a "fringe" as the fin rays develop farther than the fin itself. All in all, this is a magnificent fish. The female is nearly equal in beauty though she never develops quite the same intensity of colour. She can be identified out of a group due to her rounder, smaller dorsal fin and slightly more subdued coloration.

Breeding Pearls

Spawning the Pearl gourami is not at all difficult. The adult male will signal his readiness by developing the characteristic deep red coloration described above. The female will get somewhat more colorful and her belly will become distended with eggs. These fish will spawn year 'round, but young adults will generally start spawning for the first time in late winter or early spring, especially if they have been separated and conditioned properly with live or frozen foods like Bloodworms, Glassworms, Tubificids, and Brine shrimp.

The water in the spawning tank should be lowered to about 15 to 20cm. You will see where this is very important when you see how hard the male works to tend the eggs and fry. The water should be about 28°C.

The male will generally start to build a bubblenest within hours of developing the redder breast. Once a male has started building bubblenests, he generally continues to do so as if in the hopes that a willing female will chance by. We will take the guesswork out of this for him and return the plump female to the spawning tank when he has a good bubblenest built and his colors are shocking. Don't bother to

return the female if she is not bulging with roe. It will cause a lot of frustration on both their parts and could endanger her life.

Spawning takes place beneath the bubblenest. The male wraps his body around the female's and she releases many, many eggs that he fertilizes simultaneously. Once spawning is complete, remove the female. Her job is over and there is an outside chance that her presence will annoy the male, though male Pearls are not the worst when it comes to abusing the female when he's done with her.

Remove the mother

The eggs float to the surface and the male carefully places them into the bubblenest. He works constantly to keep the nest together and the eggs in the nest. The pace picks up a bit when the eggs hatch and the fry (that look like slivers of glass) start to exit the nest on their own. He will try to keep the family together but it's an exercise in futility and soon all the young are free of the bubblenest. They will stay fairly close together for a while, but it's best to remove the male and let the fry carry on by themselves. He's entitled to a well-deserved rest.

WHAT DO THEY EAT?

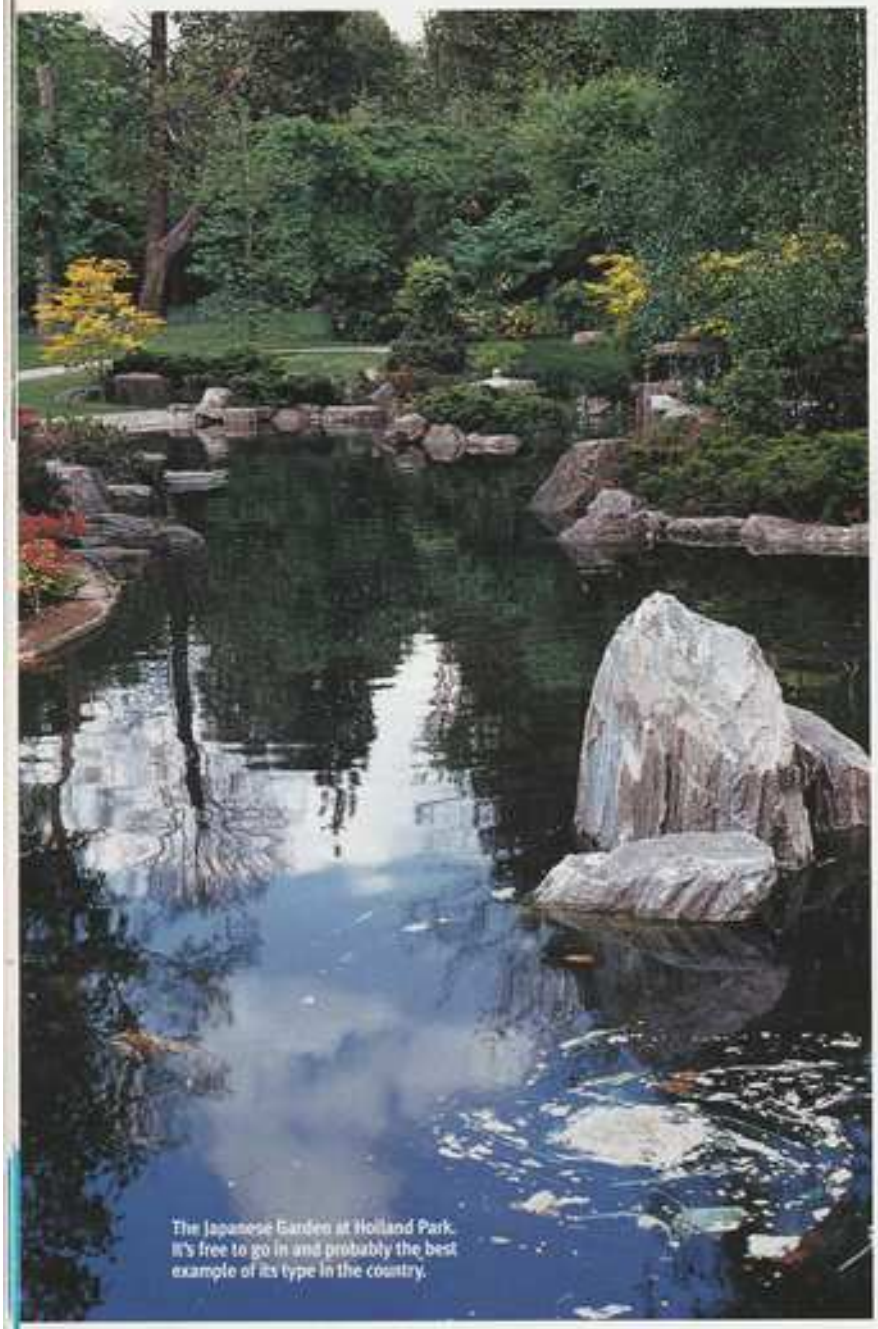
One look at the little upturned mouth of the Pearl gourami and you know right off what they eat and how they like it. These fish are omnivores that will "inhale" small tidbits from the surface of the water. They take flake food without complaint, but certainly appreciate small live foods and frozen foods as well. They seem to be very fond of Daphnia. They are also quite useful at removing the aquarium pest, the Hydra. In fact, they will also clear out any small, unwanted wormy things living in an older tank, such as the harmless but unsightly Planaria. Bloodworms, Blackworms, and Tubifex worms will cause them to make total pigs of themselves and they look very uncomfortable if allowed to overdo these treats. A Pearl gourami with a bulging belly just looks wrong.

If you have used a sponge filter, you will see the fry pecking at the surface of the filter. This is a sign that you should start to offer infusoria or liquid fry food morning, noon, and night. Increase the size of the food as they grow. Keep the water clean and give them enough room and you should have plenty of baby gouramis to offer at your local club or pet shop in no time. One additional point of importance: it is very important to prevent drafts from reaching the fry. Cool air interferes with the development of the labyrinth organ, thus it is most important to cover the tank with a sheet of glass when the fry become free swimming. ■

A touch of the Orient

Peter May says "It's not what you do, it's the way that you do it".

PHOTOS: PETER MAY



The Japanese Garden at Holland Park. It's free to go in and probably the best example of its type in the country.

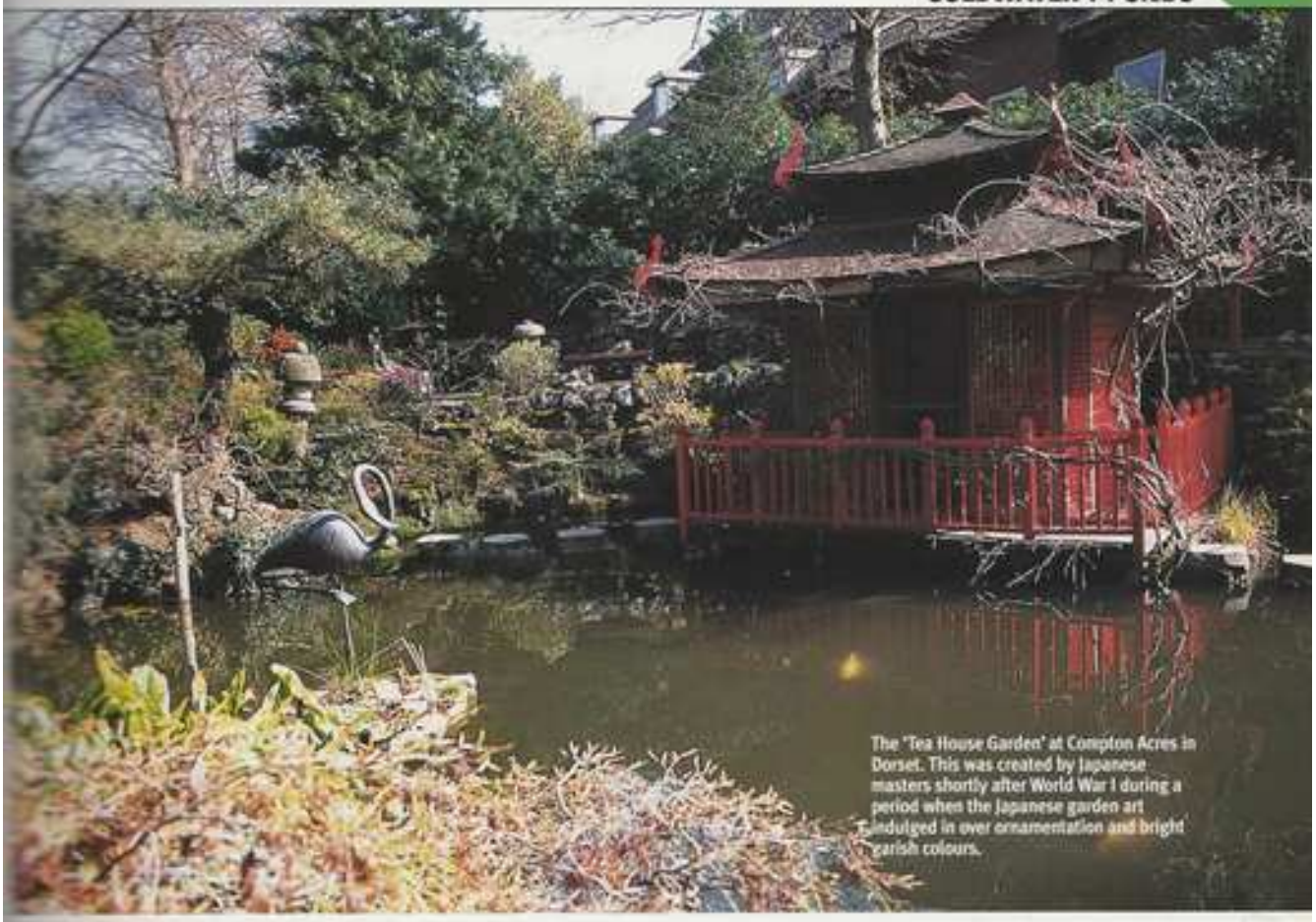
As any teenager will tell you, if you want to be accepted as fashionable or stylish, you need to do more than just dress up in the latest gear and parade about. You really need to think, be and breathe life into the image that you are trying to create. The same applies to style from another culture and not just in the fashion that affects clothing, but in all artistic endeavours that involve personal expression, and this definitely includes garden and landscape design.

Take the style and culture of Japan for instance; you certainly have a head start if you just happen to be Japanese, because the style expresses an underlying ethos of the whole Japanese culture that is just too difficult for most of us to grasp on first encounter. Japanese gardens are therefore not just brightly painted teahouses, red and black fencing, tortured trees, stone pagodas, stepping stones and spitting frogs.

Fishy story

Many people come to the Japanese garden style obliquely through their passion for another hobby, fish keeping. For them as with the Japanese, water is the focal point of the scene. The fish, primarily Carp, are integral to the summer scene in the garden, lending a gentle movement to the stillness. They are a symbol of strength and determination. If you build a Japanese style waterfall, there is a stone at the base of the fall, which is often referred to as the 'wave dividing stone'. It represents a fish on its journey up the fall where it turns into a dragon; another stone that is otherwise referred to as the 'water dividing stone'. This, believe it or not, is a symbol of a man's journey through life and the final achievement of his ambition.

The Chinese and the Japanese have bred both goldfish and carp for centuries. The Japanese originally bred carp or Magoi primarily for eating, but apparently sometime in the 1800s people in the main fish farming area, the prefecture of Niigata, started keeping colourful mutations of these fish as pets and breeding new varieties from them. Although by the 1880's there were quite a few set varieties, hardly anyone was aware of their existence, even in Japan, until 1914 when a display of them was shown in a Tokyo exhibition in an



The 'Tea House Garden' at Compton Acres in Dorset. This was created by Japanese masters shortly after World War I during a period when the Japanese garden art indulged in over ornamentation and bright garish colours.

attempt to promote the welfare of the poor people of the Niigata region. Although it sparked a great deal of interest at the time, economic depression and world wars delayed any global exposure until after World War II. With an infrastructure of rail and air transport then in place these fish that had come to be known as Nishikigoi would be available to everyone all over the world.

Essential water, essential requirements

Water has been essential to Japanese gardens since the concept of a garden was originally lifted from the Chinese in the 9th century. It is there to reflect the beauty of the overhanging trees and it adds depth and space to the area in front of the viewer. Water in a pool is a balancing 'in' element to the hard 'yo' of the rocks and also any stream or cascade running through or over the rocks.

Islands are important because they were inherited with the original concept from China where the island was the home of Immortal Souls. They also help to hide some of the water from the viewer in a large stretch of water. All of the water must not be visible from any one point suggesting that there is more to be seen.

For the health and clarity of the water, it must never remain static. Traditionally the water garden would be fed by a natural stream and an outlet from the pool would rejoin the original course of the stream. The source of the water must be obscured from view.

Moving water is as essential as the calm reflective pool because it has the power to distract us from our preoccupations. The noise it creates also has the effect of drowning out most other extraneous noise in a calming way. Small ribbon waterfalls are as effective as great torrents. →

'IN' AND 'YO'

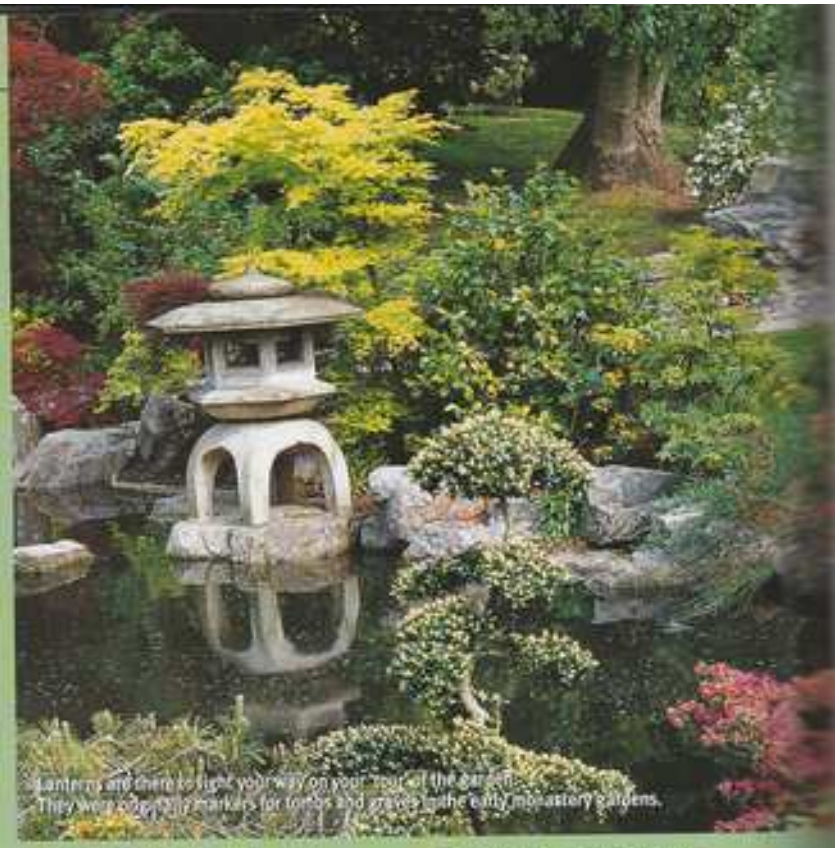
The Chinese 'yin' and 'yang' is the Japanese 'in' and 'yo' and the names of the forces of nature that have to be kept in balance. In the garden, one element like the smooth surface of the pool, 'in', balances the hard stone, 'yo'. It can get quite complex when you have to consider flat colours, like a sward of green moss, in balance with the billowing greens of the trees and shrubs (basically a balance of form and colour) at the same time as considering the balance of horizontal with vertical, light and shade, movement and stillness and the elements of stone, water and plant life together.

Geometric forms and any sort of geometrical formal balance are out of the question, although natural form and shape are all important. Trees are pruned to a shape or form symbolic of some ideal for that plant or to balance the hard shape of buildings or manmade structures in the garden. Although plants, grasses, moss, or pebbles cover the ground with no bare soil to be seen, flowers themselves are limited mainly to plants that mark the seasons; the azaleas, camellias and cherries in spring; irises for the summer and the glow of the Maple foliage in the Autumn. The huge range of Japanese flowering plants were generally kept close to the main entrance to the house in pots. However there seems to be something inherently Japanese in all indigenous Japanese plants, and in choosing them, in exclusion of plants from other countries, you will find even the most maudlin effort at Japanese garden landscaping acquiring a distinctly oriental air.

MEANINGFUL ORNAMENTS

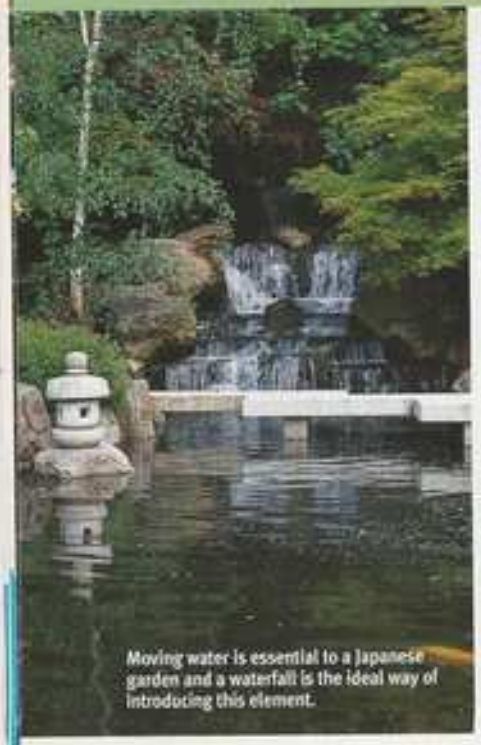
Rocks have their own individual characters expressed in their texture, shape and how they sit. They are never piled up on each other, neither are they placed singly, unless they sit like an island in the middle of a pool. Usually they are in an odd number, grouped in a way that is in harmony with the complete ambience of the garden. They provide permanence and stability amongst the slow change and growth of the trees and shrubs and they were considered the greatest treasures of the garden. Being able to see their true character and to be able to place them in the most appropriate place was an art left to special priests called Ishitate-so.

Stepping-stones or zig-zag bridges over water prevent evil spirits from following you on your journey. Frogs make a mockery of them as their progress is daunted. The purifying qualities of water are to be used for cleansing yourself before you enter the Teahouse. The Teahouse is where you meet your mentor and devoutly perform the ritual of the tea ceremony as part of your quest for spontaneous enlightenment. It had evolved from a mountain hermitage that would have been sought out by a member of the ruling elite of the warrior class. There may be a small stone wrapped up in ribbon on the path. This means you must not pass this point. Pergolas and archways have their place in Japanese garden art and they can double as supports for screens and shading over the pool.



Lanterns are there to light your way on your tour of the garden. They were originally markers for tombs and graves in the early monastery gardens.

The boundaries of the garden are hidden by trees and shrubs, but it is helpful to be able to look beyond the boundaries if there is a desirable view to be seen, to try to give the impression that you are in a garden without boundaries. This common technique is called 'borrowing the landscape' or 'shakkei'.



Moving water is essential to a Japanese garden and a waterfall is the ideal way of introducing this element.

Practicalities

For most people there is little inclination to tie themselves to any one form of garden style. Besides that, Japanese gardens require a commitment in time and expense, taking years to mature, if not life times before the starkness melts into a mellow softness. So most people choose to compromise.

All fish look at home in a Japanese garden, if you can see them. In fact the visual emphasis is often on the fish as they congregate around the oxygen rich area around the base of a waterfall, or the cool shade of a bridge. Plants like marginals and lilies don't normally figure a great deal in the traditional Japanese water garden, which is probably just as well since if it is Koi that you interested in keeping then they are highly likely to make pretty short work of them. One way of preserving the plants is to make their own torpedo resistant planting beds placed behind the strategic protection natural looking stone.

An efficient biological filtration system is essential. If you have the room, the wherewithal and you are starting from scratch, a gravity fed system from bottom drains in the pool would be perfect. This allows you to have the pool completely clear of clutter, with no pumps or piping visible and without the expense, noise and maintenance of external pumps. This can be operating some distance away behind a plant or bamboo screen, whilst the pumps within the filter only have the effort of pumping back clean and clear water to the pool.

As long as the shape of the pool is fairly organic, you can get away with edging it with anything. The customary shingle and large pebbles leading up to a lawn of moss may not seem suitable for most domestic situations. Decking is a soft option and balances the effects of a lot of hard landscaping, even reducing the effect of a geometric shape to a pool. The art is in less rather than more, so the impact of certain well placed features or the right kind of containers suitably planted and very little else is all that is necessary to create an oriental balance to even a formal geometric shape. In 1995 a Merrist Wood College creation at the Chelsea Flower Show had a formal pool off to the right, with a large paving area to left rather than the pool formally placed centre stage. With a few finishing details for the fence and pergola ends, the right plants and colours, although it seemed a hybrid of cultures the effect was nonetheless appealing. So it ain't what you do, it's the way that you do it! ■

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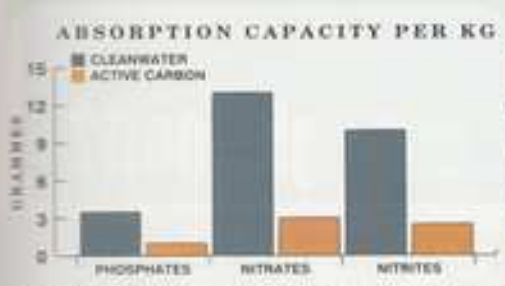

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Q&A

Gouramis, like this Dwarf Gourami, are a bit more intelligent than Danios and will soon figure out how to get to the food first.

Star Letter

Will my Gouramis get enough food?

Q I am new to the hobby and I have just bought two Gouramis (1 Dwarf powder blue gourami and 1 royal red gourami) to add to my tank which has 3 Zebra danios and 3 Leopard Danios in. Can you tell me if the Gouramis will eat the flake food that I am feeding the other fish in my aquarium, or should I be using a different food. If so, which one? Can you recommend a particular brand. The other fish in my aquarium are quite greedy and are quick to get to the food, so I am worried that the Zebras and Leopards will be overfed and the Gouramis will not get enough.

Chris via e-mail.

A These Gouramis will eat flake food without any problem. Once they have settled in they will be over to the food like a shot, so you don't need to worry that they will miss out. In fact, because they are smarter than your other fish and more aware of what is happening outside of their tank, you may well find them sitting directly underneath where you put the food in your aquarium as soon as you move to open the aquarium lid! Nutrafin Max is an excellent quality flake food but all the major brands of flake food are of a good standard so you can buy any of those on offer in your local aquarium shop.

Derek Lambert

Having problems? Then let our panel of experts solve them for you. *Today's Answers* is our free reader service. Just send your question by letter or e-mail and we will forward it to our panel of experts. Everyone receives a reply regardless of whether we publish them or not.

How do I balance my pH and KH ?

Q **I have recently purchased a Kent Marine R/O DI unit and are experiencing difficulties in 'fixing' the water. I have two tanks, a community heavily planted, and a lightly planted one with two baby Discus. My tap water chemistry is as follows, pH=7.6, GH=8, KH=3. I run CO2 through my community tank which reduces the pH to around 7.0.**

Basically I want to get the R/O water to a pH of 7.0 with a KH of 3 - 6. Unfortunately this is not to be. I spoke to Kent Marine about using a phosphate free method of raising and buffering the pH, so I followed their instructions, as follows. Reduce the pH of the R/O water way below target value, I dropped it to 4.5. I then added the potassium carbonate at 15 minute intervals using a power head to ensure all was mixed well. I tried this method several times without success. When I managed a KH of 3 degrees, the pH was 8.5, when I attained a pH of 7.0 the KH was only 1 degree.

Obviously I am worried about the pH crashing using such a low KH. At present, the R/O water I am using is pH 7.5 with a KH of 2 degrees, (I have since spoken to Kent, who didn't seem concerned, they said it is usual for a pH of around 7.0 to have a KH of 1-2 degrees, just keep an eye on it). I do two water changes a week and measure the pH every day, twice a day using an electronic meter. So far the pH has remained stable. Obviously this would not be the case if I were to go on holiday say, for 2 weeks, I would imagine that the nitrifying process would erode the pH even further, with very little buffering, and could quite easily crash?

I read an article on plant keeping the other day where a hobbyist had a pH of 6.5 and a KH of 6 degrees, how is this done without having a high pH? Where am I going wrong?

Stuart Cooke (Worcs).

A Although pH is affected directly by KH, you must not overlook other factors that can cause pH to change, without affecting the KH. KH is a measure of carbonates dissolved in the water, which are the most common 'family' of buffering compounds in water. However, other non-carbonate containing compounds can cause the pH to change without affecting KH. For example, the pH would rise with the application of NaOH (sodium hydroxide), but as it does not contain carbonate, would not cause the KH to change. The close relationship between pH and KH can also be affected by the addition of CO_2. From the table below, you can see that the addition of CO_2 to different levels can cause the pH to fluctuate in a water whose KH is constant. So in conclusion, test kits can often cause us to oversimplify water chemistry, as there are many other factors besides those that cause KH to fluctuate that can cause pH to rise and fall. I assume your target pH and KH values are to achieve 'ideal' water conditions in your aquarium. I would be tempted to redefine ideal as those in which your fish and plants thrive and let your captive aquatic organisms be the judge as to whether your aquarium water is ideal. A good starting point to achieve this at pH 7.0 would be to use your CO_2 to drive down the pH of a mix of tap and RO water, and you should see your KH fall also.

Ben Helm

pH/KH	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	8.0
0.5	15	9.3	5.9	3.7	2.4	1.5	0.9	0.6	0.2
1.0	30	19	12	7	5	3	1.9	1.2	0.3
1.5	44	28	18	11	7	4	2.8	1.8	0.4
2.0	59	37	24	15	9	6	4	2.4	0.6
2.5	73	46	30	19	12	7	5	3	0.7
3.0	87	56	35	22	14	9	6	4	0.9
3.5	103	65	41	26	16	10	7	4	1.0
4.0	118	75	47	30	18	12	8	5	1.2
5.0	147	93	59	37	23	15	9	6	1.5
6.0	177	112	71	45	28	18	11	7	1.8
8.0	240	149	94	59	37	24	15	9	2.4
10	300	186	118	74	47	30	19	12	3
15	440	280	176	111	70	44	28	18	4

CO2 milligrams/litre

Why has this fish grown so big?

Q **I have just purchased a Red Saiffin Pleco. I believe its proper name is *P. gibbiceps* for my 45 cm aquarium. It was 5 cm long when I bought it (the label said 5cm was its maximum size) but it has over doubled in size in just a few months. Have I got the wrong fish or was the label wrong?**

Janice Cook, London.

A Neither! The fish you have is a Red saiffin plec and it was only 5 cm when you bought it. Some shops only label up their fish with the size they are at in the aquarium, not the final size they grow to. If you know this then it is not a problem, but if not it is all too easy to fall into the trap you have. Final adult size on your fish will be 50 cm so you will have to find a new home for it soon.

Derek Lambert

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.
Derek Lambert Livebearers, Rainbows and Breeding fish.
Ian Fuller Catfish.
Andy Gabbutt Killifish.
Stephen Smith Goldfish.
Bernice Brewster Koi and Ponds.
Bob & Val Davies Reptiles and amphibians.

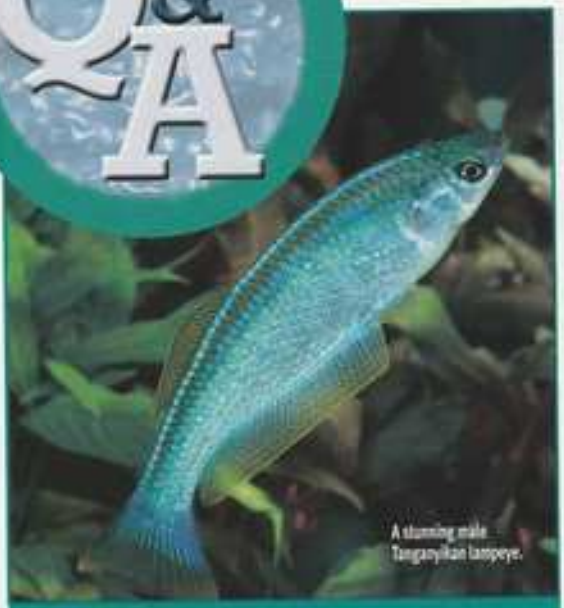
Questions by Post

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*, TRMG Ltd., Winchester Court, 1 Forum Place, Hatfield, Hertfordshire, AL10 0RN.

Internet Service

Fishkeeping Answers is also available via e-mail. 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 e-mails to:- fishkeepinganswers@trmg.co.uk

Tropical Q&A



A stunning male Tanganyikan lampeye.

What is that beautiful blue fish and can I keep it?

Q **I went on a fish buying trip last weekend and saw some beautiful blue fish labelled up as Tanganyikan lampeyes. They looked nothing like any lampeye I had seen before and I would love to add some to one of my three tanks. One is for soft water fish, another is supposed to be a general community with normal tap water (very hard and alkaline around here) but only has some Albino corydoras left in it now, and the third is a Malawi cichlid tank. Do you have any idea what these fish are, how big they grow and what conditions they require?**

Brian Jordan, via e-mail.

A I can see why you fell in love with these beautiful fish. Their scientific name is *Lamprichthys tanganicanus* and they are found in Lake Tanganyika where they grow to a maximum size of 15 cm. It is a timid schooling fish which requires hard alkaline water (your tap water should be fine) and a temperature between 23 - 25 °C. Good filtration is essential and they can be a little delicate when transporting them. Make sure each fish is bagged separately for the journey home and don't delay getting them in their new home as soon as possible. Good luck with what must be one of the most spectacular of all killifish.

Derek Lambert

The Old Nemesis — Algae!

Q **I have started a tropical aquarium that I was given as a Christmas present and I am doing my best to ensure that I am doing everything correctly. However, despite weekly water changes I am building up a fair amount of algae on my plants and I need to know what I can do to get rid of it and stop it coming back in the future. My present set-up includes a number of plants with 4 Golden danios and a recent addition of 2 Bristle-nosed catfish (hoping they would eat the algae). Unfortunately, I live in a house with an abundance of windows so I cannot ensure the tank is out of daylight for the whole day, but I have improvised with some car sun glare screens to try and reduce the amount of natural light in the aquarium. I also note that I seem to be in a particularly hard-water area and to try and counteract this, I am adding pH buffer 6.5 to my water changes, without much success. Please advise me before my beautiful looking set-up turns into pea soup.**

John Graves, via e-mail

A The first thing you can do to tackle this problem is increase your plants. Strong fast growers like Vallis will gobble up nutrients the algae need to grow. You can also introduce a floating plant like Riccia. This stuff will provide shade and reduce nitrates. All new tanks tend to have a problem with algae after a few months because nitrates and phosphates (from fish food and biological filtration) build up. Plenty of growing higher plants will counter this. If you still have problems after a month then you will have to tackle it using another route. Algae feed on two things besides light - phosphate and nitrate. So if you can't cut the light down enough, you can tackle the other two foods by using both phosphate and nitrate removers in your aquarium (there are lots on the market). That way you will starve the algae out.

Derek Lambert

Where can I train in aquatics?

Q **I have been a keen aquarist for some time now and due to a job change am now looking to make a career in aquarium supplies and maintenance. I have contacted many training providers all with many different types of courses available. My main concern is that I wish to be trained by recognised providers. Do you have any ideas on what courses and also what experience would be best in order for me to further my career?**

Andrew Cooper , Via e-mail

A There are 2 recognised leading aquatic training providers, who have been specialising in ornamental aquatics for many years. These are Brooksby Melton College, Leics and Sparsholt College, Hampshire. You will be required to attend a 2 year full time (30 weeks/year) course, for a National Diploma, which has an excellent record at placing qualified students in a range of aquatic opportunities. Choose the one which is closest to you and they will gladly give you a tour of the facilities and advise you on your options. These colleges also run short courses.

If you cannot afford the time commitment of a full time course, then contact the Ornamental and Aquatic Trade Association (OATA) and enquire about their distance learning packages. Tel 0870 0434013.

Best of luck, there are many people in our industry that have successfully turned their hobby into their career, including me!

Ben Helm

Finding companion species for Zebra plecs can be difficult.

Suitable Corys for a Zebra plec tank

I am hoping that you might be able to suggest some tankmates, preferably a Cory species, to share my Zebra plec tank. The tank is set up to try and breed Zebras, (no success yet) so the water is warm at about 28 °C with lots of water flow. I find that the 1/2 Zebras are very poor at keeping the tank clean. It contains various pieces of wood and caves and I find that any food which lands on top of the wood or caves does not get eaten. I am looking for a couple of fish which are a little more active to search just off the bottom for food and as I am a Cory fan, I am hoping to introduce a couple of them. I have seen *Corydoras gossei* kept in warm tanks with Discus in a number of shops, and the *Corydoras adolfi* I keep appear to be happy in up to 26 °C, but what do you suggest? Would it be worth considering a pair of Sturisoma cats as peaceful tankmates, or would the water be too warm?

Graham Summersgill via e-mail

Picking Cory's as tank mates for *Hypancistrus zebra* is as you rightly say is not an easy task. The Corydoras gossei that you mention is the ideal candidate, this is one of the few Corydoras species that require warm conditions to breed. I am not sure how Cory's and Zebras would get along, they are not naturally sympatric species. The fact that you want, or expect them to clean up after the Zebras is not really the ideal situation for them or any other Cory species. You do not mention what you are feeding the Zebras but it may not be the ideal Cory diet. I would advise you to firstly make sure that you are feeding the Zebra's correctly, then decide whether or not you want to add some Cory's. If you are feeding so much food that there are remnants left around the tank the following morning, you are either feeding the wrong food or you are feeding far too much. Zebras are very active at night and the best time to feed them is just before the lights go out, if there is any left in the morning do not feed them that day and reduce the amount at the next feeding time.

Ian Fuller

WARNING **We checked with a welding gas supply firm and although they do supply CO2 in its pure form, most welding is done with Argon/CO2 mixes. So you have to be very careful about what gas you are buying. The other important factor to consider is some fish farmers use an overdose of CO2 to kill trout without marking them! We strongly suggest you spend the money on proper aquarium equipment for CO2 fertilisation.**

CO_2 on the cheap?

I've seen lots of CO_2 setups advertised, varying prices, however can you tell me if the CO_2 gas used for welding is exactly the same? If so, could I use a small gas bottle with a basic airline and diffuser stone? Obviously I would set it to its minimum flow so that the bubbles are just trickling up, my tank set up is 120 x 37.5 x 30cm, and contains Tetras (various), 1 small pair of Angels, a few Corydoras and six Bristlenoses.

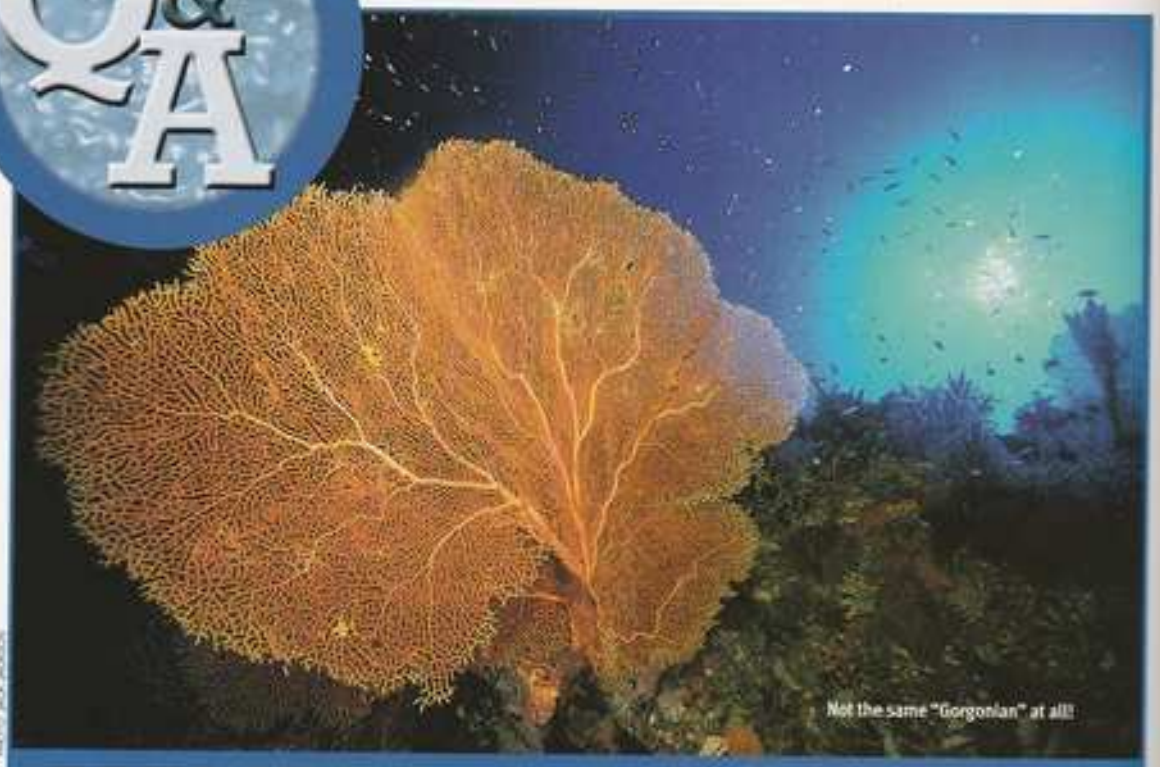
Kewing Walker, Via e-mail

I am not a welding expert, however you could add the CO_2 from a cylinder to your aquarium via an air line and diffuser stone, but this would not be the best approach. Standard airline is porous to CO_2, and when you buy a needle valve, you will be supplied with the correct tubing for CO_2.

Furthermore, you need to find a way of ensuring that the CO_2 that you introduce to your aquarium remains in contact with your water so that it will dissolve completely. Remember that the water movement in CO_2 fertilised aquarium should be as low as possible or the CO_2 will come out of solution. Firstly, CO_2 passing through a diffuser will race to the surface and secondly, will possibly lead to excessive levels of CO_2 entering the aquarium (although this can be controlled at the needle valve). Aquarium CO_2 diffuser systems introduce the CO_2 through a semi-enclosed chamber in a downward stream of water (returning from an external power filter). This chamber prevents the CO_2 gas racing to the surface and enhances contact time between the incoming water and CO_2 by ensuring an intimate mix between the water flow and captive CO_2 is achieved. A final piece of equipment is a bubble counter that will enable you to dose your aquarium with the correct rate of CO_2 in relation to your aquarium volume and KH.

Ben Helm

Marine Q&A



Not the same "Gorgonian" at all!

ANY IDEA WHAT THIS IS?

Q **I purchased a new coral for my Fish/Invert aquarium. Although his/her first day has gone well and he seems happy, so far I do not know what he is. This coral, of which I have attached a pic in an attachment within this e-mail, was being sold as a Gorgonian. Although this may be very correct I can't seem to find a picture or reference to this coral anywhere on the internet. I have searched high and low. Please could you help me in identifying this coral as its becoming a little frustrating and hard on the eyes?**

Paul Hallissey, Maidenhead.

A Your coral is not a Gorgonian but in fact a member of the genus Goniopora, so I can see where Gorgonian came from. In looks and requirements, however, they cannot be more different. They are very difficult to keep long term and seem to die off within a year, and we do not fully understand why. Feeding could be the way forward. Feed with copious amounts of live phytoplankton which will also provide the required very small zooplankton prey. High lighting and very good water quality are also required. Sorry to be the bringer of bad news but feed correctly and this may be the answer.

Andrew Caine

Which replacement lights?

Q **I currently have a 120 x 30 x 45cm mixed marine tank. It is currently illuminated by 2 coral life 10,000 k: 1 coral life 20,000 and 1 actinic fluorescent tubes.The time has come to replace these tubes as routine. I do not think I can afford the new T5 lighting systems, so would you recommend replacing the coral life tubes using only coral life 20,000k ones? Would this be a brighter arrangement or can you suggest a better mix?**

Colin Brashier, Via e-mail

A The cost of 4 T8 tubes would be the same as a twin T5 system so by investing in this you will be saving money because your tubes will only need replacing every two years instead of one, then you can buy a new actinic tube. The light quality would also be greater with 2 x T5s than all four T8 tubes you have.

IS A PROTEIN SKIMMER ESSENTIAL?

Star Letter

Q **I am writing to ask about my new marine tank that I am setting up. The other day I took a trip to one of my local aquatics centres. I asked whether a protein skimmer was an essential piece of equipment in a fish only tank. He told me that as long as it was a fish only tank and I am using artificial coral it would be OK. I was very happy about this because it meant that I didn't need to spend 5 months of my pocket money on a protein skimmer. Yet the same day I took a trip to the new Maidenhead aquatics centre in Boldheath where I was looking for another filter for my 1 metre tropical tank, where I was told that without a protein skimmer all my fish would get diseases and slowly die off. Please tell me the correct answer so that I can start up my new tank as soon as I can.**

Adam Taylor, Widnes, aged thirteen.

A I am sorry to tell you that in a fish only system a bigger protein skimmer than that normally specified for your tanks capacity is required. This is because more waste is produced in a fish only system than any other. If you send us a S.A.E. we will send you a free beginners guide to marines, which will put you on the right path.

Protein skimmers come in all sizes depending upon the size of the aquarium they are going to be used on. This one from AB Aqua Medic is designed for very large systems but they make a whole range suitable for every size of aquarium.

Which is the best method for adding calcium?

Calcium reactors are the best way to add calcium.

Q **I wish to ask your advice on the subject of kalkwasser and calcium reactors. I have a 125 gallon reef tank and currently use the AB Aqua Medic 3 part additive. What I would like to know is which is the best method in your opinion for adding calcium as I understand some reef keepers use both. What I mean by best, is the simplest and most cost effective method to use. I am very nervous of kalkwasser because the more I read about it the more I don't really understand its use. Do you have to have a pH monitor to use it safely? Do you have to add CO2 ? Do you add kalkwasser every day to your top up water? How much do you add, what is the function of a klakwasser stirrer, do you need to add other trace elements, does it buffer? If you have only space for one method which would you prefer to use?**

Nick Honor, via e-mail

A It is always far better to provide calcium via calcium reactors than kalkwasser or kalk alternatives. This way is more cost effective as the cost of additives adds up and some have proven to cause an ionic imbalance to the water chemistry with long term additive use. Calcium reactors do not need a pH probe to work effectively, test the outgoing effluent for d°kh and if you have a reading of between 40 - 60 d°kh your calcium reactor is working well. Only inject carbon dioxide in the daylight hours, controlled via a solenoid switch in a plug in timer. Add Kalkwasser or an alternative (which is the safer option) via top up of purified water dripped into the aquarium slowly overnight. You can link in a stirrer via an automatic top up system which is easy to do but will add over 24 hours as the evaporation of water dictates. Again you do not need a pH probe to control this.

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Coldwater Q&A

WHY WON'T MY PIKE EAT?

Young Pike adapt better to captive conditions than larger specimens but they are not suitable aquarium inhabitants long term because of the size they grow to.

I have tried several times to keep Pike in a large tank but have never been able to get them to feed and have had to return them to natural waters. Why will they not feed?
John Faith, via e-mail

If you are trying to keep fairly large Pike in a tank I think that you are expecting too much. Small Pike, say up to two years old could be kept in a large tank, and very handsome they are too; but larger Pike need so much space that only a public aquarium would be able to cope with them. You must also realise that Pike take a whole fish at a time and in their large stomachs they are able to digest the fish over a long period. If the fish you caught had had a meal recently, it is probable that it would not need to eat again for a few days. While digesting a large fish it would have no need to eat any more. The usual fishes eaten by Pike are: Dace, Roach, Rudd, Gudgeon and Minnows. Young Pike can be fed on earth worms. It may be possible to get these small Pike to eat flake food mixed with chopped up worms. This is how Sun Bass can be encouraged to take flake food.

Derek Lambert

HOW LONG CAN GOLDFISH LIVE?

Common goldfish tend to live longer than their fancy finned cousins.

Can you tell me how long a goldfish lives? I have had one for ten years and it is getting sluggish and keeps by itself. Shall I take it from the pond and keep it in an indoor tank?
Peter Jones, Bradford

Goldfish are like human beings, with regard to their length of life. Some die early others much later. So much depends on the way they are kept. In healthy conditions a goldfish can live for over twenty years. Your fish may not do as well in a tank as in a healthy pond. However, if it lives until the autumn, it may be safer to take it indoors, as if we get a very hard winter, it may not survive out of doors.

Derek Lambert

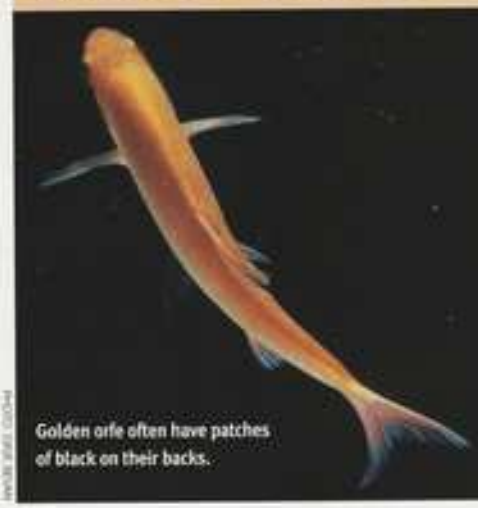
CAN FISH SURVIVE ON DRIED FOOD ONLY?

I have some goldfish in a tank but am unable to get any type of live foods for them. Can I keep them alive on a dried food?
Mike West, London.

There is no need to worry. You can keep the fish healthy by feeding with a good quality flake food only. I have known someone with Fantail goldfish in a tank which have been fed exclusively with flake food for over five years. During this time they have not seen anything in the form of live food. They are perfectly happy and healthy. The tank is well planted and so they can always get something in the form of soft vegetation if they so desire. Personally, I would add some frozen live foods to your fishes diet as well as just the flake food.

Derek Lambert

What are the black patches on my Golden orfe?



Golden orfe often have patches of black on their backs.

Q **What are the black patches which appear on Golden Orfe. Is it a disease and can it be cured?**
Harry Wilson

A I do not think that the black patches are a sign of disease and have had these marks appear on Orfe which are perfectly healthy. They are just a colour pigment change, and usually appear on the backs of the fish as they get older. There is probably something in the make up of these fish as they are actually a sport from the original Silver Orfe, or Ide (Idas idus). In parts of the Continent almost all the young of this species turn golden.
Derek Lambert

WHY IS MY PUMP ALWAYS BREAKING DOWN?

Q **I have a small submersible pump in my pond to work a fountain and a water fall, however, the waterfall is more of a dribble than a proper cascade. Do you think I need a more powerful pump?**
John Moore, via e-mail.

A Unfortunately you don't say what pump you have. As the water has to be raised a significant height for the waterfall, I am sure that your pump is not powerful enough for the job you are asking of it. It is quite adequate to work the fountain but to expect it to work the waterfall as well is very optimistic. A useful 'rule of thumb' is that for a 15cm wide waterfall covered with a realistic layer of water, a pump should be delivering approximately 2700 litres per hour at that height. Check the pump's specifications before purchasing.
Ben Helm

WHERE CAN I BUY SHOW FISH?

Q **I am trying to get hold of some fancy goldfish suitable for showing. Obviously they would have to be fully grown and meet the standards.**
John Baker, via e-mail.

A I think that you will be fortunate if you are able to buy fully grown fancy goldfish of show quality. These are rare and when obtainable are very expensive. If you are able to visit some shows you might be able to contact some of the breeders of winning fishes there. An exhibitor is very rarely inclined to part with fully grown show specimens but may have some young ones to grow on. Alternatively, you can visit the shops which specialise in importing good quality Fancy goldfish and search through all of their fish. Take a copy of the goldfish standards with you and look at each fish carefully. Select only those which meet the standards. Another very good source is Mr Sutton who advertises in this magazine and has excellent strains of fancy goldfish for sale. It was from him that I purchased some of my show quality Fancy goldfish many years ago. They were all young fish which needed to grow on for a year or so before making show winners though.
Derek Lambert

Can you give me information on how to breed Fancy Goldfish?

All types of fancy goldfish will breed together, however, if you want good quality youngsters you must only allow fish of the same type to breed together. This Calico Fantail would be a good fish to breed from because it has a body shape and correct finnage for the type.

Q **I have recently set up a 1.2m. tank for coldwater fishes and would like to breed red Fantails, and calico Fantails or Calico veiltails. Can you give me any necessary information on the project please?**
Phil Hampton, via e-mail

A You will need more than the one tank you have, in the first place the three varieties of fancy goldfish you mention, will all breed together and give you a lot of odd types. You must have only one variety in the tank. You will also be up against the possibility that the eggs or fry will be eaten by the parent fish. I think that it is practically impossible to breed the fish you need in one tank.

You must have at least two tanks, so that when the fish have spawned in the one tank, the fish can be moved to another tank, so that the eggs can be hatched and the fry reared in safety away from the parent fish. From a healthy pair of fancy goldfish a few hundred fry can be bred and they will have to have plenty of swimming space in which to grow on to good specimen fishes. While very small, say up to 1.5cm long, they do not seem to mind being rather crowded, but after this. Unless they can be spread out, they will not thrive. You can use all sorts of containers in which to grow on the youngsters, glass tanks are not essential, in fact children's pay pools make useful temporary growing on ponds for youngsters during the summer.
Derek Lambert

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Rasbora reflections

PHOTOS: MAX GIBBS

When asked what his favourite 10 fish were, **Roy Osmint** realised just how many of the rasboras were in his top ten list.

Two other species that at first glance are often mistaken for Harlequins are T. espei (pictured) and T. hengeli. A closer look at the main body mark, however, shows a much narrower, less clearly defined triangle. These two species are also noticeably smaller and slimmer.

I WAS RECENTLY REQUESTED TO nominate my top ten all time favourite tropical fish. On the face of it, this seemed a pretty straightforward and uncomplicated task. In reality, however, it proved rather more difficult than first anticipated. Numerous additions, deletions and alterations took place before I managed to come up with anything like a final selection. Even then, with so many wonderful fishes to choose from, each having their own special attractions, I was far from convinced that the choice was in any way definitive. Despite all the confusion there were, nevertheless, a few species that always figured prominently. Among these was a little fish that has remained firmly in my affections for more years than I care to remember - the Harlequin (*Trigonostigma heteromorpha*). Not only does this fish's subtle coloration and distinctive markings make it exquisitely beautiful, but its gentle, peaceful temperament make it an ideal inhabitant for the newcomer's small community aquarium. For it to be seen at its best, however, certain points require bearing in mind. But more about this later!

The Harlequin is in fact just one of a number of species within the genus Rasbora that is of considerable interest to newcomer and experienced aquarist alike. Sometimes tending to be overshadowed by those other aquarium favourites the Tetras, Rasboras have among their number some real beauties that will provide a lasting source of interest and pleasure.

Largest family

Rasboras are members of the largest order of freshwater fishes, the Cyprinidae. From the average aquarists point of view, the family can logically be separated into two groups. The first, consisting of Barbs, the second, made up of Rasboras, Danios and Minnows. With notable exceptions, that include Australasia, South America and Madagascar, Cyprinids as a whole are naturally distributed across much of the world. The majority of Rasboras, however, are generally restricted to areas of South-East Asia. Many inhabit fast flowing streams where the water is fairly soft and slightly acid in composition. Most are relatively slim-bodied with well forked tails. None possess the mouth barbels that are characteristic to many others of the family.

All have in common a lack of teeth in the jaws, although pharyngeal teeth located in the throat are present. These are used for grinding food. An adipose fin is also conspicuous by its absence.

Maximum size among Rasboras varies according to species. Captive specimens rarely attaining the size of their wild living counterparts. There is consequently something for almost every size of aquarium and community.

These are most definitely shoaling fishes and will only really prosper and sparkle when provided with these circumstances. In odd ones and twos they will often become reclusive and never be exhibited as confident and secure. 'The more the merrier', but for most species eight or ten individuals should be regarded as the minimum.

In the aquarium

Rasboras lend themselves well to a variety of aquarium set-ups. Being generally placid and peaceful they make excellent community inhabitants, although, as always, they should be approximately matched in size to their fellow tank mates. A shoal of single species rasbora housed in an appropriately planted and furnished aquarium can make a truly stunning aquascene. The environment of such a tank can, of course, be specifically tailored to suit the particular species, thus doing away with the need for community compromise.

Another nice idea is to create a theme aquarium, in this case only incorporating fishes that originate from South-East Asia.

Red Scissortails (*Rasbora caudimaculata*) grow a little larger (up to 14cm) than the common Scissortail but are more colourful.

This might include, for example, Harlequins, Glass Catfish, gouramis and loaches. Such a selection would also ensure that all levels of the water column are regularly inhabited. Incidentally, this latter point is worth bearing in mind for most aquarium applications. By including a selection of top, bottom and middle swimmers you will ensure plenty of activity in all regions of the tank, thus creating a more interesting and visually pleasing aquascene.

There are perhaps two principal reasons why Rasboras are often not exhibited to best advantage. The first, as previously mentioned, is associated with insufficient numbers being housed together to properly sustain the shoaling instinct. The other is illumination!

Broadly speaking, Rasboras prefer subdued lighting. This is easily achieved by either using lower powered fluorescent tubes, or through shading. A natural way of creating shade in the aquarium is to choose plants whose leaves will extend over the water's surface.

It should be noted, that although lower illumination will in no way affect other fish species within the tank, plants will suffer if subjected to inadequate light levels. Select forms that are tolerant to lower illumination conditions.

Glowlight
(Rasbora pauciperforata)

Not to be confused with the tetra species of the same popular name, this attractive fish generally reaches a size of some 5cm. Seen at its best only when part of a shoal and in low level illumination, it is often overlooked in the dealers brightly lit display tank where its colours dull. Provide the appropriate conditions and circumstances, however, and colours significantly heightened and confidence grows.

Clown rasboras are some of the most attractive of the larger rasboras but need soft acidic water to do well in captivity.

NAME CHANGES Several fish that have always been thought of as members of the Rasbora genus, hence the common name, have now been moved into other genera. Best known of these are the Harlequin and its relatives that are now placed in the Trigonostigma genus.

Breeding Rasboras

It must be said that rasboras as a group are not among the easiest to induce to spawn, particularly among the smaller species. In fact, in some cases they are extremely difficult, if not impossible for the average aquarist. But then again, nothing is impossible! In any event, therein lies the challenge! I have long been of the opinion that the highly developed shoaling instinct of Rasboras, often continues into the spawning ritual. In other words, they are what might be described as community or flock breeders. Also, the age, quality and chemistry of the water seems of crucial importance. Though some forms spawn in distinctive manners, plenty of space, plenty of fish, shallow, well-aged, soft, slightly acid water with large quantities of fine leafed plants probably offer the best chances of success in most cases. But as I have stated many times in the past, breeding is a "funny thing". If your set-up just happens to have that "certain something" - who knows?

Species selection

The following include some of the charming Rasboras worthy of any suitable aquarium:

Pygmy (*Rasbora maculata*)

One of the smallest Rasboras reaching little more than 2cm, indeed, one of the smallest fishes found anywhere in the world. But this little beauty more than makes up for in appearance what it lacks in size. Its slender, brick-red body distinctively contrasted by a dark blue blotch located behind the gill cover and a small dot at the base of the caudal fin, makes this little fish an extremely attractive addition to any aquarium of smaller fishes.

Scissortail (*Rasbora trilineata*)

So called not only for its sharply forked tail, but its habit of contracting each lobe in scissor like manner. This is a larger species reaching up to 10 cm. Though not a brightly coloured fish, its pleasing shape and attractively marked tail fin give it widespread popularity. Here again, when housed in less than favourable circumstances it can appear rather drab.

Other Rasbora species

Other Rasbora species well worth considering are the Elegant (*Rasbora elegans*), Eye-spot (*Rasbora dorsiocellata*), Slender (*Rasbora daniconius*), Red-tailed (*Rasbora borapetensis*) and the Glass (*Rasbora urophthalma*). Take a little trouble to provide these charming fishes with favourable conditions and circumstances and your efforts will amply rewarded!

Harlequin (*Trigonostigma heteromorpha*)

The general body shape of the Harlequin differs from most other members of the genus in that it is much deeper. In terms of coloration there is an overall impression of coppery tones, but in favourable conditions closer examination also reveals the presence of lovely subtle pinks and greens. The fish's most distinctive feature, however, is undoubtedly the large blue/black triangular body mark, the apex of which is located at the root of the tail fin and its base between the dorsal and pelvic fins. The Harlequin reaches a maximum length of about 4.5cm.

Clown (*Rasbora kalochroma*)

Having previously stressed the shoaling nature of Rasboras, we have in this species a bit of an exception, in that this instinct seems generally less developed. That said, I am still of the opinion that a small group does better than odd individuals. This is a very attractive fish with an overall handsome red colouring. Fins are erect and set well back on a slender body which can reach a size of some 10 cm. Two distinctive dark spots are located on the flanks roughly in line with eye. For this reason the fish is sometimes called the Two-spot rasbora or when the eye itself is taken into account, the Three-spot rasbora.

Living Jewels

Paul Skinner breeds Jewel cichlids which may not be the best community fish but are still worth keeping.

With their lovely red colour, Jewels really do live up to their name.

These cichlids have been available in the hobby for many years although they have never achieved universal popularity due to their suspect temperament. Outside of the spawning season they can be kept with similar sized, or larger, fish as long as these are not of a timid nature. However, as spawning approaches they become more and more territorial, becoming increasingly aggressive towards any tank mates. Indeed if a pair prove to be incompatible then violent fights often lead to the death of one of the potential partners.

Taking the above into account I can hear many readers asking why anyone should wish to keep these fish at all. The answer lies in the incredible colours that these fish sport. Indeed they become even more gorgeous as the fish begin to court each other and breed. As an added bonus these fish prove to be the very best of parents, as is often the case with aggressive, antisocial, fish.

Love at first sight

It was many years ago that I first fell in love with these fish when I was totally entranced by the beauty of an adult male, in full colour, at an open fish show. I stood in front of this fish for fully ten minutes before I could tear myself away. Even then I found myself returning time and time again to stare in rapture. It was one of the most beautiful freshwater fish that I had ever seen. Indeed I believe that it would have given many marines a run for their money.

I had a community aquarium of medium cichlids at home, consisting of Firemouths, Convicts and Blue Acaras, along with a selection of catfish. I decided to add some Jewel cichlids at the earliest opportunity. I found plenty of 2.5 - 5 cm specimens available in shops but these drab, unattractive, grey-coloured fish were nothing like the one of my dreams. I decided that some research was called for and started to read as much as possible about these fish. This is a step that I would greatly recommend prior to purchasing any fish.

Results of my research

I learnt that they originally came from a variety of biotopes in Africa and as such water chemistry is not critical. The books also stated that the young fish are shoaling in habit, becoming more territorial as they develop. It was recommended that a small group be purchased letting a pair develop naturally as violent fights can break out if you try to force pairs together.

Taking all this advice on board I decided to purchase a group of 6 fish, utilising a 90 x 45 x 30 cm aquarium, and hoped that two would pair off. The tank was set up using Birmingham tap water (soft and slightly acid), sand and a number of smooth pebbles. The tank was heavily planted at the rear and sides, leaving an open area at the front of the aquarium. As these fish are reported to be energetic diggers and a good filter was recommended I installed an internal Fluval 4 power filter.

The group of fish that I purchased were all just over 2.5 cm in length and quickly settled down, feeding on a variety of dried, frozen and live foods. They were a pinkish-grey in colour with a blue-black spot on the gill cover. A further black spot was visible halfway down the body with another at the base of the tail. The fins had a bluish sheen to them with a red line to the edge of the dorsal and tail.

First signs of action

Initially the fish got on well, swimming around as a group and feeding together. Over the next couple of months the fish steadily put on size until they were averaging 7.5 cm in length. At this size they were beginning to colour up, although there did not seem to be any obvious differences between males and females either in colour or finnage. Then one evening when I returned from work I noticed that two of the fish had dug a pit at the base of one of the pebbles. They were actively chasing the other fish away from this area and I decided to remove the other fish for their own safety.

As the next few weeks passed the pair continued to increase in size and, without the competition from the other fish , quickly reached a size of 10 cm. As they increased in size they also increased in colour, although there was no obvious difference between them. They now had a background red colour while their flanks were flecked with bright blue spots. These shiny spots spread into the dorsal and the tail. The black spots were still very visible.

One morning the fish were busily cleaning one of the pebbles and the egg tubes were visible on the undersides of the fish, just in front of the anal fin. One was thin and pointed (the male), while the other was thicker and rounded (the female). Two days later the fish began to spawn. The female would swim over the pebble, pushing her egg tube over the stone while attaching a line of eggs. The male would then follow her over the eggs fertilizing them as he went. This process continued until they had laid in the region of 150 eggs on the pebble.

Over the next couple of days both parents took their duties most seriously with one patrolling the area surrounding the pebble, while the other fanned the eggs with its fins and removed any dirt with its mouth. →From time to time the parents would change roles. During this period the colours of the fish were truly stunning.

After 3 days the eggs hatched and the fry were moved to a pit in the sand some 15cm away from the hatching site. For a further 2 days the fry were a wriggling mass on the bottom of the pit. They were unable to swim at this point as they were weighed down with the yoke sac . Following these two days the fry were free swimming and kept trying to escape from the pit. Each time they escaped the parents picking them up in their mouths and then spitting them back into the mass of brothers and sisters duly returned them.

Time to start feeding

Once the fry were free swimming I started to feed them on newly hatched brine shrimp and powdered dry food, both of which were readily accepted. After a further week had passed I removed the parents from the tank, as I was worried that they may get fed up of their parental duties and start eating the youngsters. As the young grew I slowly started to introduce other foods, such as grated prawn and bloodworm, to their diet.

On this diet and with regular water changes (25% weekly) the youngsters grew quickly and reached the 2.5 cm mark in about 7 weeks. The one problem that comes with breeding fish that are not in everyday demand is that shops tend only to want a dozen at a time and usually do not give you very much for them.

Having said this I believe that this fish is well worth keeping in a species tank if only for the reward given by the stunning coloration. The fascinating parental behaviour shown by these fish is a bonus.

AQUARIUM SETUP

Tank used:	90 x 45 x 30 cm
Filtration:	Fluval 4 Power Filter
Substrate:	2.5 cm layer silver sand
Decor:	Smooth Pebbles
Plants:	Cabomba, Elodea, Amazon Swords
DIET	
Frozen:	Prawn, Brine Shrimp and Bloodworm.
Live:	Crickets, Mealworms, Maggots and Flies.
Dried Food:	Flake and Pellet
Temperature:	26°C
pH:	6.8
GH:	20 degrees
The Fish:	6 purchased at just over 2.5 cm

FACTFILE
JEWEL CICHLID

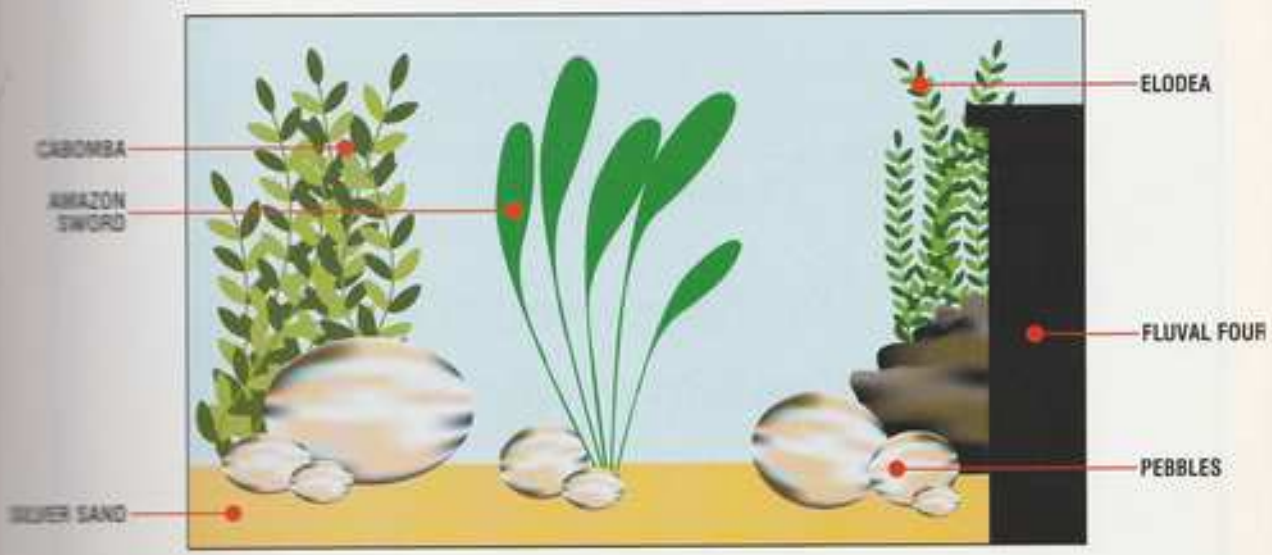
Common name
Jewel cichlid

Scientific Name
Hemichromis bimaculatus

Family
Cichlidae

Distribution
Central Liberia to Southern Guinea, Africa.

Size
Up to 15 cm, but usually smaller than this in captivity.



Flag cichlid

Kathy Jinkings profiles another great cichlid for the beginner

Flag cichlids are very attractive when they grow up but as youngsters are a dull brown colour and tend to hide away.

THE FLAG CICHLID IS SEEN ONLY occasionally in aquarium shops, where it is usually dull brown and doing its best to hide in a corner, where it is often passed by for the more obvious and brightly coloured fish. This impression does not do justice to one of the few cichlids suitable for a community tank which is both beautiful and endearing when given a suitable home. For those who have steered clear of cichlids under the impression that all members of the family are murderous bruisers, these little fish are an ideal starting point.

Gentle and shy, they will only become territorial when spawning, and provided your community is large enough to allow the other fishes to get out of the way at this time, they will settle in well to a tank of peaceful companions. Coming from the soft waters of the Amazon, they fit well into a community of Tetras, Corydoras and other small fish that share their tastes in water. However, like many Amazonian fishes, they will acclimatise to harder water, although unlikely to spawn in those conditions. Regular water changes are necessary. Although of course good water quality is necessary for all fish, Flag cichlids are particularly prone to exopthalmia (bulging eyes) if the water quality starts to slip.

Although unattractive when exposed and nervous, as in the aquarium shop, once they have settled in with plenty of plants, caves and other hiding places they will soon start to show their true colours. These are iridescent greenish blue with a black back, black stripe along the side, and a little red in the fins. Markings on the face give them an appealing 'smiling' appearance.

Check the name

When buying your fish, you should exercise caution and ensure that the Latin name is correct - buying fish under the name of Flag cichlid could get you some large and aggressive fish that are completely unsuited to your peaceful tank - one of the best examples of why it is worth taking the time to learn the scientific names of fish! As with many species the Latin name has been revised several times, and the fish have been Acara curviceps and Aequidens curviceps, as well as Laetacara. The species name of curviceps remains constant however, so you should be able to be reasonably sure of your purchases.

How to breed them.

Like most cichlids, it is best to purchase a small group of juveniles and wait for a pair to form. Once the fish have chosen their partners, the 'spares' can be returned to the fish shop. The males are larger than the females, with extended dorsal and anal fins. Starting off with a small group is most likely to assure you of a pair - if you only buy two, two females can sometimes behave as a pair, even laying eggs, but of course all the eggs resulting will be infertile. Assuming that you have succeeded in your matchmaking and that all is to their liking, they will start to clean a flat stone, plant leaf or area of roots, and this is where up to 300 eggs will be laid. They are good parents, prepared to overcome their natural nervousness in defence of their new family, and their tank mates will have to spend a little while collected up the other end of the tank. A tank divider can be used to give the other fish a little peace and the new parents a bit of security. As with many cichlids, sometimes they need a bit of practice to get it right, and they may eat the first few spawns.

These little cichlids are an ideal 'first cichlid' for someone who would like a chance to observe the fascinating family life of the group. Peaceful and beautiful, next time you see a frightened small brown fish trying to jam itself into the corner in the shop, give it a second look - these ugly ducklings really do become swans in the right conditions! ■

PROFILE

Name
Flag cichlid, Sheepshead acara, Flag acara

Scientific name
Laetacara curviceps

Size
6-7.5 cm

Aquarium type
Community of peaceful fish

Distribution
Amazon basin

Diet
flakes, all live foods (or frozen live foods)

Temperature
22-26°C

Sea view

Photos: Derek Lambert

In a specially extended edition of Sea View, **Andrew Caine** is joined by **Mark Howarth** to present a new natural feeding method for the reef aquarium

Mark (left) and Andrew in front of the experimental aquarium.

From the very beginning of the captive care of marine animals within home, public and research aquariums to the present day, we have been feeding the animals contained in such systems incorrectly. This method of feeding results in many problems associated with the long term care of animals within a marine aquarium. It is not the total amount of food that is the problem, which has previously been accepted in the past and blamed for poor water quality, but the manner in which it is delivered that causes adverse effects on the livestock and system.

WYMAG Seminar pointed the way

We came to this startling conclusion after Dr Ellen Thaller's presentation at the WYMAG seminar in October 2002, and the installation of a new and revolutionary feeding system in a marine aquarium.

Dr Thaller described reef fish eating plankton at a rate of 50 - 60 pieces per minute all day. She then spoke of a food injection system in her research aquariums providing small quantities of small particle food continuously during the day light hours. Her results found a dramatic reduction in aggression between fish species and an increase in vitality and health.

We decided to develop this feeding practice and alter the food delivered and time scale to see the effects on a large system stocked with fish, motile and sessile invertebrates with a 98% hard coral stock.

We wanted to see the effects of continuous feeding in the aquarium which was not solely aimed at the fish. We developed Dr Thaller's idea from feeding fish in the daylight hours to feeding continuously, injecting not only fish food but coral food as well, with food injection 24 hours a day to facilitate the nocturnal feeding of some coral polyps, other sessile filter feeders and mobile invertebrates such as crabs and shrimp species.

We also introduced a new food source to the aquarium, live phytoplankton, the ocean's primary producers to increase the zooplankton population, in an effort to develop a more natural food source.

In other words we are feeding the aquarium 24 hours a day 7 days per week.

We looked at the effects of this food injection not only on the animals which we were targeting but also the natural population of life within the aquarium system. We also had to monitor the effects of this feeding on the filtration and water quality of the system.

The Aquarium, Filtration System and Stock

The Aquarium system has a water capacity of 7,000l and has been in operation for 8 months, however, the filtration system is 2 years old. The aquarium has over 1200kg of live rock, over 100 fish ranging from a 20cm Naso tang, *Naso lituratus*, to a shoal of Ventralis anthias, *Pesudanthias ventrolis*, 2.5cm long, around 300 hard corals about 200 small polyped stoney corals and 100 large polyped stony corals, anemones, gorgonians, worms and countless crabs and shrimps.

It is lit by 7 x 400w 10,000K metal halide luminaries and a custom built light computer by Aqua-Medic and 5 x D & D Aquarium Solutions T5 pendant units each with 6 x 39w Actinic tubes, with a moonlight all under computer control. All lamps are from Arcadia. Water circulation is via 10 x IKS turbo 3500 pumps and 2 TUNZE 6100 pumps with a 40% reduction in power during the night.Temperature is controlled via a plate heat exchanger, air conditioned aquarium room and a chiller.

The filtration consists of an Aqua-Medic denitrification unit, Deltec fluidised bed calcium reactors x 2 running 12 hours per day turned off during the night, injection of ozone only when the redox potential falls below 450, and is very rarely used. Deltec AP1006 protein skimmer with a self cleaning head, algal refugium reverse lit

Dr Ellen Thaller pointing the way! Her lecture at the WYMAG seminar suggested the direction Andrew and Mark's experimentation should take.

PROBLEMS WITH TRADITIONAL METHODS

With traditional feeding at two to three times per day and no nocturnal feeding, the natural feeding patterns of our small reef fish, corals and other animals are altered, this has many detrimental effects on the animal, filtration system and its operation. The effects of this feeding are vast, animals that have evolved to have a low concentration of food but continuously supplied are suddenly subjected to a gorge, starvation, gorge, starvation feeding regime.This sporadic introduction of relatively large amounts of food causes many problems.

1. Fish gorge themselves to collect as much nutrition as possible in a short time span, filling the gut with large unnatural amounts of food.

2. Large amounts of food remains partially or undigested within the fish gut and is passed as faeces, only a small proportion of food is assimilated through the gut wall. This represents a huge loss in the animals' potential energy budget and an increase in contamination to the aquarium's water body.

3. The animals are then starved with only natural food to eat existing at a very low concentration. Over time the fishes health can suffer as they begin long term malnutrition. This results in a loss of vitality, high rate of disease, infection, and a high mortality rate.

4. Fish behaviour is altered as they become unnaturally aggressive to species they would ignore in their natural environment.

5. Large amounts of microscopic particulate food is lost to the system, most will reside in the boundary layer existing over the solid/ liquid interface of the rockwork within the aquarium. If not eaten by scavengers this can rot down causing pollution and possible algal problems.

6. Filter feeding foods are often added in too small amounts once per day, resulting in rapid increase and rapid decrease in food concentration to the animals.

7. Corals and other Cnidarians suffer as their food source is sporadic. A surge in amino acids stimulate their feeding responses but is often too late as the main bulk of particulate food has been taken out of the system by filtration, or eaten by other animals, by the time the corals have extended their polyps to feed.

8. No food is added during the night, many animals including corals and other filter feeders are active during the night. They rely on the capture of natural nocturnal zooplankton within the aquarium, whose populations remain low due to low food source and predation. Nocturnal feeders are slowly starved.

9. For Cnidarians less food is assimilated, resulting in less waste production, this waste is food for the symbiotic algal population within the gut wall, this results in a lower algal population within the coral, resulting in low algal waste such as sugars required by the coral as food.

10. Lower algal activity results in lower growth rates of the corals, and lower calcification in the growth of hard corals.

11. Again long term: malnutrition acts upon the animals resulting in weaker animals which lowers the vitality, and increases the disease and mortality rate.

12. Denitrifying bacteria populations and activity fall and rise to the availability of their food source, this source again has high peaks and low troughs due to the feeding. As a surge in toxins appears the bacteria are slow to respond, this results in a high residence time of toxins in the system. Even at low concentrations the toxins are acting on the metabolic processes of the aquarium inhabitants further increasing the biological stress levels.

So it follows that if we can feed our captive animals in a way in which they have evolved to feed, this would result in healthier animals, higher growth rate, less disease and mortality.
What we had to do was devise a way in which we could provide food for all the animals within the system as close to their natural requirements. Whilst increasing the food quantity yet not suffering a drop in any water parameter, thus maintaining high water quality.

with a 250w metal halide, phosphate control via a Deltec fluidised bed flowphos reactor, and a Deltec Kalkwasser stirrer, dosing at night only. UV sterilisation is not used.

Iodine, strontium, and various trace elements by HW Aquaristic are dosed under computer control every 4 hours. Salinity is kept constant with an automatic top up system, and 20% water changes using HW synthetic marine salts are performed once per month. Total water turnover is at the rate of 64,000 litres per hour.

All water parameters in both the sump and main aquarium are monitored via two IKS professional computer systems with the general parameters at the beginning of the feeding being :-

Salinity 1.026, Temp 26 celcius, pH 8.2 - 8.4, Calcium 420ppm, DKH 11.2, Alkalinity 4.0, Magnesium 1350ppm, Iodine 0.06, Nitrate 20ppm, phosphate .34, nitrite and ammonia 0.0 Redox potential 450

Feeding

As we wanted to feed during the night time hours, after much discussion we decided to increase the total food given to the aquarium. We had also decided to add a totally new food source, live phytoplankton to the system in an effort to increase the natural zooplankton population, facilitating another increase in food injected to the system.

THE ORIGINAL FEEDING REGIME

All food listed here was the total food injected to the system in a 24 hour period, fed twice per day half in the morning the other half in the evening.

8	cubes of San Francsio Bay Baby brine shrimp
12	cubes of Gamma Omega 3 enriched brine shrimp
16	cubes of Gamma Mysis shrimp
4	cubes of Aquafresh chopped cockle
4	cubes of San Francisco bay chopped mussel
5ml	HW Multi Vitamin Complex
400ml	of Marine Snow or Marine de lux alternating daily
1	Full sheet per day of San Francisco bay Seaweed Salad, green marine algae.

New feeding regime

We decided to mix up a two day supply of food in a container for the continuous feeding, the following were mixed together:-

500 ml	Marine Snow
500 ml	Marine Deluxe
1	blister pack of San Francisco Bay Baby brine shrimp
1	blister pack of Aquafresh Cyclops
8	cubes of Gamma Omega 3 enriched brine shrimp
10 ml	HW Multi Vitamin Complex Then diluted with aquarium
water	to a volume of 2 litres.

This represented an increase of food by 200ml of coral food and mixing the two brands together as previously they had been fed on alternating days.
Twice a day the following was added to feed the larger fish in the aquarium:-

6	cubes of Gamma Omega 3 enriched brine shrimp
8	cubes of Gamma Mysis shrimp
4	cubes of Aquafresh chopped cockle
4	cubes of San Francisco bay chopped mussel

This represented an increase of 8 cubes of brine shrimp, 24 cubes Cyclops, 12 cubes baby brine.
The dried seaweed feeding remained unchanged.
4 litres of home cultured phytoplankton *Nannochlaropsis oculata* over a 24 hour period.
This was a totally new food source to the aquarium.

The Results after 28 days of continuous food injection

Water quality:-. This was obviously the area of most concern since such heavy feeding might have caused a problem, however, the water quality actually improved even with the increase of food injected into the system. All levels remained stable at the levels before the feeding commenced, only the nitrate level fell from 20ppm to 5ppm over the 28 day period. There was no evidence of an increase in element depletion within the water body nor did we have to change any settings on the reactors within the system or alter dosing rates.

Calcareous algal growth:-There was a big increase in calcareous algal growth over the rockwork, aquatic equipment and glass was noted, with a distinct improvement in pigmentation.

Zooplankton:-There was a zooplankton population explosion, with a conservative estimate being at over 500% biomass increase within the aquarium and sump filter.

Corals:-There was a dramatic increase in coral coloration, polyp extension and growth rates. It is estimated that hard coral growth from the beginning of the feeding exceeded the growth for last three previous months.

Fish behaviour:-A distinct drop in fish aggression between established fish with new additions hardly recognised.

A discussion of the results

These results were produced after we increased the total food injected to the system, yet reduced the daytime feeding quantity resulting in less food available to the fish, corals and daylight feeders, and injected a relatively high density of food to the nocturnal feeding animals within the system. Low quantities of food released continuously into the system allowed the fish, corals and other animals to consume small particles but regularly. This has resulted in us coming to the following theory of what is happening in the system:-.

1. Nutrition assimilation through the gut is at a constant allowing an unchecked supply of energy.
2. Digestive enzyme levels within the gut remain constant to the food supply allowing a greater digestive ability to attack the food as it is passed through the gut, resulting in a more efficient nutrient assimilation, therefore less waste is produced and released into the system.
3. Less food is lost as particulate waste, as the fish's feeding behaviour changes from biting and fighting, to passively picking at pieces which can be swallowed whole and not bitten which releases particles into the system.
4. We are hoping to show a drop in disease and mortality rate due to the increase of vitality within the fish and coral stock.
5. Corals and other Cnidarians are subject to a constant but low level of free amino acids 24 hours per day, this stimulation ensures a high degree of polyp extension facilitating a higher rate of prey capture.

THE CONTINUOUS FEEDER

EQUIPMENT :-

Aqua-Medic plankton reactor and peristaltic pump
Air volution 2 air pump and air line
IKS Aquastar computer and 4 plug bar non variable

METHOD :-

The food was placed into the plankton reactor and then the reactor was filled with aquarium water. The air pump was connected to the plankton reactor and air passed to mix and suspend the food mix within the reactor. Air line was passed to the base of the reactor with a bend at the bottom to avoid the stream of bubbles from the air inlet without any kink in the pipe. This air line was connected to the suction side of the peristaltic pump. Air line was connected to the pressure side of the pump and passed to the aquarium terminating above the outlet of an IKS turbo pump to ensure dispersal of food on introduction to the system. The pump was plugged into the IKS plug bar and the IKS computer programmed to switch on the pump every 15 minutes for 5 seconds 24 hours a day, 365 days per year. This timing allowed the peristaltic pump to deliver 20ml of food solution to the aquarium system every 15 minutes. The remaining frozen food described was thawed in a glass of aquarium water and released into the aquarium in bulk twice per day. The seaweed was fixed to the side of the aquarium using a lettuce clip three times per day.

The continoous feeder which has helped make all the difference.

PHYTOPLANKTON FEEDING

EQUIPMENT :-

Cleartides fluidised bed filter
2 off Air-volution 4 air pump, air line, 5mm ridged piping and air stone
Twin 54w Arcadia T5 starter and marine white tubes and reflectors.
Plankton culture and nutrients.
Salt water.
Peristaltic pump and digital timer.

METHOD :-

One 2 metre high 15 cm diameter Cleartides fluidised bed filter was modified by cutting down the centre pipe to a length of 30 cm. A standard air stone was attached to the end of a 5 mm ridged pipe which was passed down to 10 cm from the bottom of the reactor in the middle of the cut down centre tube, and the air pumps turned on. The reactor was filled with a fresh salt mix with a specific gravity of 1.026 at 26°C. The T5 tubes and reflectors were fixed at opposite sides of the reactor and timed for 18 hours per day. 2000ml of culture was added and fed with nutrients until dark uniform green culture was produced.

3 Air lines were fed into the reactor and attached to the peristaltic pump, the terminal end of the air line from the pressure side was placed in front of the suction intake of the main return pump from the sump to the aquarium. The peristaltic pump was timed to deliver 333 ml of live phytoplankton over a twenty minute time span every 2 hours, 24 hours per day.
The phytoplankton culture was topped up every day with fresh salt water mix and fed nutrients, we are currently looking to install a further 3 reactors to ensure an even culture density at all times, whilst reducing the nutrient content within the culture.

6. The constant and higher supply of nutrients results in a steady rate of waste produced allowing the symbiotic algal populations to remain constant and at a higher density due to the increase in the supply of food.

7. This enhanced algal activity and nutrient concentration results in a greater growth rate of corals.

8. There is less waste produced in the system, but what degree of waste there is remains at a much more constant level. This allows the denitrifying bacterial population and activity to remain constant to the food supply, resulting in a much lower toxin residence time within the aquarium water body. Therefore less stress is exerted on the biological functions of the animals.

9. The introduction of live phytoplankton acting in a synergistic manner with the new feeding during the night, has boosted the natural planktonic populations within the aquarium. Most zooplankton species are nocturnal, rising in the water column to filter phytoplankton, or prey on those that do. The nocturnal feeding allowed a higher food source to the planktonic filter feeders facilitating a population explosion, the predatory zooplankton population followed. The constant supply of food allowed the predator prey populations to remain at a higher and dynamic level, we hope to sustain this level if not increase it, however too high levels may prove detrimental to the system.

10. This increase in plankton biomass represents a huge increase in the natural food source for nocturnal filter feeders such as many species of small polyped stony →

WHAT THE RESULTS SO FAR PROVE

We stress that we have no quantitative data on the apparent change, however, we can provide a theory with sound evidence to warrant on going experiments to collect such data. We also acknowledge that the time span is far too short to establish long term success, but felt we had to release the study because of the magnitude of change involved. Much is still to be done and too much remains unknown, it is with this in mind we ask fellow aquarists not to attempt this on their home aquaria until the long term effects have been evaluated. Long term the results could still prove negative.

Moorish Idols have long been thought of as "difficult" or "impossible" by some people, yet this one is thriving in Mark's tank. You can also see the fantastic Calcareous algal growth on the rocks behind.

Above: The aquarium is owned and extensively maintained by Mark Howarth, in the North West of England who co-authored this report.

corals. Higher concentrations and natural food sources for these corals results in increased growth and vitality.

11. Other sessile filter feeding animals such as sponge, bryozoan and tunicate populations increase providing increased water purification and natural food sources for others.

12. The motile benthic invertebrate population also exploded allowing a greater turnover of the sediment. This resulted in a cleaner substrate as detritus is formed and consumed at a constant rate, further reducing toxic waste production.

13. The increase in hard coral growth and calcium fixation rates within the system has not forced us to alter the calcium production rate from the calcium reactors, nor have we had to alter any element dosing rates. We feel this is a direct result in the increase of zooplankton predation providing those natural elements in a more natural form. Elements utilised and removed from the water body via biological pathways must come from somewhere, and we may well have to alter the dosing rates to maintain levels in the future. However the increase in benthic biomass and activity will provide an increase in acidic secretions acting on the surface of the calcareous substrate. This will provide an increased source of calcium and other elements to the aquarium water body, and may be contributing to balancing the increased demand.

14. We have achieved a nitrate level drop of 15 ppm yet we have increased the food levels introduced to the aquarium. High nitrate levels have mostly been associated with over feeding and high levels of waste. Even though we increased the food concentration we spread it over time, this resulted in more food being assimilated and thus less waste produced. Less food was lost as detritus and the detritus that was created soon became consumed by the natural populations of scavengers, only to recycle up the food chain within the aquarium, and not rot down. The introduction of live phytoplankton may also be responsible for utilising nitrates as a food source.

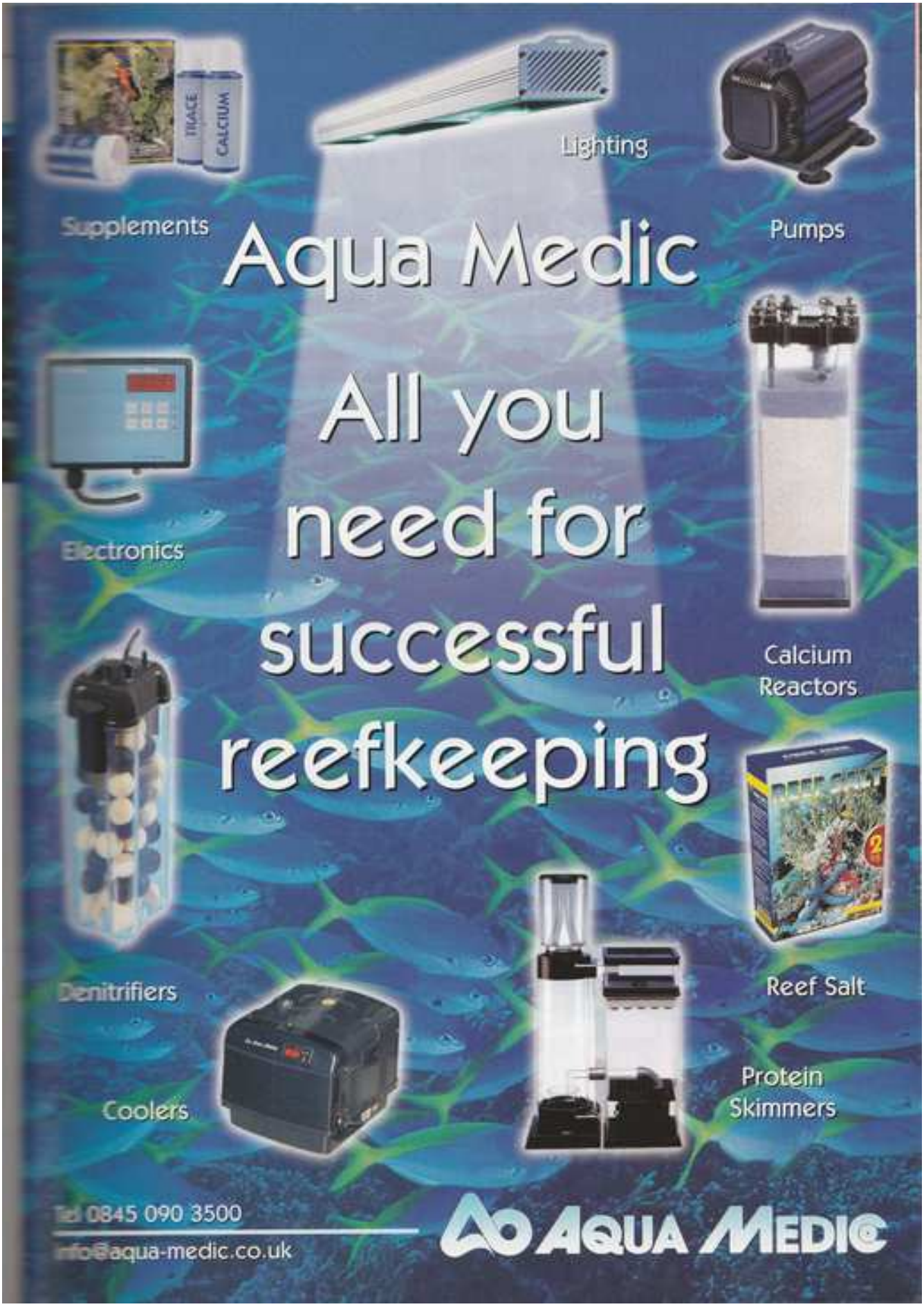
With the cessation of starve/gorge feeding replaced with constant release of food into the system over 24 hours per day and a new food source, the base of the natural aquatic food web, phytoplankton, a dramatic change has occurred to all life within the closed system. The problems associated with traditional feeding as previously discussed are dampened and every aspect of life within the aquarium is altered showing dramatic change in population dynamics within the planktonic, benthic, sessile and motile invertebrates. Hard coral growth, coloration and polyp extension increases, the fish are less aggressive and coloration has increased.

We have now introduced 5 *Dendronephthya* species, a coral acknowledged to be "impossible" to keep in aquariums, to see if this new method of feeding will allow them to not only survive but grow in captivity. ■

...just a small selection of the invertebrates which have benefited from this new feeding regime.

IN CONCLUSION

To sum up we feel that this method of feeding allows energy to be transferred more efficiently through each and every pathway of the food web within the aquarium, resulting in an increase in the health of animals contained within it. Less biological waste produced as a result improves the water quality exerting less biological stress on the animals and a more efficient denitrifying bacterial population. This short study may well prove to be further evidence that striving to create a near as natural environment for marine animals housed in a closed system is the way forward to increasing our success in the husbandry of such creatures.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TOP GEAR

Hydratech Cyclone pressure filters

Blagdon launches Hydratech Cyclone pressure filters and Torrent pumps.

Blagdon have just launched the Cyclone range of pond filters, which they say have all the advantages of the pressure filter concept without the drawback of frequent cleaning. The pressure filter has become the standard format of pond filtration with its effective filtration coupled with the advantage of being able to bury it discretely beside the pond.

The drawback of the early pressure filter designs was the limited surface area and filter media format, which meant they needed frequent time consuming cleaning. In recent years this problem has been the focus of innovation with a number of clean 'in situ' solutions offered. After three years of development work with an international team of American and Italian designers Blagdon are proud to unveil the Cyclone pressure filter system.

The Cyclone design majors on effective and low maintenance filtration. Interpet say Cyclone filters have canister volumes that are 25-40% bigger than competitors, which not surprisingly delivers higher filtration capacity. The unique swirling cyclonic intake flow causes fine particles to clump making them easier to remove and causes larger particles to settle out at the bottom of the canister reducing filter blocking. Cyclone uses a multi foam set-up with fine, medium and coarse foam in a unique layout which minimises blocking and optimises the use of the whole surface area of the foam which is seven times larger than the current market leading pressure filter. The net effect of all these filter design initiatives is that the Cyclone needs cleaning 3 to 5 times less frequently than other pressure filters.

Cyclones are available with an integrated UV that effectively kills off green water algae. The UV bulbs are higher wattage than all equivalently rated competitors filters and use a unique bulb format which has an integrated high efficiency built in ballast. These UV bulbs are long lasting and easy to replace with the added benefit that replacing the

Blagdon's new Hydratech Cyclone 20000 filter

THE PRICE

Prices start from as little as £59.99 for the Cyclone 3000 and £119.99 for the Cyclone

ballast with the bulb means that the operating efficiency of these bulbs is always at an optimum. With all these UV advantages and Cyclones filtration efficiency it is not surprising that all UV models have a clear water guarantee.

Cyclones are available in five sizes for ponds up to 20,000 litres both with and without UV. A realistic sizing guide makes it easy for you to select exactly the right model for your pond.

Hydratech Torrent pond pump

THE PRICE

The Hydratech Torrent is initially available in two sizes: 5500 which produces 2900 lt/hr at 2 metre head with a maximum head of 4m and a MRRP of £139.99, and 8000 which produces 6300 lt/hr at 2 meter head, has a maximum head of 6m and a MRRP of £179.99. A 10,500 model will be available later in the year.

Blagdon have launched the Hydratech Torrent pond pump, which is ideal for running waterfalls and filters.

Pond pumps intended to run waterfalls and filters need to move large amounts of water at a high flow rate and lift it high above the pond for spectacular waterfalls or under high pressure through modern filtration systems. This type of pump should easily pick up and pass relatively large (8mm) pond waste matter through the impeller system of the pump and into the filter or over the waterfall removing the need for a pre-filter which constantly needs cleaning. The filter pump is like the heart and lungs of the pond and so needs to be reliable and since it has to run 24 hours a day 365 days a year it also needs to be economical to run.

The Torrent has a synchronous motor, which like the caged pumps is low wattage, so cheap to run, and inherently reliable - the reliability is enhanced with a ceramic impeller shaft and bearings. The unique feature of the Torrent is the Duplex Magflow technology which is delivered as a result of the design of the impeller and its housing. The snail shell shape of the chamber creates an area of tight tolerance where the impeller can generate significant pressure and higher clearance areas where larger particles are picked up in the flow. This design is only possible because of the unique self-cleaning action, which operates if a particle does become trapped by the impeller.

The Torrent pond floor intake is at the base, which ensures effective

FURTHER INFORMATION

Please write to the Blagdon Information Centre, Interpet, Vincent Lane, Dorking Surrey, RH4 3YX

After 18 months on test we give Hozelock Cyprio's Vorton Ultra Violet Clarifier its final review.

The Vorton certainly looks different from most other models.

When this clarifier was launched at GLEE in September 2000 it was with a great fanfare and some very clever marketing. A huge model of the unit towered over the Hozelock Cyprio's stand and they even ran a video all about the new unit on the bus taking shop keepers to and from the show.

Hozelock Cyprio's main claim for the Vorton UVC is that it will be up to 50% more efficient than other UVC products thanks to its unique design. We have now had the spec model on test for 18 months and can give our final verdict. Throughout the trial it has operated without any problems and done an excellent job on the pond it has been installed on. It was easy to instal and the bulb was easy to change at the beginning of the new season.

When water enters the Vorton UVC it spins around the tube thus increasing the contact time.

Mis-information

All in all, we have been satisfied this product is well up to standard. The only thing we would critise is nothing directly to do with this product, but on the information given in the Hozelock Cyprio cataloge about UVC's. Under the heading of Clarification vs Sterilisation they say *"The Hozelock Cyprio's UVC's are not sterilisers."* They go on to say *"The problem with sterilising pond water is that the fish can lose their natural immunity to disease."* We have to take issue with them over both these statements. Firstly, all UVC's kill some bacteria and larger parasites as they pass through them. Not as much as those units specifically designed to sterilise the water passing through them but certainly enough for a significant number to be effected. This is particularly true when the bulb is new. Secondly, we totally disagree with the statement about about fish losing their natural immunity to disease. Most larger aquatic outlets use UV sterilisers on their systems to prevent the spread of diseases. Likewise many marinists install UV sterilisers on their aquarium with a noticable reduction in disease problems.

The range consists of models designed for ponds up to 2,200ltr, 4,500ltr, 9,000ltr, 14,000ltr, 18,000ltr and 27,000ltr with the largest two models having two units joined together.

Book reviews

TOP GEAR

Many of Today's Fishkeeper's contributors are well known aquatic authors as well. Bob Goldstein and Peter Hiscock have both had books published recently. Dick Mills reviews Bob's new book, while Derek Lambert has all the details about Peter's new plant encyclopedia.

Glorious guide to aquarium plants

A great book for anyone interested in becoming an "aquagardener" rather than just growing a few plants.

The Encyclopedia of Aquarium Plants, from Interpet Publishing is a stunning glossy hardback showing planted aquariums in all their glory - and how to create them! The author, Peter Hiscock, well known and respected in his area, provides a wonderful exploration of beautiful aquarium plants, along with lots of sound practical advice on how to grow them.

It is well illustrated with over 250 colour photographs and graphics and a complete guide to more than 150 popular aquarium plants. To make it easy for the reader to access all the information, the book is divided into two; a practical section followed by the plant profiles.

The first section is a practical guide to all aspects of creating a stunning planted aquarium, and provides all the information needed on the natural biology of plants, water quality and filtration, choosing substrates and correct planting methods. Also, the important subjects of lighting, feeding and propagation are covered in detail, followed by tips and suggestions for artistic aquascaping.

The second section is a comprehensive survey of more than 150 popular aquarium plants, presented in A-Z order of scientific name. Each profile includes a colour photograph, full botanical details, practical and growing information along with the plants common name, origin, height, growth rate, suggested aquarium zone, lighting requirements, temperature range, propagation techniques and a difficulty rating. Obviously a book of this size and stature is not going to be cheap, but at £25 it still represents good value for money.

American aquarium fishes

A must buy for anyone interested in North American native fish.

With the wealth of South American tropical species, fishkeepers north of the Rio Grande may think they've been neglected for too long when it comes to appreciating native fishes in their own backyards. However, galloping to the rescue like the proverbial US Cavalry, comes this book.

American aquarium fishes by Robert J Goldstein with Rodney W. Harper and Richard Edwards.

If you thought 'American' aquarium fishes started and stopped with the Flagfish (Jordanella floridae) and the Red Shiner (Cyprinella lutrensis) you're in for some incredible enlightenment.

The whole raisons d'etre of the entire range of species is examined: why certain fish live where they do and why transferring them to other waters is not a good idea. Whilst these facts are of importance to biologists working in the field, it's the practical information on keeping these fishes that will appeal to fishkeepers. The practical advice on their collection and transportation will be particularly appreciated by American aquarists.

A very helpful table correlates species with their native States and this information is further enhanced by listings of each State's collection restrictions (or not) together with relevant publications about the local species. The label 'American aquarium fishes' conjures up such species as Darters, Minnows, Shiners, Suckers and Sunfishes. They're all here - and the word 'all' is deliberately used: there are at least 60 Darters, 30 Dace and Shiners, probably 15 or so Sunfishes (both large and small) plus Killifish and Catfish in the colour photo section, with associated text details elsewhere. These are the 'popular' well-remembered species but there are plenty of other species too such as the Pirate Perch, Blennies, Gobies and Gambusia livebearers by the bucketful.

An added 'extra' in the book is a short, but nevertheless useful, chapter on Plants in the Aquarium which add yet another 'native' feel to the aquarium collection. A copy of this uniquely-focused book on your aquatic bookshelf will give you the edge over most other collections; unfortunately, due to legislation restricting the importation of some species, non-USA based aquarists may not be able to take full advantage of all the information within its covers. ■

BOOK INFORMATION

Title:	Encyclopedia of Aquarium Plants
Author:	Peter Hiscock
ISBN:	1903098467
Price:	£25 For further information contact the Interpet Sales Office on 01306 873822 or email sales@interpet.co.uk

BOOK INFORMATION

Title:	American aquarium fishes
Author's:	Robert J Goldstein with Rodney W. Harper and Richard Edwards
ISBN:	0-89096-880-2 Texas A&M University Press 2000
Price:	It costs around $45.00 direct and can be obtained online from www.tamu.edu/upress.

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[illegible]	Tel 01865 556623
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[illegible]	Tel 01284 755051
[illegible]	Tel 01306 743747
[illegible]	Tel 01284 755051
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[illegible]	Tel 0208 981 9117
[illegible]	Tel 02380 628863
[illegible]	Tel 01509 610310

Decor/accessories

[illegible]	Tel 08450 903500
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[illegible]	Tel 01977 556622
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[illegible]	Tel 01205 358058
[illegible]	Tel 01509 610310

Filters

[illegible]	Tel 0115 961 4984
[illegible]	Tel 08450 903500
[illegible]	Tel 01277 366002
[illegible]	Tel 01284 755051
[illegible]	Tel 01844 292002
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[illegible]	Tel 02476 660012
[illegible]	Tel 01509 610 310
[illegible]	Tel 0208 452 9479
[illegible]	Tel 01923 284151

Fish foods

[illegible]	Tel 01865 556623
[illegible]	Tel 0845 0903500
[illegible]	Tel 01664 410000
[illegible]	Tel 01553 776778
[illegible]	Tel 01306 743747
[illegible]	Tel 00 314 336 32397
[illegible]	Tel 01306 743747
JBL	Tel 01284 755051
JMC	Tel 01246 415275
King British	Tel 01427 810231
LAC	Tel 0208 981 9117
Nishikoi	Tel 01371 851424
NT Labs	Tel 01622 817692
Oase UK	Tel 01264 333225
Omega	Tel 0208 949 6100
Petes	Tel 0208 501 1033
Phoenix	Tel 0115 961 4984
PPI	Tel 0115 982 3900
Hagen	Tel 01977 556622
Seachem	Tel 07000 393940
Sera	Tel 0208 665 0026
Tetra	Tel 02380 620930
TMC	Tel 01923 284151
Underworld	Tel 01509 610310
Vitakraft	Tel 01484 866422
Waterlife	Tel 01753 682487
ZM	Tel 01962 856050

Heaters

Algarde	Tel 0115 961 4984
Aquamedic	Tel 08450 903500
Dupla	Tel 01306 743747
Hagen	Tel 01977 556622
Interpet	Tel 01306 743747
LAC	Tel 0208 981 9117
Nathura	Tel 01952 883408
TAP	Tel 01275 810522
Tetra	Tel 02380 628863
Underworld	Tel 01509 670310

Liners/Underlay

Interpet/Blagdon	Tel 01306 743747
Tetra	Tel 02380 628863
Trident	Tel 02476 660012

Lighting/Aquarium

Aquatic solutions	Tel 01553 776788
Aquamedic	Tel 08450 903500
Arcadia	Tel 0208 251 5522
Deltec	Tel 0208 501 2492
Dupla	Tel 01306 743747
Interpet	Tel 01306 743747
Hagen	Tel 01977 556622
LAC	Tel 0208 981 9117
Underworld	Tel 01509 610310
Zoo med	Tel 00 1 80 55 42 99 88

Lighting/Pond

Blagdon	Tel 01306 743747
Oase	Tel 01264 386500
Hagen	Tel 01977 556622
Trident	Tel 02476 660012
TMC	Tel 01923 284151

Marine Equipment

Aquamedic	Tel 08450 903500
Aquatic Solutions	Tel 01553 776788
Casco	Tel 07000 393940
D & D Marines	Tel 0208 501 2492
Ft filtration	Tel 01332 850345
LAC	Tel 0208 981 9117
Nathura	Tel 01952 883408
TMC	Tel 01923 284151
Tunze	Tel 00 49 88 562022
Interpet/Red Sea	Tel 01306 743747
Underworld	Tel 01509 610310

Medication

API	Tel 01865 556623
Aquamedic	Tel 08450 903500
Esha	Tel 00 314 336 32397
Interpet	Tel 01306 743747
NT Labs	Tel 01622 817692
Sera	Tel 0208 665 0026
Tetra	Tel 02380 628863
Waterlife Research	Tel 01753 682487
Vitakraft	Tel 01484 866422

CO_2 equipment

Aquamedic	Tel 08450 903500
Dupla	Tel 01306 743747
JBL	Tel 01284 755051
LAC	Tel 0208 981 9117
Sera	Tel 0208 665 0026

Pond Cleaning

Hozelock Cyprio	Tel 01844 294328
Oase	Tel 01264 386500
Rotoflush	Tel 01297 560229

Pond Pumps

Aquamedic	Tel 08450 903500
Interpet /Blagdon	Tel 01306 743747
Draper Pond	Tel 01264 386500
Fishmate	Tel 01932 700000
Hozelock Cyprio	Tel 01844 292002
Oase	Tel 01264 386500
Hagen	Tel 01977 556622
Tallis	Tel 0115 982 3900
Tetra	Tel 02380 628863
Trident	Tel 02476 669012
TMC	Tel 01923 284 151

Pumps and Powerheads - Aquarium

Algarde	Tel 0115 961 4984
Aquamedic	Tel 08450 903500
Aquatic Solutions	Tel 01553 776788
Eheim	Tel 01284 755051
Hagen	Tel 01977 556622
Interpet	Tel 01306 743747
LAC	Tel 0208 981 9117
Tetra	Tel 02380 628863
TMC	Tel 01923 284 151
Tunze	Tel 00 49 88 56 20 22
Underworld	Tel 01509 610310

Reef Tank Supplements

Aquamedic	Tel 08450 903500
Aquatic Solutions	Tel 01553 776788
Casco	Tel 07000 393940
Deltec	Tel 0208 5012492
Interpet/Red Sea	Tel 01306 743747
NT Labs	Tel 01622 817692
TMC	Tel 01923 284151
Underworld	Tel 01509 610310
Waterlife Research	Tel 01753 682487

Salt

Aquamedic	Tel 08450 903500
Aquatic Solutions	Tel 01553 776788
Interpet/Red Sea	Tel 01306 743747
SEACHEM	Tel 07000 303940
Sera	Tel 0208 665 0026
TMC	Tel 01923 284151
Underworld	Tel 01509 610310
Waterlife Research	Tel 01753 682487

Tapwater Purification

All Clear	Tel 01277 214911
API	Tel 01865 556623
Aquamedic	Tel 08450 903500
Aquatic Solutions	Tel 01553 776788
Deltec	Tel 0208 501 2492
LAC	Tel 0208 981 9117
Nitragon	Tel 01708 744880

Test Kits

API	Tel 01865 556623
Aquamedic	Tel 08450 903500
Aquatic Solutions	Tel 01553 776788
Casco	Tel 07000 393940
Esha	Tel 00 314 336 32397
Interpet	Tel 01306 743747
NT Labs	Tel 01622 817692
Hagen	Tel 01977 556622
Sera	Tel 0208 665 0026
TAP	Tel 01275 810522
Tetra	Tel 02380 628863
TMC	Tel 01923 284151
Waterlife Research	Tel 01753 682487
Vitakraft	Tel 01484 866422

UV Clarifiers (Pond)

Hozelock Cyprio	Tel 01844 292002
Interpet/Blagdon	Tel 01306 743747
Oase	Tel 01264 386500
Petmate	Tel 01932 700000
Hagen	Tel 01977 556622
Trident	Tel 02476 669012
TMC	Tel 01923 284151

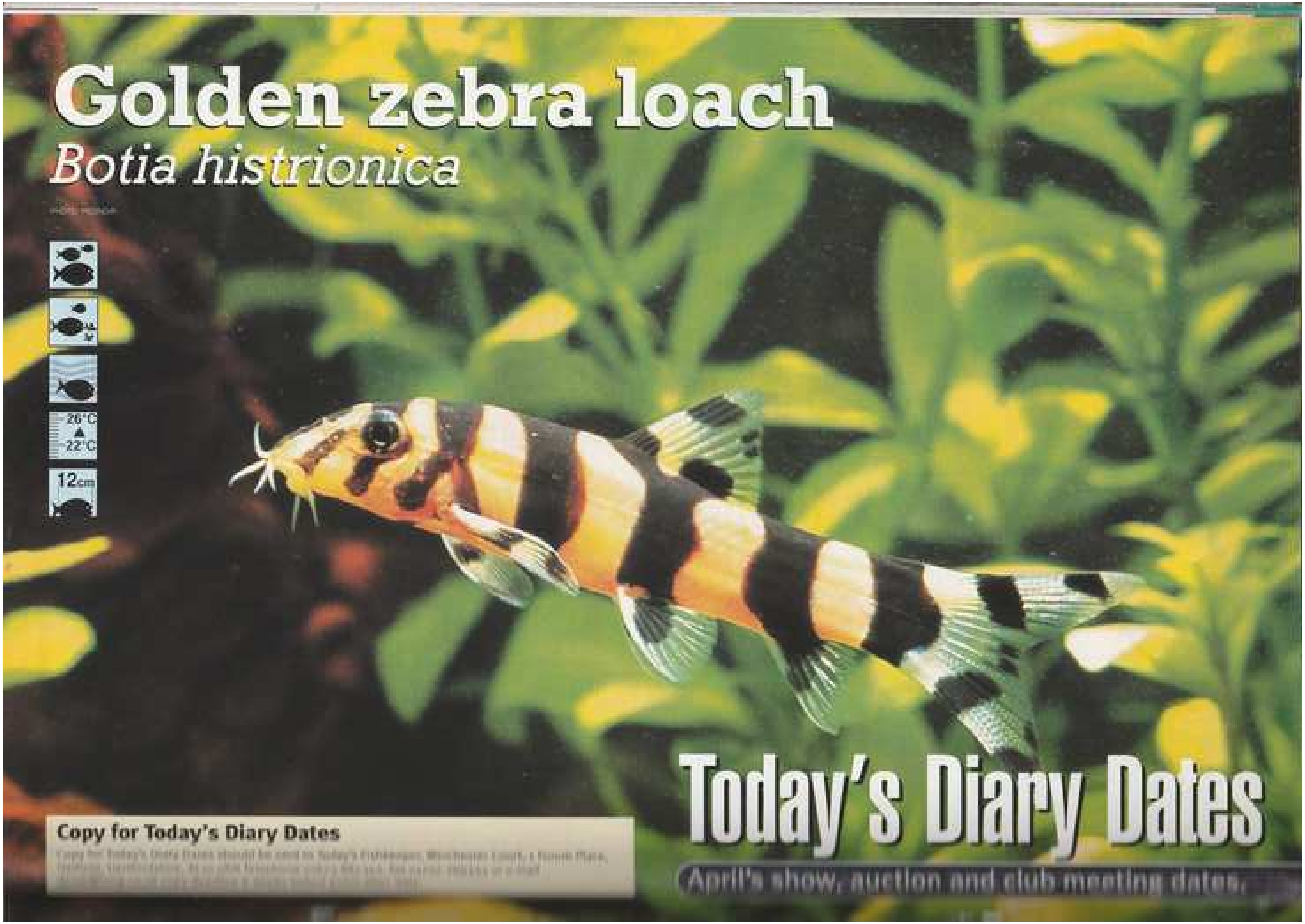
UV Sterilisers (Aquarium)

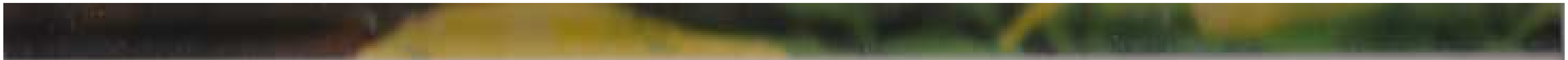
Aquamedic	Tel 08450 903500
Aquatic Solutions	Tel 01553 776788
Aquaworld Partners	Tel 01925 483979
LAC	Tel 0208 981 9117
TMC	Tel 01923 284151

Water Treatments & Dechlorinators

API	Tel 1865 556623
Aquamedic	Tel 08450 903500
Aquarian	Tel 01664 410000
Aquatic Solutions	Tel 01553 776788
Deltec	Tel 0208 501 2492
Interpet	Tel 01306 743747
Hagen	Tel 01977 556622
NT Labs	Tel 01622 817692
Oase	Tel 01264 386500
PPI	Tel 0115 982 3900
Schuran	Tel 01923 284151
Sera	Tel 0208 665 0026
TAP	Tel 01275 810522
Tetra	Tel 02380 628863
Tunze	Tel 00 49 88 56 20 22
Waterlife Research	Tel 01753 685896

tropical | marine | coldwater & ponds | plants | reptiles & amphibians | regulars


Golden zebra loach
Botia histrionica
26°C
22°C
12cm
Copy for Today's Diary Dates
Today's Diary Dates
April's show, auction and club meeting dates.



Tues 1st
Southend Leigh & D.A.S. AUCTION. Contact 01702 305740
Paisley & District A. S. meeting.
Contact [illegible]
Dunstable & D.A.S. meeting. Contact 01582 707280
York & Dist. A.S. meeting. Contact 01904 41427
The Irish Tropical Fish Society meeting.
Contact 01 4561836
Halton A.S. meeting. Contact 0151 2898190
North Bucks A.S. meeting. Contact 01908 377333
Oldham A.S. meeting. Contact 0161 281 3725
Preston A.S. meeting. Contact 01772 321145
Lang Toun Aquarists and Pondkeepers Group meeting.
Contact 01592 595825
Wyke A.S. meeting. Contact 01482 445543

Wed 2nd
Corby & D.A.S. meeting. Contact 01536 790937
Oasis Fish Club (Sunderland) meeting.
Contact 0191 384143
Perth A.S. meeting. Contact 01 738 621704 or 01506 510558
Clacton Fish Keeping Club meeting. Contact 01255 428065
Portsmouth A.S. meeting. Contact 01673 865352
Bracknell A.S. meeting. Contact 01344 485287
Ryedale A.S. meeting. Contact [illegible]

Thurs 3rd
Glenrothes meeting.
Contact D. Smart, 4 Lochty Ave, Kinglassie, Fife.
Faircity A.S. meeting. Contact 01738 561291 or 07714 188507
Sandgrounders A.S. meeting. Contact 01704 541177

Friday 4th
North West Cichlid Group meeting Contact 01942 707593

Sat 5th

Sun 6th
Halifax A.S. Auction Contact 01274 880471

Mon 7th
Kirkcaldy A.S. meeting.
Contact 01738 634689 or (01592) 205565
Solway A.S. meeting. Contact 01387 750606
St Helens A.S. meeting. Contact 01942 671463
Ayrshire Fishkeepers Association meeting.
Contact 01294 605277
Reigate & Redhill A.S. Contact 01293 782182
Merseyside Aquarist Society meeting.
Contact 0151 260 3664
Warrington A.S. Contact 01925 483979

Tues 8th
Darwin A.S. meeting. Contact 01254 701975
Northwich A.S. meeting. Contact 01606 882966
Caer Urfa A.S. meeting. Contact 0191 5237464
Telford & D.A.S. meeting.
Contact 01952 409721 or 01952 614410
Lang Toun Aquarists and Pondkeepers Group meeting.
Contact 01592 595825
Northern Goldfish and Pondkeepers meeting.
Contact 0161 9697567
Greenock D.A.S. Meeting. Contact 01475 704219

Bangor Aquarists & Breeders Society
Contact 028 9187 3539
Clyde Aquarist Society meeting.
Contact [illegible]
Hull A.S. meeting. Contact 01964 562387

Wed 9th
Linlithgow Aquarist Society meeting.
Contact 01506 510558
Halifax A.S. meeting. Contact 01274 880471
Tameside A.S. meeting. Contact 0161 339 6593
Bradford A.S. meeting.
Contact (01274) 652542 or (0113) 257 7709
Hounslow D.A.S. meeting. Contact 020 8890 6933

Thurs 10th
Mid Sussex A.S. meeting Contact 01924 602407
Kings Lynn Fish Club meeting.
Contact 01553 769522 or 01553 763743
Faircity A.S. meeting.
Contact 01738 561291 or 07714 188507 West Yorkshire

Fri 11th
South East Marine Aquarist Society Contact 01279 300542
Yorkshire Cichlid group meeting. Contact 01924 362086
Basingstoke A.S. meeting. Contact 0118 970 1461
West Cornwall Fishkeepers meeting.
Contact 01209 614158

Sat 12th

Sun 13th
Robin Hood A.S. Open show & auction
Contact [illegible]
Preston A.S. Auction Contact 01772 321145

Mon 14th
Kirkcaldy A.S. meeting.
Contact 01738 634689 or 01592 205565
Bristol Aquarist Society (Goldfish) meeting.
Contact 01792 207467
Ilford &D A&P Society meeting Contact 020 85507329
Grimsby & Cleethorpes meeting. Contact 01472 349178
St Helens A.S.meeting. Contact 01942 671463
Otley A.S. meeting. Contact 01274 531418
Robin Hood A.S. meeting.
Contact [illegible]

Tues 15th
Southend Leigh & Dist A.S. Contact 01702 305740
Greater Manchester Cichlid Society meeting.
Contact 01706 822284, 01706 353363, 0161 766 4457
or 01422 942 155
Midlands Marine Aquarists Society. Contact 0121 359 4469
Oldham A.S. meeting. Contact 0161 281 3725
Lang Toun Aquarists and Pondkeepers Group meeting.
Contact 01592 595825
Wyke A.S. meeting. Contact 01482 445543

Wed 16th
West Yorkshire Marine Aquarist Group meeting.
Contact 01924 420101
Clacton Fish Keeping Club meeting. Contact 01255 428065
Tongham Aquarists Society meeting. Contact 01252 25686
Portsmouth A.S. meeting.

Contact [illegible]
Perth A.S. meeting. Contact 01 738 621704 or 01506 510558
Bracknell A.S. meeting. Contact 01344 485287
Workington A.S. meeting. Contact 01900 67951

Thurs 17th
May 2003 Today's Fishkeeper on sale
Glenrothes meeting.
Contact D. Smart, 4 Lochty Ave., Kinglassie, Fife.
Bristol Tropical Fish Club meeting. Contact 0117 973 2145
Sandgrounders A.S. Contact 01704 541177
Faircity A.S. meeting. Contact 01738 561291 or 07714 188507

Fri 18th
Eastbourne & District Pondkeeping Society.
Contact 01323 7731369
Discus Ireland meeting. Contact (061) 318593

Sat 19th

Sun 20th
Kirkcaldy A.S.Open show & auction.
Contact 01738 634689 or 01592 205565

Mon 21st
Kirkcaldy A.S.meeting Contact 01738 634689 or 01592 2055
Thorpe & D.A.S. meeting. Contact 01953 605394
Solway A.S. meeting. Contact 01387 750606
Merseyside Aquarist Society meeting.
Contact 0151 260 3664
Ayrshire Fishkeepers Association meeting.
Contact 01294 605277

Tues 22nd
Northwich A.S. meeting. Contact 01606 882966
Lang Toun Aquarists and Pondkeepers Group meeting.
Contact 01592 595825
Greenock D.A.S. meeting. Contact 01475 704219
Croydon Aquarist Society meeting. Contact 020 8654 0984

Wed 23rd
Hounslow D.A.S. meeting. Contact 020 8890 6933
Halifax A.S. meeting. Contact 01274 880471
Tameside A.S. meeting. Contact 0161 339 6593
Workington A.S. Contact 01900 67951

Thurs 24th
Mid Sussex A.S. meeting. Contact 01273 602407

Fri 25th
West Cornwall Fishkeepers meeting.
Contact 01209 614158
Anabantoid Association of Great Britain 19th convention.
www.aagb.org

Sat 26th
Anabantoid Association of Great Britain 19th convention.

Sun 27th
Anabantoid Association of Great Britain 19th convention.
Oldham A.S. Open show & auction. Contact 0161 281 3725
Hull A.S. Open show & auction. Contact 01964 562387
Dunstable & D.A.S. Spring Auction. Contact 01582 707280

Mon 28th
Kirkcaldy A.S.meeting. Contact 01738 634689
or 01592 205565

Tues 29th

Wed 30th

Catfish convention success

The Catfish Study Group (U.K.) always have great speakers at their convention, and this year they invited Hans Georg-Evers & Ingo Siedel.

The Catfish Study Group (U.K.) is very lucky to have Brian Walsh as one of its members. Every speaker at their convention receives a hand carved model of a fish made by Brian. These are real works of art, yet are also scientifically accurate down to the number of scales along the lateral line. Brian is second from the left and on the right is club president Trevor Morris.

CATFISH STUDY GROUP (UK) MEETINGS.

The Catfish Study Group (UK) meet monthly on the 3rd Sunday of each month. The meetings are held in Wigan, which is central to members from the north and south of the country, at the St. Elizabeth's Parish Hall, Bolton Road, Aspull, Wigan. This is just off the M61 (junction 6) about a mile from the Bolton Reebok Stadium. The two most important dates left this year are Sunday Sept. 21st, when they will be holding their annual Open Show & Auction, and Nov. 16th Autumn Auction.

About 80 people turned up for what was the highlight of this year's Catfish calendar. They were not disappointed! Hans and Ingo are two of the world's most knowledgeable catfish experts and have been out to the wild habitats of these fish many times over the years. This in depth knowledge of their subjects shone through the presentations, however, their bright and lively style made even the scientific parts fascinating for those people without an academic background.

The only down side of this convention was its venue. This year's convention took place at a new venue which everyone was hoping would be a step up from the usual type of place used by fish clubs to run prestigious events like this. Sadly, the Standish High School near Wigan proved to be just like so many others. The building itself was in good condition and the room was properly blacked out, so at least we could all see the excellent slides without any problem. That was if you could stand the cold. The room was huge, the day bitterly cold and no-one knew how to turn the heating on until half way through the lectures. Hans and Ingo took this in their stride and took it in turns to give sections of the presentation whilst the other was running around trying to warm up!

Apart from this one negative, the convention was a great success and everyone had a good time. Well done the Catfish Study Group (U.K.). Lets hope the heating is on next year!

FESTIVAL OF FISHKEEPING AND WATERGARDENING

Plans are well ahead for this year's festival. A new addition will be a huge marque for a national Koi show. We understand from the organisers that about half the rooms are already booked at a time of the year when less than a third normally are. President of the FBAS, Joe Nethersell said *"We are really worried that not everyone who wants to come this year will be able to. Traditionally the regulars are always the last to book, but if they leave it too long this year they will end up missing out. I am trying to find alternative accommodation but obviously this will be off site and mean people travelling between the venue and their accommodation."* Taking this warning on board the *Today's Fishkeeper* and *Watergardener* magazines team have already booked their rooms. See you there!

Shop visit

Today's Fishkeeper visits *Perry's Aquatic Centre* at Dunholme, Lincolnshire.

Coming from directly opposite you can see the signs to this shop without a problem. Driving along the road, however, it is all too easy to miss them.

If there was a guide to the hidden places of the aquatic world, Wayne's shop would certainly feature in it. Tucked away in a rural Lincolnshire village with little along the way to tell you it is there, Perry's Aquatic Centre started life as a fishkeeper's hobby room. At the time Wayne was working at various jobs, including painting cars and working on the roads, before taking the plunge and trying his hand at breeding fish for a living. Perry's Angels, as it was called then, produced high quality angelfish for other aquatic shops to sell. Later Wayne opened up as a retail outlet and Perry's Aquatic Centre was born.

The centre has been steadily expanding and modernising over the years and is now a well laid out aquatic shop. The only problem is that it is hidden behind the family home, so all you see as you drive by are a couple of boards which are rather easy to miss.

Looking around the tanks in Wayne's shop it was obvious a lot of love and care went into them. All the fish were healthy and looked in excellent shape. In terms of rarity there was nothing that really stuck out, just a full range of lovely healthy 'bread and butter' fish with a few oddities dotted about. All the prices were reasonable and we would have been happy buying any of the fish in this outlet for our own community tanks.

The other thing that stands out is Wayne's interest in his customers. He really does care about them and is willing to give them any help and advice they need to be successful fishkeepers. That's why many of his customers have been coming to him for years and will continue to do so. ■

Shop details: Perry's Aquatic Centre, The Bungalow, 6 Market Rasen Rd., Dunholme, Lincoln. Tel 01673 860727

Shop opening hours: 10am-6pm Tuesday – Staurday, 10am- 4pm Sunday

Proprietor: Wayne Perry

Staff knowledge: Tropicals, fish breeding and plants

Number of tanks: 70 Display tanks and ponds three display tanks and Billy the Black shark

Display tanks and ponds: One Tropical and two Marine

Specialities: Plant equipment and Danish potted plants

Additional services: Free water testing

Brands stocked: Arcadia, Juwel,Tetra, Hagen, Waterlife and JBL (CO_2 equipment)

Which groups of fish do you sell?: Freshwater tropical and Coldwater


All the tanks were spotless and the fish in excellent health.


Wayne really looks after his customers and will do anything he can to help them with a problem.

Our verdict

A great venue for anyone looking for healthy 'bread and butter' fish for their community tank.

Wayne's verdict on the manufacturers

Which manufacturer has the best range of products in your opinion?
Tetra & Juwel
Which company gives your customers the best service?
Hagen

tropical | marine | coldwater & ponds | plants | reptiles & amphibians | regulars

New introductions

Top German aquarist **Erwin Schraml** has been trawling through some recent imports to find more interesting fish.

PHOTOS: ERWIN SCHRAML

Flatfish

Again and again 'cute' little flatfishes appear in our pet shops which are sold as 'freshwater flounders'. In most cases the species is actually Trinectes maculatus (its local name is Hogchoker). This Sole is mainly imported from Florida. Basically all Soles are predatory bottom dwellers. This species is not really a dwarf as it reaches a length of about 20 cm. The aquarium-atlas (Vol 5) gives the size as 45 cm, but this might be a mistake as the species can be found twice on one page under two names as well as under the synonym Trinectes fasciatus!. 20 cm is not really big, if one considers, that most species of the family Achiridae are food fishes and are known to be at least 'plate-size'. This species adapts well to freshwater, even if it is also found in brackish and pure saltwater down in depths of 75 m. Little is known about the biology of this flounder. In the Aquarium-atlas (Vol. 5) it is mentioned that the species spawned in captivity in 1985, when a large quantity of eggs were released. But no further information is given. These flatfish are found along the Western Atlantic-coast from Massachusetts to Venezuela.

Right: A head on shot shows how strange looking *Trinectes maculatus* is. In part this is because as a youngster these fish swim normally and only as they mature move over on to their side. At this time the eye migrates from one side of the head to the other, so both eyes are on the top.

Below: A side view of the same fish. Normally they would be partly buried in the substrate (ideally sand) so you can hardly see them.

Electric eels

The term 'electric eel' has the same hierarchical meaning as the term 'perch'. Both names differentiate classes of fish which are called in biology 'orders'. Six independent families (Sternopygidae, Rhamphichthyidae, Hypopomidae, Apteronotidae, Gymnotidae and Electrophoridae) are recognised within the electric eels (order Gymnotiformes). It is not easy to assign a living fish to one of these families without a diagnostic examination. But it is much more difficult to identify the right species. Nowadays it is the extraordinarily good catalogue Electric Fishes of the Continental Waters of America which Francisco Mago-Leccia has produced that makes it possible to identify most imports.

Sternarchogiton porcinum was imported from Peru by Aquarium Glaser for the first time. It was first discovered in the Rio Huallaga near Iquitos. This less attractively coloured species grows to about 30 cm long. The aquarium base should be dimly lit. It should be noted that they are aggressive towards smaller fish. Live foods, such as bloodworm or any kind of worms, are best for this species and larger specimens will prey on small fish and shrimps during the night. The species belongs to the family Apteronotidae, to which the much better known Black ghost knifefish (Apteronotus albifrons) belongs. The relatively large, deeply split muzzle is striking and clearly indicates its predatory nature.

Tatia brunnea also occurs in Peru!

Above Top: Female. Above Bottom: Male. Males are more slender than the females of this species although no reports of aquarium breeding have been published.

Mees has scientifically described, in 1974, Tatia brunnea as a new species from Suriname, actually from the Compagnia Creek. The species has up to now been known only from the Suriname River, the Marowijne basin and from the adjacent French Guiana (Kamaloe or Saloea Kreek).

This species could also have been imported by Aquarium Glaser from Peru, although there are some slight differences in the coloration when compared with the specimens Mees described. In Mees the fish have dark brown marbling in the area of the caudal peduncle. The caudal has brown dots and no margins, the dorsal fin is not so darkly coloured and there are some single spots on it. The caudal is more deeply forked but otherwise morphologically they are very similar.

The species only reaches a length of about 6cm. Several differences between the sexes can be recognised, especially in the anal fin. The male's anal fin is thickened at the base and the membranes are pointed. Tatia catfishes can be bred in captivity. They are cave spawners and the male guards the eggs. Of this particular species, however, no breeding report has appeared yet and photos cannot be found in the aquaristic or scientific literature.

Literature: Mees, G.F. (1974): The Auchenipteridae and Pimelodidae of Suriname (Pisces Nematognathi). (Zool. Verh. 132)

Letters in association with Tetra

Today's Postbag

Share your news, views and experiences through *Today's Postbag*. Every month the star letter wins £25 worth of Tetra fishcare products – all for the price of a 27p stamp or an e-mail.

REAL THUGS

Star Letter

Six-barred distichodus bear a remarkable resemblance to our native Perch.

I have kept five Distichodus sexfasciatus over the years. As much as I love the fish, when my present little chap goes I've promised myself that this will be my last. Mr Lowe's fish (as you know) is a tiddler, but let it grow a little more and it will become an absolute psycho. Mr Lowe should never let this fish anywhere near fish that resemble it colourwise i.e. Clown loach, Tiger barbs etc also any of the disc characins. Broad sided silver fish will be constantly harassed.

These fish can truly handle themselves and are a match for most fish. The manager of a local Maidenhead aquatics once told me he made the mistake of housing one of these fish with some larger Jaguar cichlids (punchy in anybody's book) You've guessed it, the Jaguars came off worst. Despite what I've said about loving these fish they are real thugs and thrive on a bit (a lot) of rough and tumble.

G.Simmonds Reading, Berks.

Favourite SHOP

Enclosed please find some photographs of my favourite shop in Aberdeen. I wrote to you about this shop a little while ago and recommended it to your readers. I would also like to hear from people in the Grampian region who keep and breed Rift lake cichlids because I am thinking of setting up a club in Aberdeen.

R Muller, Aberdeen

Keeping it cool

The excellent photo of Distichodus sexfasciatus (TFK Feb.p14) is reminiscent of our stunningly beautiful native Perch, Perca fluviatilis. Tony Jenno (1985) commented that various wild, coldwater fish do not survive in aquaria or shallow ponds, because they need lower temperatures than can readily be provided "As no suitable refrigerating equipment for aquaria is readily available, these fish cannot be kept very successfully which is a great pity because, for instance, a Perch in good condition in a truly representative environment is probably as attractive as any other freshwater fish"

Well, equipment and aquarium techniques have moved on, and it would be interesting to know if anyone successfully displays Perch in indoor tanks. Ole Stripey is somewhat voracious, however, and his quarters might become quite messy. He also grows quite large, perhaps reaching 30cm after 5 years. It would be nice if some of our native fishes would become a bit more prominent. Not Pike, perhaps...

John Abbott, Okehampton, Devon.

Fruitless search

As a reader of all magazines regarding tropical fish and countless phone calls to practically every shop in the country. I am, after three years, still trying to trace a supplier for the Siamese Flying Fox, Crossocheilus siamensis. Does this fish exist any more? Pictures of it are in most books with descriptions etc. I have seen all the look-alikes from Epalzeorhynchus kallopterus to Gyrinocheilus aymoneri, but never the real thing. I would like to buy half a dozen but even one would be nice.

Michael Bennett, Wadebridge, Cornwall.

Ed note:- Can any reader help Michael Bennett in his quest for these fish?


RAINBOW EMPEROR TETRA
Nematobrycon lacortei
27°C
23°C
5cm
PHOTO: M.P. & C. PIEDNOIR
TODAY'S FISHKEEPER

Blue Buttons

This part of **'Alf's Column'** will be a lot different from the previous ones, as it will deal with one very special animal only. And it is not even likely that the animal will commonly be kept in private aquariums. Why then spend a full column just on this organism? The answer is to me obvious: Simply because of its tremendous beauty and fancy adaptations to a life in the open oceans.

The beach of Cabilao where we found *Porpita porpita* washed ashore after a storm.

The tropical oceans are huge! Albatrosses drift on the up-winds of the southern seas. Sea swallows spend their complete life on the oceans and only seek the shores when nesting. Whales migrate from north to south. Less commonly known are the jellies that float more or less helplessly with the current. The stinging Portuguese-Man-of-War, the common and cosmopolitan Moon jelly (*Aurita aurita*) or the colonial siphonophorans, (*Apolemia uvaria*), that form metre long colonies, sting badly and have caused disasters in fish-farms world-wide.

Blue buttons (*Porpita porpita*) belong to the drifters of the great oceans. Sometimes these tiny and fragile organisms are washed ashore on tropical beaches - often during tropical storms. This was just what had happened when my friend Jan Olsen and myself first saw Blue buttons on the beach of the island of Cabilao in the Philippines. (The island of Cabilao is in itself so beautiful that it is worth its own article, and we shall return to this location in later columns).

Systematic

The Blue button belongs in the Phylum Cnidaria (Nettling Animals) and in Class Hydrozoa. They are grouped in the small, but nevertheless widespread order Chondrophora, which contains only two families and two genera. Chondrophorines were once classified with another unusual group of hydrozoans, the siphonophores.

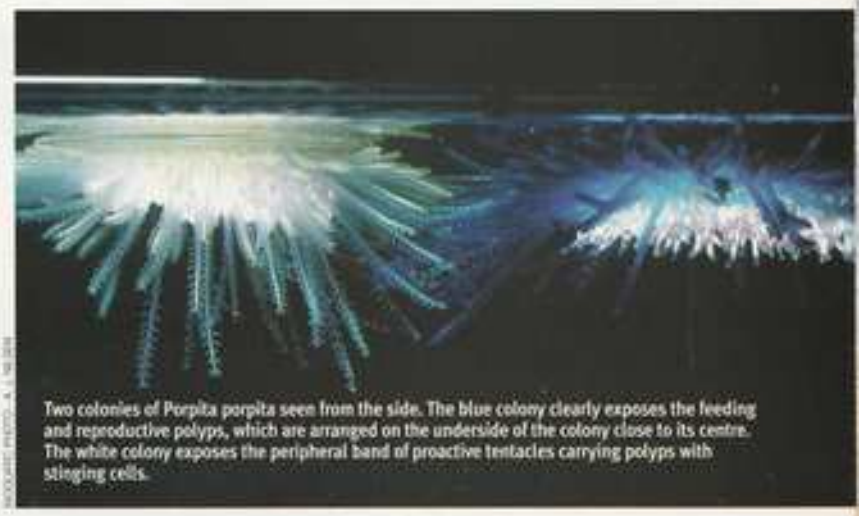
The most famous siphonophore is Physalia, the so-called "Portuguese man-of war." Like Porpita, siphonophores somewhat resemble jellyfish but are actually colonial organisms, with different individuals specialised for different functions. There are only two accepted genera of chondrophorines, Porpita and Velella, the latter, which resembles Porpita but has a keel-like "sail" on its top surface.

Biology

In Cnidaria we find many different sorts of organisations and reproductive cycles. Some, like the Anemones, have only polyp stages. Others, like the common Moon Jelly, alter between a sessile asexual polyp generation and a free-living sexual medusa generation and are used in biology textbooks as an example of such. Many →

TABLE 1: SYSTEMATIC PLACEMENT OF GENUS PORPITA IN THE ORDER CHONDROPHORA.

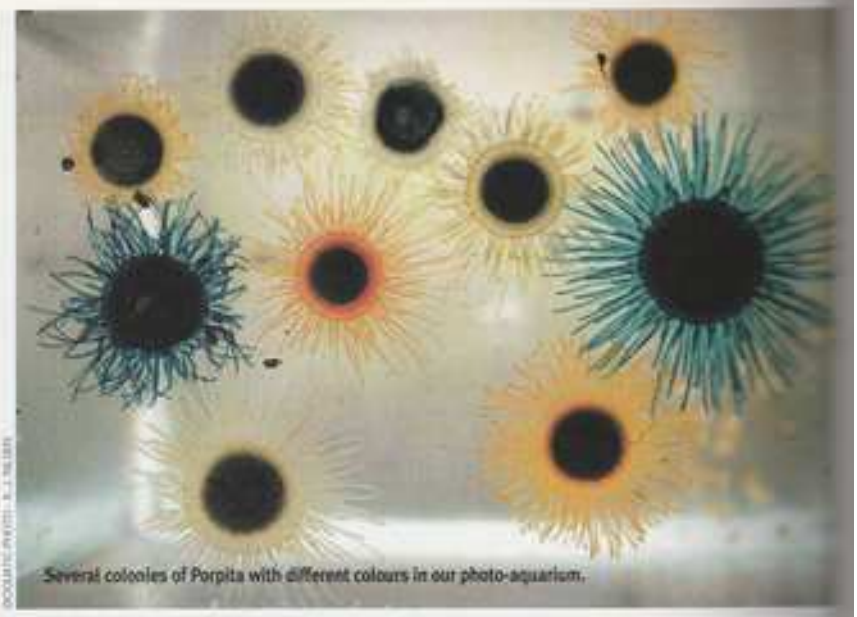
Phylum Cnidaria
Class Hydrozoa
Order Siphonophora
Order Chondrophora
Family Porpitidae Brandt, 1835
Genus Porpita
Porpita porpita Calder, 1988
Family Velellidae Brandt, 1835
Genus Velella
Velella velella Linnaeus, 1758



Two colonies of Porpita porpita seen from the side. The blue colony clearly exposes the feeding and reproductive polyps, which are arranged on the underside of the colony close to its centre. The white colony exposes the peripheral band of proactive tentacles carrying polyps with stinging cells.

WHAT DOES PORPITA FEED ON?

This has not been investigated in great detail, but probably the feeding polyps do (like the similar polyps of its relatives) catch all sorts of minute plankton passing through the bunch of tentacles hanging down from the underside of the colonies. I could, in a small photo aquarium placed on the veranda of my bungalow, observe that the colony regularly retracted or moved its tentacles, a response that might have been triggered by the touch of eatable particles to its tentacles. It should also be noted that both Porpita and Velella have symbiotic algae (zooxanthellae) in their tissues, which would suggest that at least some of their nutritional requirements would be met by photosynthesis. On the other hand, other pelagic animals, especially the nudibranches from the genus Glaucus, feed on Porpita incorporating the poisonous compounds from their stinging cells into their body as protection.



Several colonies of Porpita with different colours in our photo-aquarium.

hydrozoans also show altering generations and not only that; they also show a high degree of polyp diversity within one and the same colony. Some polyps are specialised in feeding, others in reproduction while yet others have special functions such as floating. So also with *Porpita porpita*.

It looks like a jellyfish but it isn't. The Blue button isn't even a single organism, but a colony! The individual colonies are disk shaped. On the underside of the centre of the colony is a large, sterile, smooth zooid (individual polyp or animal), which contains an up to 2.5 cm wide central disc (pneumatocyst) that is reinforced with a chitin-like material. It is chambered in cross-section and filled with gas, which keeps Porpita afloat. The remainder of the lower surface of the disc, between the central polyp and the tentacular zone, is completely covered by the long, slender feeding and reproductive polyps, bearing at their bases clusters of medusa in all stages of development. There are also a peripheral band of small dactylozooids, individuals that contain nettling poison and sting. The sting is, however, not painful to humans.

More colours than just blue

Drifting on the surface of the endless oceans, Porpita has to protect itself from the strong and burning ultra violet radiation that hits the colonies almost constantly. Perhaps the bright colours found among these animals are linked to just that? Perhaps the colonies contain UV-protective pigments? Blue button is actually somewhat misleading. Many of the colonies are bright blue – due to carotenoprotein complexes, which shifts the absorbed light pattern to appear bluish, but there are all sorts of colours found among a population of *Porpita porpita*. We spotted white, blue, orange and yellow colonies ourselves when I first saw these wonderful animals washed up on the beach of Cabilao after a tropical storm. "Colourful Button" might be a better popular name perhaps?

Porpita porpita has a circum-tropical and circum-subtropical distribution, which means that it can be found in all tropical and subtropical oceans and along shores of subtropical and tropical areas. Look for it the next time you visit such locations.

Blue buttons" in aquariums?

Can Porpita be kept in captivity? As far as I know, pelagic hydrozoans have never been kept in captivity, but this does not mean that they cannot be kept. Porpita probably can thrive in an aquarium, but would need a very special set-up. The delicate and fragile colonies are furthermore most vulnerable to collecting and shipping. Transporting the colonies from the site of collecting to the wholesaler's facility, storing them there and shipping them further to the market and pet shops is probably more difficult than keeping them alive in a specially designed tank! Enthusiasts living along tropical and subtropical shores have a much better opportunity to keep Porpita in captivity and to study parts of their biology in an aquarium, than aquarists of Europe or the States.

An aquarium designed for Blue buttons, should from my point of view, be rather wide and low with a thin layer of coral gravel and should be designed to be viewed from the top rather than from the sides. It should be equipped with medium to strong illumination and have a weak but constant flow of water that would not disturb the colonies but ensure that food particles are carried around in the water column. Needless to say that the colonies must be fed often with minute, living plankton.

Blue buttons are jewels of the oceans. They belong in the ocean rather than in any marine tanks. I would, however, be very interested in feedbacks from people who have observed these animals in the wild and/or spotted them in the aquarium trade. ■

Ponderings

As the pond really comes back to life in the warmer spring weather, Dave Bevan sets about dividing marginals and takes a look at our largest snake.

Snake in the grass

Being confronted by a snake in the grass may be a surprise, but it will be as much of a surprise for the snake as it is for you.

The Grass snake is the largest of our native snakes and may reach nearly 1.5m in length. It is equally at home on land or in the water where it hunts for both frogs and small fish. They often turn up in garden ponds, particularly in spring, attracted by the influx of spawning frogs and the promise of a few easy meals.

Apart from their larger size they can be identified by the yellow collar round the neck. Grass snakes are non poisonous and are more attracted to frogs than fish, usually moving on to pastures new when the frogs disperse after spawning. However several years ago a large metre long grass snake took up residence in the filter box at a friend's pond, often coming out on sunny days to bask in the sunshine on top of the box. He (or she) showed no inclination to move on, and as the pond owner's wife was terrified of snakes we popped it into a hessian sack and re-homed it at my large wildlife pond.

FASCINATING Fact

The grass snake moves quickly over land and through the water but if it is cornered it has other defences it can fall back on. It can excrete a foul smelling liquid and if this fails it may simply lie down and pretend to be dead.

STAR STURGEON FACTFILE

Species: Star sturgeon (*Acipenser stellatus*)

Other names: Stellate

Other forms: None

Size: Can easily reach 1.5 metres

Weight: Up to 20 kg

Availability: Frequently seen in aquatic outlets but are expensive fish and unsuited to most ponds

Habitat: Inhabits large to very large rivers.

Identification: An unusual looking fish covered with large bony plates. The long slim body terminates in a streamlined head with a long bristle covered snout.

Habits: Generally bottom loving which makes it difficult to see in the average pond. Will, with time, come to the surface for food. Tends to become easily tangled in pond plants and blanket weed often resulting in premature death.

Pond fish value: Only for the large well oxygenated pond, particularly koi ponds where they can be shown to their best advantage in the clear water.

Star sturgeons are definitely not the best pond fish.

POND PROBLEM

Whilst most of my fish have come out of the winter in good shape one of my goldfish remained sulking in the weed. Attached to its flank was a blackish grey 4cm long worm like creature. Do you have any idea what it is?

The fish leech (Piscicola geometra) is a common parasite of freshwater fish and can grow to 6 cm in length. It can be found on any part of the fish's body including the gills and inside the mouth where it hangs on, sucking the blood. When not attached to a fish it lives freely amongst the plants adopting a characteristic fish like posture.

Single leeches are unlikely to do much harm to a large goldfish but they are very difficult to eliminate from the pond because they produce leather like cocoons around their eggs which are resistant to chemical treatment.

Fish leeches are common parasites which can be difficult to eradicate once they have found their way into your pond.

DIVIDING A FLAG IRIS

Remove your plant from the pond and reduce to manageable clumps. Use a spade or fork if necessary.

Place in planter, spread roots and add more aquatic compost and firm down ensuring the growing point remains above the soil.

Rinse thoroughly and sub divide the clump into individual plants ensuring each has some rhizome. Do not use rotten or discoloured material.

Cover with gravel and slowly lower the plant into the water to allow the air to come out.

EQUIPMENT CORNER

Spring is here and the fish are starting to show some interest again and the food you feed, both the quantity and quality, can have a profound effect on both the fish and their environment. No fish keeper wants his fish to go hungry but overfeeding, particularly early in the season, will lead to water quality issues as the filtration system struggles to cope with the additional load.

Would you like to be dished up the same meal and three veg. every day? Ringing the changes may also result in happier healthier fish. Start the season with an easily digested sinking wheat germ pellet, change to floating types as the fish mobilise before moving on to the higher protein foods for the main season. What ever you feed make sure it is all cleared up within a few minutes. Uneaten food will only contribute to poor water quality and how would you like to be swimming around in the left over gravy!

Barley straw held in a net like this can be used to combat algae.

BELOW THE SURFACE

When the pond is murky green or you are pulling out stringy blanket weed by the metre it is hard to believe that a large handful of barley straw could be the answer to your problems. How does it work? Rotting barley straw releases algae inhibitors. These complex phenolic compounds inhibit the growth of most algae species but there is a catch - it is not an instant cure. It may take from 1 to 3 months depending upon the temperature before any effect is seen.

The best results are usually obtained if the straw is contained in a net and placed in the water flow or at least just below the surface, in the early spring before the algae populations start to build up. A natural cure which really is a win - win situation as the rotting material boosts invertebrate numbers providing welcome treats for the fish.

PLANT LORE

All types of water plants have one thing in common, once established they can grow and spread very quickly often forming a tangled impenetrable mat before you realise it. Sorting out the tangle often leads to levels of disturbance leaving areas of the pond looking like a bombsite. What is the answer? Planters are available in all shapes and sizes and provided they are managed well your plants will look great whilst remaining under control.

APRIL'S POND PROJECT

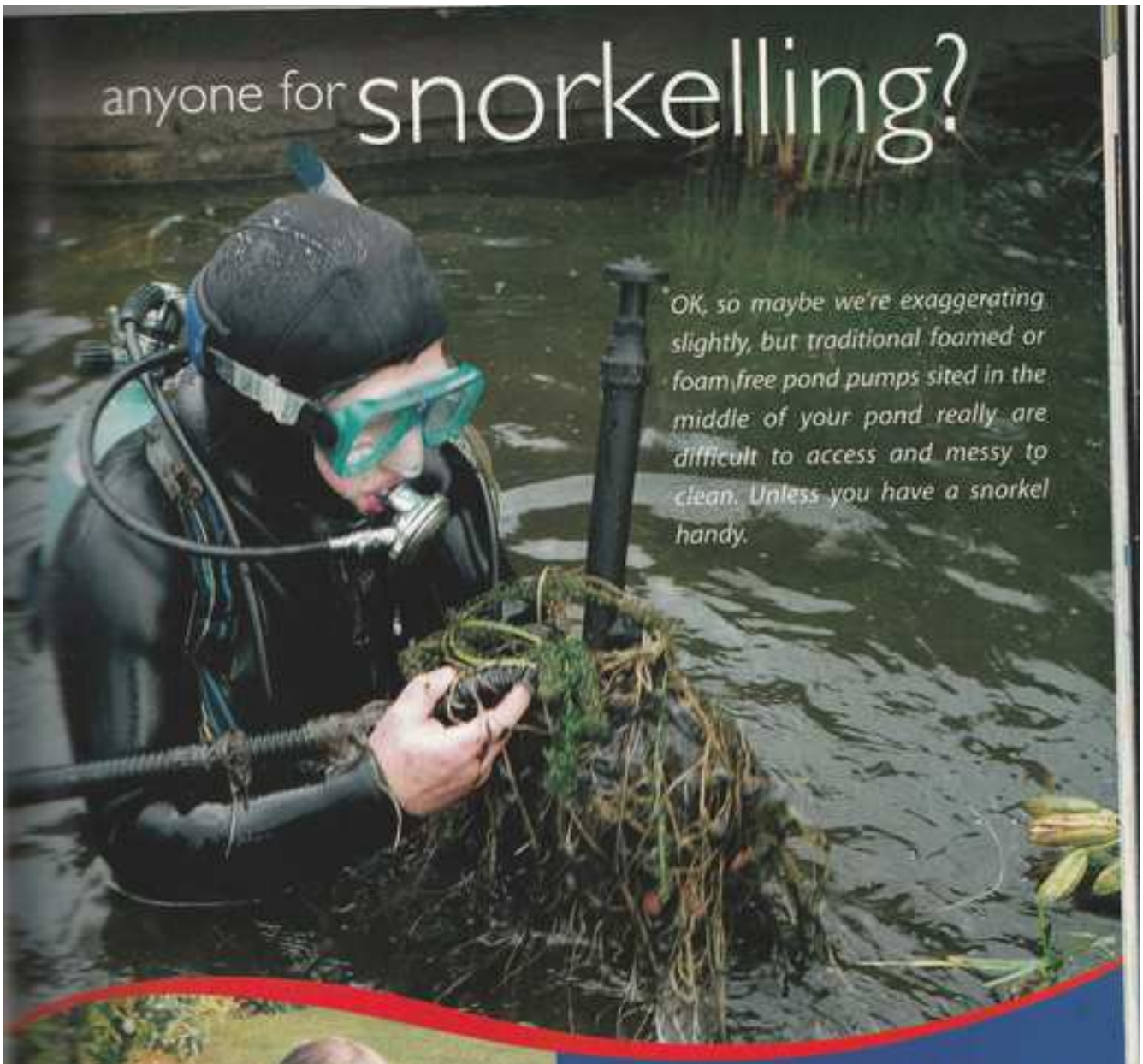
Now is the time to have a look at the well-established plants. Oxygenators like pondweed or water violet can be given a good short back and sides. It is surprising how much root growth there is, but leave any trimmings near the pond so that the pond life can return to the water. Now is a good time to thin out those clumps of marginals that are starting to take over the pond. If they have been growing in a container they can usually be lifted from the pond fairly easily, but if they have rooted to the bottom then you may be in for a wet and messy struggle.

FISHY TALES

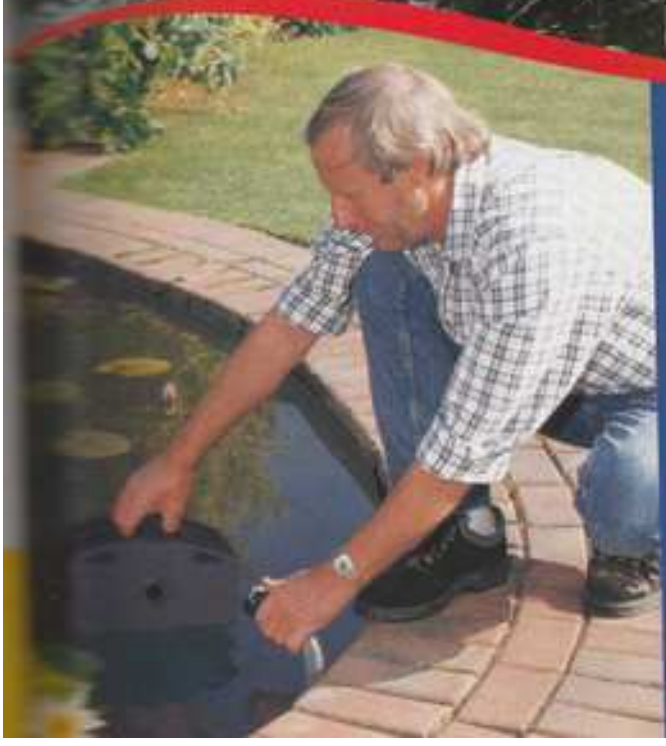
Pond fish are at their most vulnerable as the temperature starts to rise and they begin to feed again after months of semi-dormancy, huddled together in the bottom of the pond. Whilst they still move slowly check them out for signs of disease and other ailments. Pay particular attention to any fish that remains on its own sulking on the bottom or among the pond plants.

The causative organisms of fungal and bacterial infections are often present in the water just waiting for the right conditions, particularly when the fish's immune system is at its lowest, to invade. Watch out for fluffy fungal growths and tiny white spots. During the winter months external parasites like the fish leech and fish louse can attach themselves to the fish, further lowering the body defences at this critical time. ■

anyone for snorkelling?



OK, so maybe we're exaggerating slightly, but traditional foamed or foam free pond pumps sited in the middle of your pond really are difficult to access and messy to clean. Unless you have a snorkel handy.



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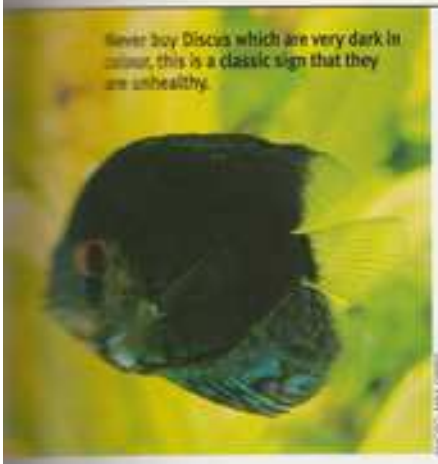

DISCUS PROBLEM SOLVER

Tony Sault solves another batch of your problems

I am close to purchasing my first shoal of young Discus. Can you help by telling me which fish to select when buying and which to avoid. I intend to have all the same colour strain initially hoping for a pair of the same colour when they have grown.
Geoff Makies, *Middlesborough*

When selecting young Discus from a shoal, the criteria I apply are as follows. Firstly shape, the fish must be a good circular shape with all the usual appendages i.e. no short dorsal fins or tails. Next size, if the average size of the fish is 5cm then logically some are over 5cm and some below 5cm, always choose the ones that are average size or above, never below average as these are less dominant fish in the pecking order. Next look at the eyes. These must be clear and bright and interested in what you are doing. Finally colour, this is not as important as the other criteria because with normal growth will come the colour, and a 5cm fish that is in full colour is not natural and is to be avoided, as is a dark fish which usually indicates that something is wrong.

Some months ago I set up a Juwel Trigon 350 on the Dennerle system to grow plants and keep Discus. Once the plants were growing well, I matured the filter with a few Zebra danios and when nitrites dropped to zero added a number of Corydoras and 4 small Angels. Nitrites and Nitrates are zero, hardness is 6, pH is 6.2 and temperature is 81°F. The tank is well furnished and the planting is getting pretty dense. Ten days ago I added 4 Discus (from the same tank at the dealers) of 7.5cm diameter. After 12 hours of hiding there followed a day of harmonious swimming and feeding as a shoal. Since then one fish has dominated the tank showing a lot of colour and relentlessly chasing the others if they appear. They show no colour, are very dark in overall coloration, spend virtually all their time hiding and are clearly losing weight. They even seem too scared to take food trickled to their hideouts while the bully is being fed in front. Any ideas would be greatly appreciated.
Rod Begbie, *via e-mail*

The dreaded pecking order syndrome I am afraid is a fact of life in a Discus tank, but there are a number of things that you can do to try to minimise this. Increase the size of the shoal, Discus are a strong shoaling fish and this decreases the chance of one fish being able to completely dominate the rest as in a small shoal the bully's life is made easier. Next, temporarily fit a divider to partition off the dominant fish giving it one third of the space and two-thirds to the other fish. When the threat has been removed the reason for hiding will also disappear and the rest of the shoal should once again return to normal. You could also remove the dominant fish, but if you do this the pecking order will only reform and another fish will become dominant, I think a combination of the first two would solve the problem, that is partition off the dominant fish and then add two more fish to the rest of the shoal to bring them out and start feeding again. Then when the shoal has returned to some normality allow the dominant fish back into the shoal and see what happens.

I am setting up my first Discus tank and as we have an abundance of rainwater in my area which I can collect with no problems in garden butts, would it be OK to use this instead of treated tap water?
Ken Miller, *Manchester*

Many years ago I tested the rainwater in my area with respect to using it in my Discus tanks and to my surprise it was heavily polluted. The reason being that within a few kilometres radius of where I lived there were 13 coal mines, two coal preparation plants, one coalite plant and four power stations, plus numerous brick works and factories all playing a small part in the destruction of the ozone layer. Alas, all have now gone, so I suggest you test a sample for basics such as conductivity, pH and, depending on the results, I would still filter it through activated carbon before use. To give you an example, distilled water has a conductivity of 0 and a pH of 7. My Reverse osmosis units supply water with a conductivity of 30 at a pH of 6.7. I would also ensure it is collected over an inert material such as roof tiles and not corrugated sheets, so theoretically pure rain water should be pretty close to these values. If so, then you would have to add some buffering capacity to the water or the pH will crash. There are various products on the market that will do this for you.

One of my Discus has suddenly become (according to what I have read) a 'Head Stander', swimming with its head pointing down all the time. Is there anything I can do for it?
S. Hughes, *Reading*

It is a quite common occurrence in Discus and is related to the swim bladder. First check your fish for lumps on either side of the abdomen, if these are absent then it is probably due to the gases being expelled from the swim bladder usually during a water change. If the fish swims through cooler water at this time the shock can expel the gases causing the condition you describe. More often than not the fish will recover without any help but tweaking the temperature up 2 or 3°C. often helps.

I am planning to set up a tank for Discus, but I have not got a great deal of room in my flat. Can you tell me what would be the minimum size tank I would need?
M Haynes, *Birmingham*

To be kind to the fish, as they are a strong shoaling fish, the smallest number of young Discus you should house is 6. If you accept this then the minimum size tank should be approx. 150 litres. When you say you have not got a great deal of room I assume this would be for the length of the tank, if so then you can simply increase the depth or width to suit both the space and capacity. ■

CARING FOR DYED CORAL

For aquarists that find themselves in the service of a dyed coral for any reason, the single most important way to improve the animal's chance of survival is feeding. Beyond the essentials of good water quality for reef invertebrates, it is critical to feed dyed corals as well or better than natural corals to compensate for their loss of production from shaded or expelled zooxanthellae. Dyed corals are starving animals. Their metabolism is slower, their immunity is weakened and they may very well be dying. How much to feed will depend on the coral species, of course. But take heed that most reef aquarists drastically underfeed their corals and too many others at large inappropriately feed their tanks (like with heavy feedings of phytoplankton to zooplankton feeders).

A dyed or bleached and recovering animal can be quite sensitive to excessive illumination. Aquaria with bright or even just average illumination may be too bright for these animals. Under-illumination, however, can often be compensated for with appropriate feeding so, let me suggest that dyed and recovering bleached coral be kept in low to moderate light, likely in the bottom third of a well-lit aquarium. In time with evidence of recovery, the specimen can be slowly migrated up the rockscape to brighter light and slowly improved natural pigmentation.

Non dyed regular Turbinari

colour as the coral tissue! Let's be clear about this: scleractinian "skeletons" almost without exception are white calcium carbonate. The non-scleractinian but stony-like octocorals Tubipora and Heliopora do produce a red and blue "skeleton" respectively, but no corals produce bright canary yellow or neon pink "skeletons" naturally. Indeed, it cannot be stated any simpler or more emphatically: information is the oxygen of understanding.

Responsible aquariology.

In parting, what can you do to help? First and foremost, don't buy theses animals! Vote with the strongest weapon you have. the consumer pound, euro and dollar. If the shippers that execute this abhorrent practice are too ignorant to know or care about a better way, and the local retailers are similarly ignorant or worse, then send a quiet and powerful message: don't spend your money with them. If you feel compelled or are in a position to be able to help a good dealer who would embrace a polite education on the practice, then by all means speak up and please do it respectfully. Perhaps share a copy of this article or any other bits of information that might seem topically helpful. ■

WITH THANKS

A special thank you to Doug Brummet of the Bay Area Reef Enthusiasts club (B.A.R.E.) and Amy Larsan for their assistance in helping me to secure useful photos for this article.

WHY DO DYED CORALS SUFFER?

The fundamental problem with dyed corals and anemones is that the saturation of their tissue with dye impedes the penetration of light into their tissue for the proper stimulation of zooxanthellae in symbiosis. Even without definitive scientific proof to confirm this, our present understanding of the dynamics of zooxanthellae in symbiosis with a host cnidarian lends a very informed assumption of the deleterious possibilities of dying live coral tissue. Zooxanthellae have evolved to utilise very specific wavelengths and intensities of light. Any shading or corruption in the illumination of these symbiotic algae as with dye-stained tissue surely impedes their function. Without fully functioning zooxanthellae to provide food/carbon through photosynthesis with adequate light, a "bleached" animal is resigned to starve to death in weeks or months without extraordinary diligence from an aquarist with compensatory feeding of particulate and/or dissolved foods to the dyed victim. The coral or anemone will continue to execute normal polyp cycles, at least in the early weeks after the assault, and this will make supplemental feeding easier. A dyed coral or anemone will require the same due care and consideration as a pale stressed or bleached animal.

This dyed Finger coral is starting to rot.

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Some diseases seem to come and go with the seasons. As **Lance Jepson**, our resident vet explains, Carp Pox is one of them.

THIS VIRUS (CHV-1) CAUSES GROUPS OF skin cells to proliferate into small (and not so small) masses. These growths, known as papillomas, are often whitish or greyish and resemble blobs of candle wax. They can occur anywhere on the body but particularly affect the mouth area, head and upper surface, and the fins. Experimental exposure of carp to CHV-1 found these growths appeared five to six months after infection. After a period of time these growths are shed and disappear, with no apparent trace that they ever existed. But don't be fooled - unfortunately a large percentage of infected fish do not eliminate the virus from their body; instead it "hides" from the immune system in certain cells of the body, including the cranial nerves, spinal nerves and some skin tissues.

Such infected fish are highly likely to remain infected for the rest of their life, with recurrences of the infection and hence the papillomas. Again experimentally this reappearance was around seven to eight months after their disappearance. In the pond situation CHV-1 recurrence is most often late autumn, with the number of growths and the number of fish showing signs increasing over the winter and into the spring.

To explain this apparent link with the seasons, think cold sores! If you suffer from cold sores (a human herpes virus) it will often show itself when you are unwell. When you are unwell or run down, your body is less able to fend off infections because your immune system is suppressed. The same happens with Koi in cold weather. As temperatures drop their

DIAGNOSIS

Species susceptibility

Usually seen only in the varieties of cultured carp *Cyprinus carpio*, such as Mirror carp, Leather carp and Koi. It can infect other cyprinids such as Crucian carp and Grass carp but is rarely fatal, even in the young of these species.

Recognisable signs of disease

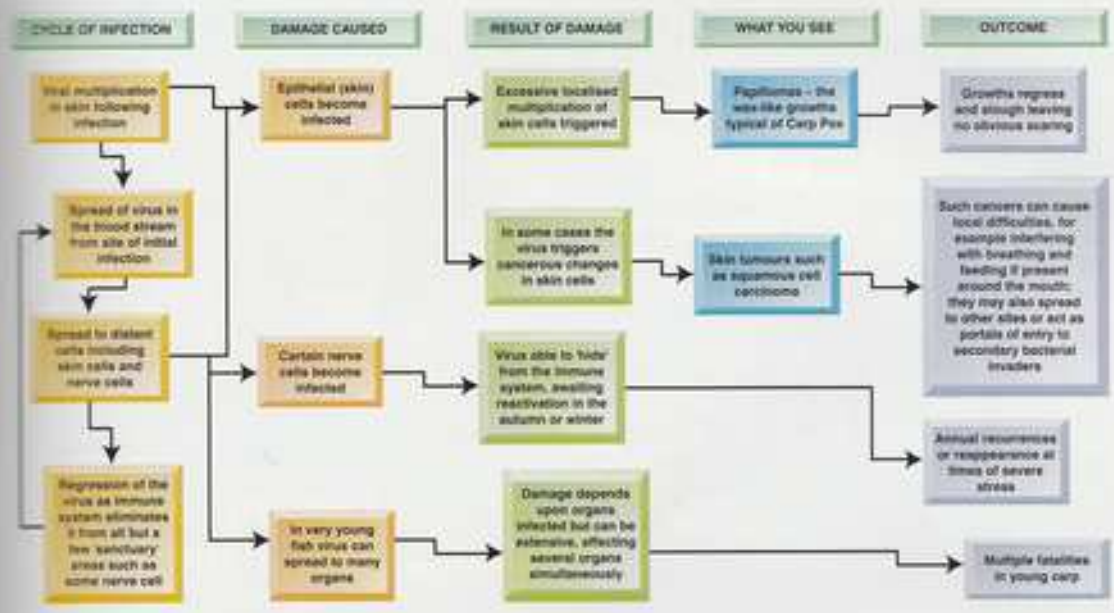
Classically this virus triggers wax-like growths on the skin and fins. In those cases where the virus triggers tumours to form, then these may appear as rough, wart-like masses, often around the mouth but potentially anywhere on the body surface. Heavy losses may be encountered in young fry.

When buying any carp always check all over the body for signs of Carp Pox. Take particular note of the area around the mouth because tumours can often develop here after Carp Pox has developed.

WHAT MAKES THE FISH SUSCEPTIBLE?

High stocking densities will help the virus to spread, as will anything that damages the protective integrity of the skin and mucous covering, such as ectoparasites (especially Fish louse) and trauma or abrasions.

Carp Pox Disease Flow Chart



TREATMENT

None. This condition is usually self-limiting and will disappear, albeit temporarily. Recurrence is common, most often when temperatures fall again in the autumn, although it can occur when the fish become stressed by other causes. Treatment with anti-herpes drugs such as acyclovir (Zovirax) has been suggested but it is usually unnecessary.

immune system is suppressed and so the virus is able to multiply and express itself. Come the spring the CHV-1 growths shrink and fall off - because as the weather improves and temperatures increase, the fish are able to mount an effective immune response, thereby stopping viral production and resolving the wax-like lesions.

Generally, for most healthy adult Koi CHV-1 represents a nuisance condition - it temporarily disfigures the individual but is of no consequence. This is not so in every case - in young carp it can be fatal, and has been linked to skull abnormalities. In other cases CHV-1 has been suggested as a trigger for the formation of malignant tumours in carp, especially squamous cell carcinomas. These are invasive skin tumours that are often found around the mouth, that may require surgery or possibly chemotherapy to control.

What causes the disease?

Carp Pox is actually caused by a typical alpha-herpesvirus, and is probably better called *Cyprinid Herpes Virus 1* (CHV-1). See diagram above

Disease Lookalikes

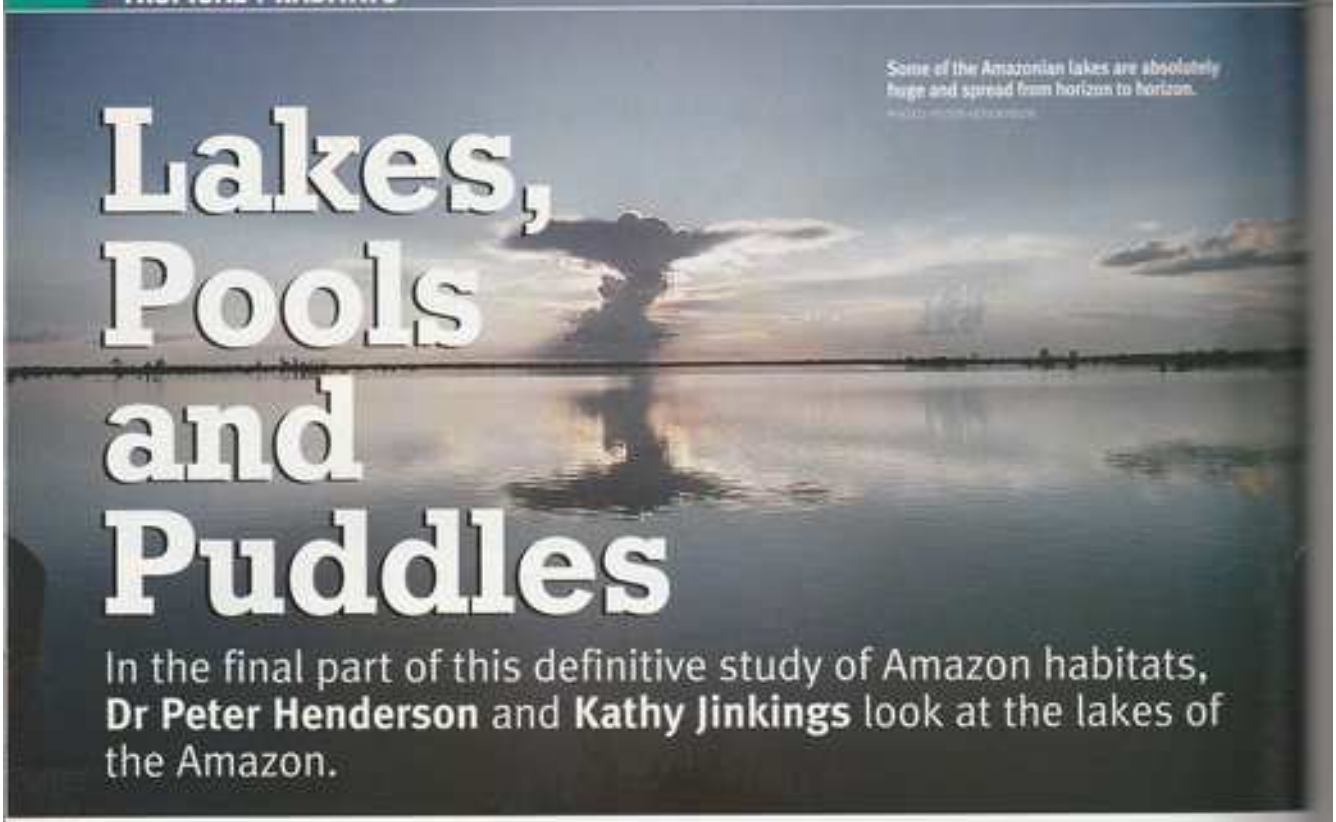
Other causes of firm swellings that should be considered include other types of tumours such as fibromas, granulomas (areas of thickened inflammation) and epitheliocystis. This last disease is infectious and is caused by the bacteria-like organism chlamydia. It triggers whitish growths to occur not unlike *Lymphocystis*, an iridovirus.

Prevention

Strict quarantine of all newly bought stock will stop the introduction of this virus into established collections. If you don't want it in your collection, don't buy from ponds or vats where there are fish showing typical pox-growths. In particular this applies to those retailers that keep their larger Koi for sale in ponds along with some resident fish; if these permanent fish are infected they will continually infect any new, non-infected Koi that are brought in by the retailer.

Notes

One of the worst cases of carp pox that I ever saw was in a Koi that had jumped out of a quarantine vat and had lain for several hours before discovery. During this time the skin on one side had dried out, presumably the side that had been exposed to the air. There was, not surprisingly, extensive damage to the outer skin layers. The fish recovered but within a couple of days there was massive outbreak of small, but typical carp pox lesions on that side. I assume this was triggered by the fish being immuno suppressed, and the damaged skin layers being susceptible to viral multiplication. This fish recovered uneventfully whilst on covering antibiotics, given to prevent secondary bacterial invasion of the desiccated skin. ■



Some of the Amazonian lakes are absolutely huge and spread from horizon to horizon.

Lakes, Pools and Puddles

In the final part of this definitive study of Amazon habitats, **Dr Peter Henderson** and **Kathy Jinkings** look at the lakes of the Amazon.

THE CHEMICAL NATURE OF AMAZON LAKE waters is controlled by the waters by which they are fed. Black water lakes such as Amanã, Iamã and Tefé are large lakes formed at the mouth of forest tributaries flowing into the river Amazon. Although they do have connections to the main rivers they are largely fed by local forested catchment areas. These areas have an old sediment, leached of nutrients and easily soluble minerals, and acidified by the leaves and vegetable matter. These lakes have less floating vegetation than the whitewater floodplain lakes. However, apart from the waters accumulating from the forest, they are also connected to whitewater rivers, at least during high water.

This means that the ecology of the lake may change from the mouth to the head. In Amana, for example, there is extensive floating meadow at the mouth of the lake, where it is fed by whitewater, but only a few small patches at the head where most of the water comes from the surrounding forest. During high water season, the chemical nature of the lake is very close to that of the feeding waters, but during low water the lakes may be isolated and their nature changes. Floating vegetation can die back and release nutrients into the water, and as the floodplain water recedes back into the lake it can bring dissolved minerals. The pH of Lake Marcielzinho, a whitewater floodplain lake, was measured at 7.8 in October 1994.

Just a small selection of the fish which inhabit Amazon lakes.

Fluctuating oxygen levels

The oxygen content of the water can vary greatly, often falling to very low levels. Factors controlling this include oxygen entering surface waters by diffusion, produced by plants during photosynthesis and consumed by decomposition processes, which increase in rate with increased temperature. Below a depth of 4m floodplain waters rarely hold more than 50% of oxygen saturation levels, and can become anoxic. Thermally stratified waters can have a high level of oxygen at the surface, with almost anoxic water beneath. When the thermal stratification stops the oxygen levels throughout can change dramatically, as the lower anoxic water mixes with the upper, oxygen rich waters. An example of such a change occurred in the channel adjoining Lake Mamiraua during October 1995. The water was low and the lake had developed a plankton bloom. At 13.30 hrs photosynthesis of planktonic plants produced 140% super-saturation at a depth of 4 cm. However, when heavy rain commenced at 15.00 hrs the upper water layers cooled mixed with lower waters; surface oxygen levels rapidly declined to almost zero by 20.00 hrs. Oxygen levels can also vary in different areas of the lake, as different areas can be different depths, hold different plant masses, or different masses of decomposing matter.

The channels provide a more stable environment. Usually they take their characteristics from the feeding river, but may occasionally be filled by water from the lake itself. As the water is constantly moving it does not usually suffer the same stratification as lake water, and often the entire water content is saturated with oxygen. This makes them attractive to the floodplain fish, and often the channel may hold a higher biomass than the lakes. White water channels generally have a neutral pH of about 7. In low water, however, the channels may dry out into a series of muddy pools, so their inhabitants need to be prepared to move out as the channels dry. As the channels are a link between the lakes and the rivers, they have a population of both riverine and lacustrine species.

Close to the banks arowana, Osteoglossum bicirrhosum, can be seen jumping prodigious distances out of the water to snatch insects from overhanging leaves.

Oscars, like this wild caught specimen and other medium sized cichlids - Geophagus and Crenicichla patrol the edges of the lakes all looking for a meal.

Chalceus macrolepidotus are a common and particularly noticeable sight with their blood red tails, and can be seen foraging in the shallows.

Jam packed with fish

Both blackwater and whitewater lakes have a high species diversity, with many species in common. Fishes such as these that can adapt to different water conditions often make tolerant aquarium fishes. In a study whitewater habitats were found to be slightly more diverse, with 108 different species found, while the blackwaters held only 68 fish species. During high waters the black waters were found to have the highest biomass, i.e. weight of fish regardless of species, although in low water periods the whitewater channels generally held the greatest amount of fish. Although lakes may be isolated in low-water periods, in high water they are joined to the main rivers. Thus fish tolerant of changing conditions can easily move from one body of water to another. In many fishes, a regular move between lake and river is an essential component of their lifecycle.

Other than during periods of low oxygen, the floodplain lakes have a varied, and, during low water, a very dense fish population, ranging from the giant to the tiny. The huge *Arapaima gigas* grows to over 3m, and is the largest scaled fish in the Amazon. They are now rarer than they once were, as they are regularly caught for food, but can still be seen in quieter lakes lying at the surface.

Whitewater lakes are ideal for snails, and the apple snails of the lakes grow heavily calcified shells, unlike the thin papery shells of those occasionally found in forest leaf litter. The lake bottom is also a good home for molluscs, and often has a large bivalve population.

Except during periods of low oxygen the floodplain lakes have a rich and at low water very dense fish fauna. In a lake that has been little fished by man it is common to see *Arapaima gigas* lying at the surface like logs or caimen waiting for suitable prey which is often an unwary fish. In low water periods the giant Colossoma feed on fruits and seeds that fall at the edge, although when high water comes they will move into the more productive forests. Catfish are common.

Close to the banks, often finding hiding places or burrowing within the banks themselves, are plecs, various doradids and Pimelodus species. These come out at night, when there is less chance of attack by predatory birds; however the larger predatory fish also enter the shallows under

METHODS OF ESCAPE

A successful method of escape is an excellent idea in waters that contain not only Piranha but also the predatory Rhaphiodon which hunt in the open waters. The most obvious feature of these fish are their immense teeth, which makes the dentition of the fabled Piranha fade into insignificance. Boulengerella maculata are also on the prowl - slender, pike-like fish that can grow up to 70cm with jaws holding sharp, conical, curved teeth. The adaptable Pike characins, Acestrorhynchus sp., are found both in open water and in channels, and in spite of a shape suggesting an ambush predator they are more than happy to pick off a meal in open waters.

Hatchet fish are able to escape from all these predators in a surprising way; the fish has a large muscular keel, and is able to propel itself out of the water with its fins to 'fly' a short distance across the water using their long pectoral fins. The flash of flying hatchets, accompanied by a clicking as their pectoral fins hit the water, is a common sight. In similar fashion the three species of Tripartheus can rise like hydrofoils from the water and propel themselves with their pectoral fins.

the protection of night. Schools of Piranha and the Tucunare, *Cichla monoculus*, patrol the edges of the lake, although staying in slightly deeper water.

In the circumstances it is not surprising that many small fish seek small shallow bays, where there is often some cover. Here may be found schools of tetras, various anostomids such as *Anostomus*, *Leporinus* and *Schizodon* and characins such as *Chalceus*, *Mylossoma* and *Myleus*.

In the depths of the lake there is often a lack of oxygen, so benthic fish are rare. However, Stingrays, *Potamotrygon* sp.and catfish such as *Pterygoplichthys* can be found foraging over the lake bottom.

Within the open waters even more fish can be found. Small and abundant fish, such as *Pellona castelnaeana*, curimatids such as *Potamorhina latior* , *Psectrogaster rutiloides* , *Potamorhina altamazonica* , *Eigenmannina melanopogon* and *Psectrogaster amazonica*, catfish such as *Hypophthalmus edentatus* and *Agenelosus* spp. all inhabit the open waters. *Semaprochilodus* and *Brycon* are easily visible because of their tail colouring, which is often somewhat frayed due to Piranha near misses.

Right on the surface of the open waters are the immediately identifiable Needle fish, *Potamorrhaphis guianensis*. These fish are extremely elongated with long jaws, and are representatives of a mostly marine family, the Belonidae. In schools the shy fish hunt the water surface for insects, easily visible but ready to dash away if a shadow falls across them or there is a water disturbance. The water surface is also the feeding place for the three species of *Triportheus*. These search the surface for pollen, other vegetable matter and insects.

Birds just as much a threat

Especially at low waters the lakes are the hunting ground for a variety of birds, often in numbers which can pose a major threat to fish. An example of this is the colony of 25,000 to 30,000 Neotropic Cormorants which inhabit the white water lake Mamiraua. During the low water season the colony hunts as a group, with each bird able to eat its own body weight in fish daily. This colony probably consumes 100,000 fish per day, even Piranhas and spiny catfish. Egrets, terns and herons also fish the waters, and every bank has a vividly jewelled kingfisher, patiently watching the water for a meal. ■

READER OFFER

Peter Henderson has produced a CD entitled Amazonian Fishes and their Habitat priced £40. This is one of the most complete reference works about the region ever published and covers all Amazon habitats and the fishes that live there. This CD is not generally available through aquatic shops so *Today's Fishkeeper* has got together with Pisces Conservation Ltd. to offer this to our readers. The price includes postage and packaging.

Send a cheque or P/O made payable to Pisces Conservation Ltd. to:

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Hatchet fish like this *Gasteropelecus stenicla* have developed a unique method to escape from predators.

Today's Fishkeeper

EXCLUSIVE READER OFFER

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SPONSORED BY HAGEN

A chance to live your dream

Departing May 2003 £2200

A lot more than just catfish will be caught on this trip. Cichlids, tetras, killifish, knifefish, and livebearers are all there waiting for your net.

It is many a fishkeeper's dream to travel to the Amazon and see where the fish they keep at home actually come from, but this sort of adventure doesn't appear in your local travel agent's brochure. So Today's Fishkeeper has teamed up with Goldenline to offer you the trip of a lifetime to the Rio Xingu and Altamira.

This expedition will take you into the heart of rare Plec country where Golden nuggets, Zebra plecs and many other beautiful fish come from. What you won't find here are first class tourist hotels. You will be travelling many miles away from civilisation, sleeping in hammocks and staying in native accommodation. You will need to be fit and willing to rough it a little to join this expedition. On the plus side, you will be taking part in a real Amazon adventure rather than a sanitised tourist holiday.

On a trip like this you will have a chance to catch hundreds of species of fish which, up to now, you have only seen swimming around in aquaria. If you snorkel then you will have the added bonus of being able to watch your favourite fish swimming around in its native home.

This could be your catching bucket with some Golden nugget plecs in it.

ITINERARY

First port of call is the historic old town of Olinda for an over night stop before flying on to Belem at the mouth of the mighty Amazon river. An overnight stop here allows you to soak up more of the unique culture that is Brazil before heading out into the wilds. The next day you catch the early flight to Altamira and join your boat in the Lagoon at Altamira.

Now starts the real adventure with a fast canoe taking you down stream to Isla do Faz. This is the main base and stopping off point for fishermen and traders in the Zebra (L46) fishery. There is an overnight stop at Isla do Faz so you have a chance to do some night fishing.

Next day it's back in the fast canoe downstream to the main fishing grounds, visiting small settlements where families fish for Gold nuggets, Peppermint plecos, Goldy plecos and the like. Here we will also find divers collecting Zebras, Hetereodon and other deep water fish. During the afternoon we return to Altamira. Here we will be visiting some local fish exporters but also experiencing the lively latino atmosphere of an Amazon river town.

Now it is back out into the wilds with an early start going by fast boat upstream to the Irriri River to explore the fishing activities and local settlements. A wonderful range of aquarium fish come from this area and we have a couple of days to explore the wonderful diversity of Amazon fish.

After returning to Altamira you catch a flight back to Recife where the last 2 days are spent in comfort before returning home to England late on day 12.

BOOK NOW

The cost of this adventure is £2,200 including all flights and transfers, hotel accommodation, including breakfast and all meals (local style) on board boat. If you would like to join the *Today's Fishkeeper* "XINGU EXPERIENCE", departing May 2003,

call Goldenline on 01564 783706
or email steve@goldenline.co.uk

Today's Fishkeeper Holiday Winner


David Clarke in front of his living room tank.

DAVID HITS THE JACKPOT

HAGEN.

In December and January's issues we ran a Hagen sponsored competition for one lucky reader to win a trip of a lifetime to visit the Amazon and another reader to win a Fluval Duo 800 complete aquarium set-up. Pat takes up the story.


David has had this Giraffe-nosed catfish since it was a little baby of just 5 cm. Coming from Africa he won't find any of these on his visit to Brazil but there will be plenty of other large cats to admire.

The response to the competition came from fishkeepers aged from 14 to 68 showing that the spirit of adventure encompasses all ages. The choice of who was going to win the trip was made after a lot of agonising by the editorial team, and after consultation with Jackie Wilson, marketing manager at Hagen who sponsored this unique prize. Now all we had to do was ring the lucky winner and tell him.

When Derek called David Clarke from Leicester to tell him that he had won the trip to the Amazon he initially thought it was someone trying to sell him insurance! Then he thought it was someone winding him up, but a quick check in the magazine confirmed that the telephone number was that of the *Today's Fishkeeper* editorial office and it certainly wasn't a wind up.

David said he had never won anything before, but it was the luckiest day of his life when he walked into the newsagent's and bought a copy of *Today's Fishkeeper*. His prize winning reply said, *'After 21 years of sharing my home with fish, it's about time they shared their's with me and at the same time fulfil my dreams.'*

David has been a fishkeeper from the age of 10 and has participated in all aspects of the hobby. He has a large tank in his lounge and is in the process of fitting out a fishroom. He has kept and bred many species and his fishroom contains several breeding colonies. He is interested in all kinds of fish. He is 31 years old and married with a baby daughter and a trip such as this would have been a distant dream. He says he doesn't like snakes and spiders (especially the large variety), he also hates flying and after his one and only trip abroad by plane swore he would never fly again, however, he'll chance it all to achieve his dream.

We had a great afternoon talking fish with David. He would like to thank Hagen for sponsoring him and I'm sure all our readers wish him well. Have a great trip Dave and we look forward to hearing all about it.


The new run of tanks David installed just before winning this trip. The top tank contains breeding groups of various cichlids.

THE RUNNER UP

The winner of the Hagen tank is Mr. J.Wilson of Worksop. More about the runner up in the May issue.

From the bottom up

Peter Hiscock, author of The Encyclopedia of Aquarium Plants joins Today's Fishkeeper as our new plant expert.

In this new series I will be aiming to cover subjects that will help anyone to develop and maintain a healthy planted aquarium. Each month I will be looking in detail at a plant related subject, providing advice in problem control, and introducing plant profiles for ponds, beginners and feature plants.

Working in the retail aquatics trade, I often hear customers say things like, "Why do all the plants I buy die?" or "I'd love to keep plants but the fish just eat them". My personal stance on this is that any plant or fish species can be kept healthy and happy if it is provided with conditions that mimic its natural environment. A lone Cardinal tetra would not do well in a bare tank with bright light, a Goldfish will not survive a fraction of its life span if kept unsuitably in an unfiltered bowl, and plants will also suffer in unsuitable conditions. So how can a good environment be created? The best place to start is at the root of the problem - the substrate.

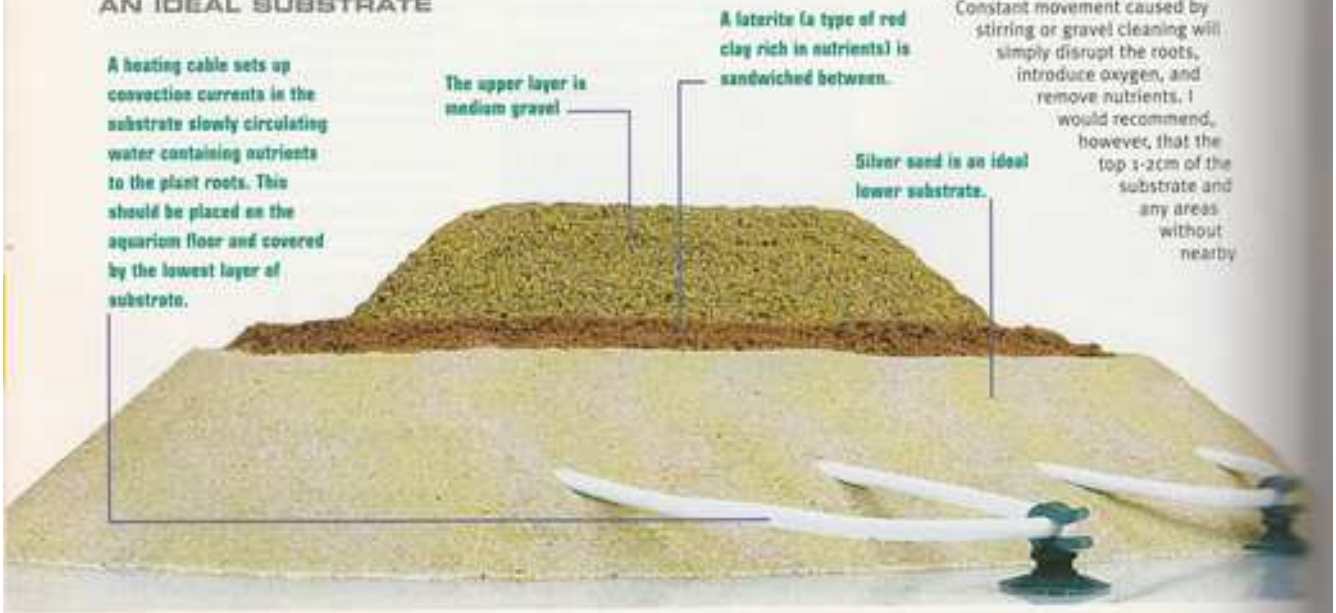
The root of the problem

Substrates should be far more than a place to put decor and stop plants from drifting around. A good substrate should act as a nutrient sink, collecting and storing nutrients for assimilation through the plants roots. An environment which collects and stores nutrients must be low in oxygen content so the nutrients are not oxidised and become unusable, it must be low in water movement so the nutrients are not washed away, and must contain organic matter that nutrients can bind to. Organic matter in the substrate is easy; waste from fishes will soon provide this. Creating minimal water movement and low oxygen conditions can be done by using a fine grade gravel (1-2mm) and making sure the substrate is at least 5-7cm deep. An ideal gravel for this purpose is lime free quartz or silica sand.

Once a build up of organic matter has begun, nutrients from fish waste, the water and any liquid fertilisers will begin to collect in the substrate, where plants can then take them up. To enhance the process, it is well worth adding a nutrient rich additive such as laterite to the substrate, normally as a thin layer half way down or mixed in with the lower half of the substrate. For a professional touch, a heating cable can be used at the base of the aquarium beneath the substrate. Heating cables provide a gentle heat, raising the temperature of the substrate slightly above the water temperature. This temperature difference creates convection currents that slowly circulate water around the substrate, also moving nutrients around and preventing anaerobic (zero-oxygen) patches, which can stagnate.

To keep a deep substrate working correctly as a nutrient sink it must be maintained properly, the best advice here is to simply leave it alone! Constant movement caused by stirring or gravel cleaning will simply disrupt the roots, introduce oxygen, and remove nutrients. I would recommend, however, that the top 1-2cm of the substrate and any areas without nearby

AN IDEAL SUBSTRATE



PROBLEM CONTROL – SNAILS

The novelty of a few snails appearing in a planted aquarium quickly wears off when they decide to multiply rapidly, becoming unsightly and causing damage to more delicate plant species. Although snails are sometimes considered useful algae eaters in the aquarium, it would take a large number of snails to equal the algae eating capacity of a team of Otocinclus, Peckoltia or Ancistrus catfish. Snails usually arrive with plants, and although each individual plant can be checked, one or two will always get through. Considering that snails are hermaphrodites, meaning both male and female, only two individuals are required to start a population explosion. Even using prevention methods such as dipping plants in concentrate snail killer solutions are never 100% effective.

As with many problems nature provides the best solutions - natural population control. Bottom feeding scavenger fish naturally eat snails and other substrate dwelling creatures in the wild, and given the opportunity, will do the same in the aquarium. Larger catfish such as some Synodontis sp., and the Talking catfish group are ideal for this job but may be a little too destructive for a planted aquarium. Loaches are a far gentler group of fish and all but the Sucker mouthed loaches will readily eat snails. A popular choice is the wonderfully coloured Clown loach (Botia macracantha) that is well suited to the job. It should be noted, however, that most loaches would be unable to tackle larger snails, which may have harder, thicker shells and so will only eat small or young snails.

For larger established snails other methods may have to be used. There are a number of treatments available to kill snails although many of these treatments may be harmful to sensitive fishes, including some loaches. The use of snail killers in tanks with a large snail population also presents another problem - dead snails decomposing in the substrate, possibly causing water quality problems. For the anti-chemical amongst us, trapping is a more agreeable alternative. A sinking food pellet placed beneath an upside-down saucer on the aquarium floor at night will attract a mass of snails. By the morning, the hapless snails, outwitted by the fishkeeper, can then be removed with ease.

Snails of many different species can become a real pest in aquaria. Never fear, with chemical, biological and plain trickery they can be irradicated.

plants should be regularly gravel cleaned or siphoned. This will prevent stagnant areas of deep substrate and remove organic matter that, although useful further down, can cause bacterial problems at the surface to some bottom dwelling fish.

Installing a new substrate in an established aquarium can be a little disruptive, if you already have a standard pea gravel shallow substrate, simply place aterite and quartz substrate on top. If on the other hand, your substrate consists of large grade (6mm+) gravel or worst of all, coloured gravel, then it may be wise to replace the entire substrate. With a good substrate, your plants will be able to root properly, obtain a constant supply of nutrients, and enjoy unrestricted growth.

Specimen plants

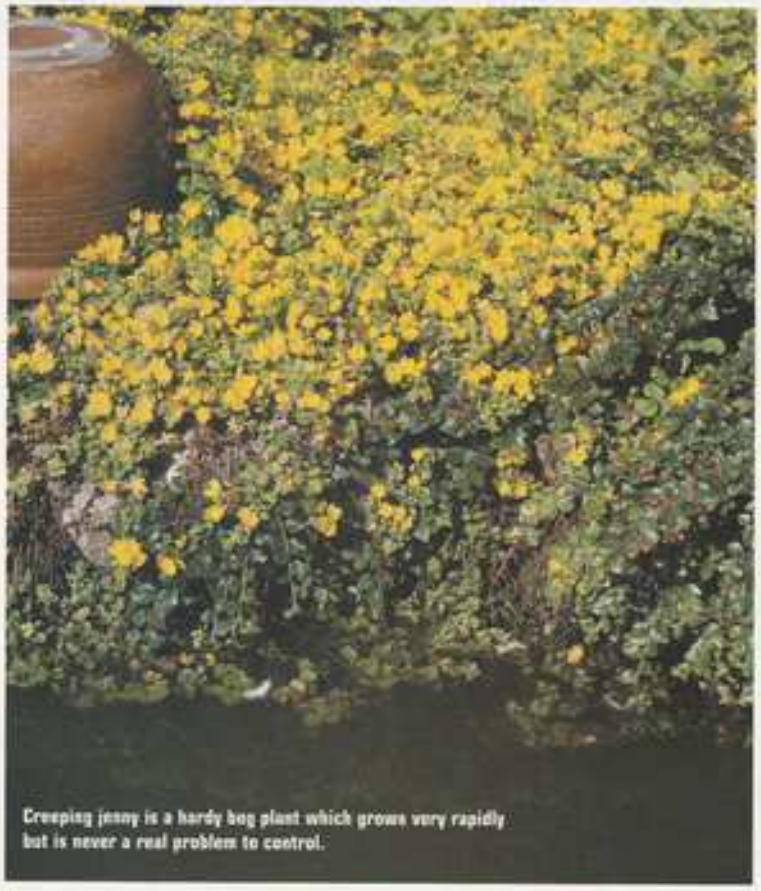
There are three main varieties of this plant available and a number of hybrid varieties; most have mottled leaves with a combination of green, brown, orange, red, or crimson. The plant is a tropical lily and produces rounded, slightly crinkled leaves up to 20cm in diameter that if left, will reach the surface and quickly dominate a large area of the aquarium. The size of the plant can be controlled by regularly pruning the largest leaves, over time the leaves will then become smaller and more compact. The Tiger lotus will take time to establish to a new aquarium and is easily damaged during transport. Check when buying this plant that it either has well established roots or is growing from a bulb, in some cases it is possible to just buy the bulbs, virtually eliminating problems of damage during transport and acclimatisation. Once established, the tiger lotus is quite hardy and only requires a good substrate, moderate nutrients and bright lighting. With good plant husbandry, this plant will become a dominating and stunning feature plant. →

Tiger lotus (Nymphaea lotus) make excellent specimen plants.

A plant for any aquarium

The versatile Java fern (Microsorium pteropus) can be used in a number of unusual ways, but you will have to wait till next month to find out how! As an aquarium plant, it is ideal for the middle or back of the aquarium and has few requirements. It is slow growing, so does not require bright light or masses of nutrients, and its roots do not require a deep substrate. Its leaves are tough and also contain a mild toxin that makes it unappetising to fishes with a taste for plants. The only requirements this plant needs are that the main root (rhizome) should be placed slightly above the substrate and it should be sheltered from very bright light. In fact, Java fern may be one of the hardiest aquarium plants available and if your plant-keeping skills are verging on embarrassing - this is the plant to try!

Java fern has several cultivated forms including 'Windelov' which is available from shops which stock Tropica plants.



Creeping jenny is a hardy bog plant which grows very rapidly but is never a real problem to control.

Something for the pond

With spring rapidly approaching it is time to begin cutting away any old growth and clearing room for new plants around the pond. Most retailers will by now be fully stocked with pond plants and equipment but it is worth bearing in mind that the best quality plants will only arrive on sale in late spring. For now, stick to hardy plants which will add a little greenery and cover any bare edges or exposed liner between the pond and its marginal areas. For this purpose Creeping jenny (Lysimachia nummularia) is ideal. This hardy stem plant with rounded green leaves up to 2cm wide will trail over the pond's edge into the water and can be used to cover any unsightly pipe work or edges. Creeping jenny should be planted in dense groups in moist soil and placed in open or partially shaded areas. When summer finally arrives, the Creeping jenny will be well established and should produce small bright yellow flowers. ■

COMING NEXT MONTH

After sorting out your substrate, next month I will take a look at some plants that require no substrate at all, and the interesting things you can do with them.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Baby water dragons showing lighter stripes.

There be dragons!

Fancy keeping some Dragons? Well, Bob & Val Davies think they make ideal starter reptiles for the beginner. Photos: Bob & Val Davies

A NUMBER OF THE AGAMA FAMILY ARE referred to as Dragons, particularly several Australian and S.E. Asian species and some of these make excellent vivarium inhabitants especially for beginners.

Two very popular species are Bearded dragons (*Pogona vitticeps*) and Water dragons (*Physignathus cocincinus*).

These two come from different habitats; the former originally from Australia where it is an inhabitant of quite arid regions and such conditions must be replicated in captivity. The Water dragon, as its name implies, needs a humid set up to simulate its rainforest habitat. Given the right conditions, treatment and food both species, if obtained in good condition, should present few, if any problems and have captive life-spans of about 10 years.

'Beardies' have the added advantage in that any you buy will have been captive bred. Selective breeding has now produced several colour morphs such as lime, red, albino, gold etc. which command a higher price. A few breeders are producing a slightly smaller relative, Rankins dragon, which is similar in appearance and requires identical conditions. Water dragons are somewhat larger than 'Beardies' but being an arboreal species can, with proper furnishing, take advantage of the increased height in a vivarium. A few keepers are breeding the species in captivity but baby specimens are frequently imported having been captive farmed. Obviously it is better to obtain young specimens of both species. Wild caught, larger specimens of Water dragons will be skittish and in the past many have caused themselves serious injury by smashing their snout on the front glass. These injuries often became infected with treatment often posing serious problems.

Bearded dragons

The common name comes from the pouch under the throat that is inflated when threatened or during courtship - in the latter case the male's beard turns almost black. It is a diurnal lizard that spends long periods basking and requires high temperatures. The spines that give them such a fierce appearance are quite soft

Juvenile Bearded dragon. The patterning fades as maturity is reached.

especially when stroked from front to back. 'Beardies' tame very quickly and love to feed from the hand. In the wild and when kept in groups in captivity hierarchies are formed. An alpha male establishes his territory and mates with females.

Hierarchies also exist among the females and juveniles. If kept in such groups, especially when young, care should be taken to ensure all get sufficient food and several basking spots will need to be set up. Any which are being bullied will need to be housed separately.

Bearded dragon - normal colour phase, showing soft spines.

CAPTIVE CONDITIONS FOR WATER DRAGONS

Distribution:	South East Asia
Adult size inc. tail:	85 cm
Vivarium size:	120 x 75 x 120cm for an adult pair.
Substrate:	Layer of potting compost mixed with leaf litter, topped with sphagnum moss.
Décor:	Branches for climbing, plastic plants for shade and concealment. Pool for bathing and drinking.
Temperature:	Day: 33°C at hot spot, 26°C cool end. Night: 22°C. Photoperiod 14 hrs. UVB light essential.
Humidity:	80% - a daily spray is necessary. A pool will help to maintain humidity.
Food:	Insects; also earthworms, morios, occasional defrosted young mice or rat pups. Calcium and multivitamin supplements needed.
Compatibility:	Males usually incompatible. Keep either a pair or trio.
Breeding:	Reduce all temperatures by about 5°C for 8-10 weeks. Reduce misting. Reduce photoperiod to 10 hrs.
No. of eggs:	Clutches of approximately 6-10 eggs two or three times a year.
Incubation:	Takes 80-90 days incubated in vermiculite and water at 1:0.8 ratio. Cover with damp sphagnum moss. Mist moss to maintain high humidity.Temperature 30°C.
Care of Young:	After hatching, if all egg yolk has been absorbed youngsters should be moved to a vivarium similar to that of the adults (obviously smaller) and offered food of a suitable size, small amounts several times a day. Temperatures should be slightly lower than that of adults to avoid dehydration.

Water dragons

These have become a popular alternative to Green Iguanas as their eventual size and character make them a more suitable vivarium subject. The body scales are very fine giving the feel and appearance of smooth fabric. Youngsters are particularly attractive with lighter green diagonal stripes on the body and some have a bluish tinge on the shoulders. Baby specimens soon become hand tame and continued daily handling will ensure adults remain tame. Interesting behaviour in Water dragons consists of head bobbing and arm waving - the former is used to show dominance, the latter a sign of appeasement. ■

Adult male Water dragon. The colours darken as they mature.

CAPTIVE CONDITIONS FOR BEARDED DRAGONS

Distribution:	Australia
Adult size inc. tail:	50-56cm
Vivarium size:	138 x 60 x 45cm for two to three adults.
Substrate:	Dust free sand
Décor:	Sturdy logs/rocks under basking light, cork bark shelters. Small water dish.
Temperature:	Day: 40°C at hot spot, cool end about 26°C. Night: 22°C. Photoperiod 14 hrs. UVB light essential.
Humidity:	Low. Do not spray - water bowl should be small.
Food:	Insects; also vegetable matter e.g. chopped peppers, broccoli, endive, watercress etc. Calcium and multivitamin supplements needed.
Compatibility:	Keep either a pair or male and two/three females. Ensure all get adequate food and basking opportunities.
Breeding:	Stimulate breeding by a cool period 6-8 weeks at maximum temperature of 24°C day, 15°C night. Reduce photoperiod to 9 hrs.
No. of eggs:	Approximately 20 per clutch - up to three clutches a season.
Incubation:	Takes 60-70 days incubated in vermiculite and water at ratio of 1:0.8. Temperature 30°C
Care of Young:	After hatching, if all egg yolk has been absorbed, youngsters should be moved to a vivarium similar to that of the adults (obviously smaller) and offered food of a suitable size, small amounts several times a day. Temperatures should be slightly lower than that of adults to avoid dehydration.

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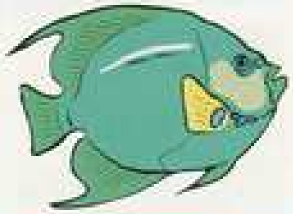

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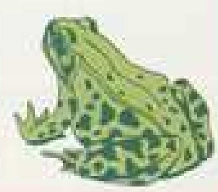

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...End Point

Do you love Pencil fish but want them a bit bigger? **Peter Capon** has an ideal golden oldie which is not so common now, but makes an ideal candidate for the larger aquarium.

Anostomus anostomus are best kept in a larger community aquarium.

In the 1940's and 1950's Anostomus anostomus was a popular fish, both on the show bench and in the community aquarium of larger fish. The usual common names are the Striped pencil fish, Striped head stander or just simply Anostomus.

The Striped pencil fish was first introduced to European aquarists in 1924 by W. Emeke but only arrived in the US in 1933. It was described by Linneus in 1758 and is classified in the Characidae within the subfamily Anostomidae. Its natural habitat is Venezuela and Guyana and there are reports of it also being found in the Amazon above Manaus. A maximum size of 14cm is recorded for this fish, but it is rare to see adult specimens above 10cm in captivity.

In appearance it reminds one of a giant pencil fish with its elongate torpedo shaped, faintly compressed body. There are three horizontal bands on the body that are usually black and in certain lights can be overlaid with a faint lilac hue. The edges of the lines are not sharply demarcated but have a saw tooth-like edge where the dark colour is on one scale but not on its immediate horizontal neighbours. Between the bands the base colour is a creamy yellow. The upper band starts from the head and runs along the flank to the caudal peduncle, often just marking the adipose fin. The second line starts at the jaw, runs through the eye to the tail and in some specimens it forms a blotch where it joins the other two lines. The lower line starts just below the eye, extends through the lower part of the operculum and finally ends in the deeply forked tail. There are red splashes on the dorsal, caudal and anal fins and occasionally on the adipose fin.

The upper lip is set well back giving the appearance of a surface feeder and the mouth is larger than one would expect from the other body proportions. The only other fish that could possibly be confused with Anostomus anostomus is the less colourful Anostomus ternetzi.

Striped pencil fish are omnivores taking the usual live foods and good quality prepared food. In the aquarium it will be seen browsing on soft algal growth often swimming upside-down or on its side to enable it to get at the choice growths. A sure sign of a healthy Anostomus is its constant mouthing of rocks and plants in search of food.

The common name of Striped Headstander is in fact a misnomer as a healthy fish tends to swim horizontally when not performing acrobatics in its search for titbits. In fact, a head standing attitude is a sign of stress and indicative that all is not well.

Water conditions are not that critical, however, when first imported it will need careful acclimatisation. Ideally this fish needs plenty of swimming space and shady areas in which to hide. A filter turning the water over twice an hour is useful. The suggested water parameters are a maximum dGH of 10o, a pH of 6.0 to 7.0 and a temperature of 24 to 27°C.

Since they can attain quite a reasonable size it is best to house them in a large deep aquarium to allow growing space. It can be housed with other peaceful fish of a similar size, but tank mates with long flowing fins should be avoided as this fish can't resist a quick nibble. Some specimens can be a nuisance and will sneakily creep up behind even cichlids and shred their fins. These attacks usually take place in the early hours, so if its tank mates start to show shredded fins it is likely that your Anostomus is the culprit. Among themselves they can be aggressive, particularly if only two or three are kept together, but if seven or more are kept then this aggression is diluted. ■

HOW DO YOU BREED THEM?

Anostomus anostomus has probably yet to be bred naturally under aquarium conditions. It has, however, been spawned a few times but always with the use of hormone injections. In these artificial spawnings the eggs were scattered throughout tank. The eggs were small for the size of the fish and completely transparent. These eggs increase in size as they develop which is unusual. It is said that the fry hatch in 18 to 24 hours at 27°C and are free swimming 4 to 5 days later.

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