Today's Fishkeeper

MARCH 2003 £2.95

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Colour Repro
DIGITAL CONCEPTS

Printed by
HEADLEY BROTHERS

Distribution
COMAG (01895 444055)

ISSN 0003-7271

Enjoy your break?

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As you will all know too well this winter has been marked by some pretty heavy snowfalls and cold spells. Great for gardeners who needed some hard winters to kill off some of those pests that have been surviving in all too large a number – but not so good for people who have to travel, or the health service that were inundated with people who had slipped over on the ice and broken various limbs. Now I have been saying for a while I needed a break but a few days before I went on holiday I had one I didn't want – I broke my wrist!

Now that really puts the dampener on a holiday, especially if you had it all worked out to go diving for the first time. Fish hunting was also on the agenda, as was snorkelling to watch the local marine fish. The first hurdle, however, was to make it out to Jamaica. Many airlines won't carry you if you have a new plaster cast but the hospital staff did a great job and fitted me with a fibreglass cast that can be cut off by a lay person if any problems arise while in the air.

So I made it out to Jamaica. Obviously diving was off the agenda and fish watching had to be limited to what could be seen from a glass-bottomed boat and from the jetty bar. Actually the bar proved a great spot to watch fish. Damsels and Sergeant majors could be seen all the time and a group of three Puffers came swimming by one day. Garfish of some sort would snap at anything that fell on the water's surface. All in all, I actually got to see a reasonable number of fish and a reef from quite close quarters.

It was the fish hunting that presented the biggest problem. One of the trips from the hotel included a visit to Dunn's River Falls. This is a must for any visitor to Jamaica and luckily one I could go on and do a little fish catching while the rest of the party climbed the falls. If you have ever had a chance to do this and noticed the fish swimming in the falls themselves, then you have probably been looking at a fish which is a new species awaiting a scientific description.

The real problem, however, was how to get over to the other side of the island and visit a couple of locations. Obviously driving was out. Instead I hired a car with a driver for the day. The driver knew I wanted to go fishing but assumed it was with a rod and line, not with a hand net. It turned out Keith and family were keen fish keepers themselves! They had a community aquarium at home that his youngest son was fascinated by. The fishing was good and in the end we all went home with some interesting fish. Keith also decided to bring his whole family over to Bluefields one Sunday for a picnic and spot of native fish collecting!

Talking to Keith about how they kept fish in Jamaica, it was pretty much the same as over here, only they didn't need a heater for the aquarium. Water conditioners could be a problem and were very expensive, luckily their tap water only has chlorine in it so they stood the water for a few days to allow this gas to escape before they used it in the aquarium.

So, despite my unscheduled break, I still enjoyed my holiday and indulged in my passion for all things aquatic. I also met another fishkeeper who is now an avid *Today's Fishkeeper* reader.

Happy fishkeeping.

Derek

PHOTOS: DEREK LAMBERT

Keith with his collection of Jamaican native fish including Black-bellied Limias and some introduced Platies. These are now in Keith's community aquarium.

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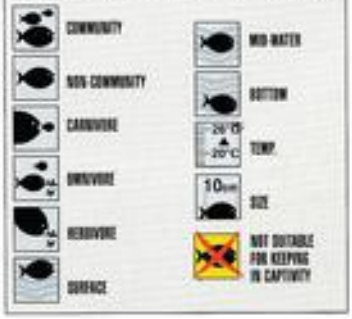
Keep an eye out for these handy symbols to help you with your fishkeeping.



Starting Point...

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

Sparkling gouramis are a real gem of a fish.

PHOTOS: IAN GIBB

A VERY BRIGHT SPARKLER

This tiny Dwarf croaking gourami that only grows to 3.5cm is a real beauty. The dorsal is sail-like and the tail fin ends in a blunted point. Blue, red, yellow, sea-green all these colours are seen on this fish. The finnage is peppered with a kaleidoscope of colours and edged in red. This is a truly beautiful little fish that glows with colour when seen in reflected light. It is a peaceful species that needs to be kept with a community of small, peaceful species. It adapts well to normal aquarium conditions but it does like a temperature of 25-28°C that is a little on the warm side of the normal range. It makes croaking noises during courtship that gives it one of its common names. Another common name is the Sparkling gourami. I prefer this name because it describes perfectly the *Trichopsis pumila* that is, indeed, a very bright sparkler.

The Common gourami is also known as the Giant gourami, a name it justly deserves.

THE COMMON GOURAMI

Common this fish might be but it should not be common in your tank or mine, for it grows FAR too large for the average aquarium. Growing to 70cm, and possessing a very deep and chunky body, it is commonly eaten in its home countries where it is bred as a food fish. I have several friends who have been caught out by this one. It is sold as a very small fish (about 5cm long) and at this young age it looks very similar to the Chocolate gourami with its dark transverse bands and more attractive coloration. It is quite suitable for a community tank, as a youngster but will soon outgrow its companions and its tank. The adult is very chunky and rather dull in colour. It is, however, a fish with personality. There used to be a very large one that grew up in a display tank at Coral Bazaar, Walton-on-the-Hill, Surrey. This was a pet fish and a favourite with many of the fishkeepers who visited the shop. I always stopped to have a chat with it when I was in the shop. It was the sole occupant of a very large tank. I don't think this is an aggressive fish, it just grows much too big (and very quickly too) which makes it an ideal food fish but not an ideal [illegible] for a tank less than 150cm long.

I'VE BARELY SWALLOWED DOWN MY Christmas pudding and here I am at the end of December writing a column for the March issue. I'm lucky to be principally writing about tropical fish. How the coldwater pond people cope I just don't know! March is supposedly the end of the tropical season or so I've been told. I suppose people buy more equipment for their garden ponds in summer, but it's really just the beginning for our 'out and about' activities in the tropical world. I've just spent the winter caring and preparing for the spring, carrying out my breeding projects and making lists of wants and will haves. With the advent of longer days and better weather (I hope), fish hunting in spring and summer is much more pleasant and you can cast your net more widely too. We will be venturing forth into the shops to see what's about in the fish world. Don't forget to take your ID book with you and, if you're new to the hobby, read the *First Time Fishkeeper* guides which are available for just the cost of p&p. The sections on preparing and introducing new fish, and what to look for when purchasing are particularly relevant when you are sallying forth to the shops. Come to think of it, writing a column in December for March makes the winter seem over almost before it's begun which can't be bad!

A few words about Gouramis

I have always had a soft spot for Anabantoids, particularly the Gouramis. I would highly recommend them for their beautiful colours (it's hard to beat a male Pearl gourami in full breeding colour), their interesting breeding habits and their hardiness. They are more tolerant of water conditions than most because they possess an additional respiratory organ which enables them to survive in oxygen depleted waters. Given the best treatment, however, they will repay you by displaying their brightest colours. The two fishes that are featured this month are both Gouramis, one of which I would urge you to seek out for a community of small fishes; the other you should avoid unless you have a VERY large tank.

FOCUS ON FISH EYES

Most fish that we keep are short sighted and do not possess light refracting corneas. These are flattened and are therefore only protectors for the eyes. Fish can see colours but they cannot turn their heads to see all round in the way that we do. Their eyes are, therefore, set well back in the head that compensates a little for this lack of mobility, and enables them to see trouble coming before it arrives. When we focus, the shape of the lens in our eye changes but in fish the lens has to move forwards and backwards to focus. Fish do not have eyelids, so their eyes remain open even when they are sleeping. They do not have an iris either and are unable to control the amount of light entering the pupil very quickly. This means that the fish eye's response to light is therefore much slower.

This Mexican bigeye has particularly large eyes to help it see at night.

The Blind cave fish is perfectly adapted to the environment it lives in.

Some fish, due to environmental conditions, are not so dependent as we are on sight; their other senses play an important part. This is particularly true of fish like the Blind cave fish that is sightless. Eyes are of no use in the dark caves in which they live so they have disappeared altogether. Other species that inhabit murky waters have greatly reduced eyes and depend on other sensory organs for survival.

WARNING

To suddenly turn on or off the lights in a fish tank can cause them distress. It is a good idea to draw the curtains in summer or turn off the room lights in winter about half an hour after the tank lights have been turned off. This way the light reaching the tank dims gradually.

Lost for Words

Aufwuchs: This is a layer of filamentous algae which grows on rocks and hard surfaces which contains within it tiny invertebrates which together with the algae satisfies the dietary requirements of many species. Some species have physical adaptations that enable them to skilfully harvest this nutritious food, for example a group of Cichlids that inhabit the rocky habitats of Lake Malawi.

Cyanobacteria: These micro-organisms in your tank mean that your tank surfaces will rapidly be covered with slimy blue green algae which is very difficult to irradicate. Thrives in tanks with high nitrate and phosphate levels.

Cyclops: These are small aquatic crustaceans that make an excellent tasty food for fishes. They are semi- transparent and hop around the tank in quick jerky movements. They are often introduced with other live foods and are soon devoured by the fish. Called Cyclops because they only have one eye like the creature in Greek mythology.

Black water: These are dark brown waters, stained to the colour of tea, which from a distance appear black. Their coloration is due to the dissolved organic substances such as decayed leaves etc., which leach tannins. This water is very acidic with a pH averaging 4.5. In the Amazon the Rio Negro, as its name suggests, is a black water river that contains many of the popular freshwater fishes in the aquarium trade.

Egg spot: Many Cichlids have egg shaped patterning on their anal fin. When a mouthbrooding female is spawning she thinks these spots are eggs and tries to collect them and while doing so she collects the sperm which fertilises the real eggs already in her mouth.

Nuclear family: This is where both parents exhibit brood care, this often means that the female protects the nest while the male protects the surrounding territory. When the young hatch and begin to venture from the nest into open waters of the tank, both parents swim with them to protect them. This is one of the most endearing sights in fishkeeping.

Odontodes: Located over most of the body scutes and fins or concentrated in groups, these appendages look like bristles and are found mostly on Loricaridae and Calichthyidae catfish.

The Radican sword plant is a great choice for almost any aquarium.

PHOTO: M.P & C. PIENAAR

AN EASY PLANT

The Radican sword plant (*Echinodorus cordifolius*) is undemanding but best used singly rather than grouped in the larger tank, as this is a large plant. The broad, long, heart-shaped, bright green leaves make a wide and tall spread. Any floating leaves should be removed so that underwater leaves can grow well. It has a thick, sturdy stalk and white flowers are produced above the water surface. Easy to grow, tolerating a wide temperature range, it is a suitable plant for the larger aquarium.

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

1 **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.

2 **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.

3 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

4 **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**

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

6 **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.

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

THE ROUTINES

8 **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.

9 **Water changes:** Freshwater tropicals 10-20% 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.

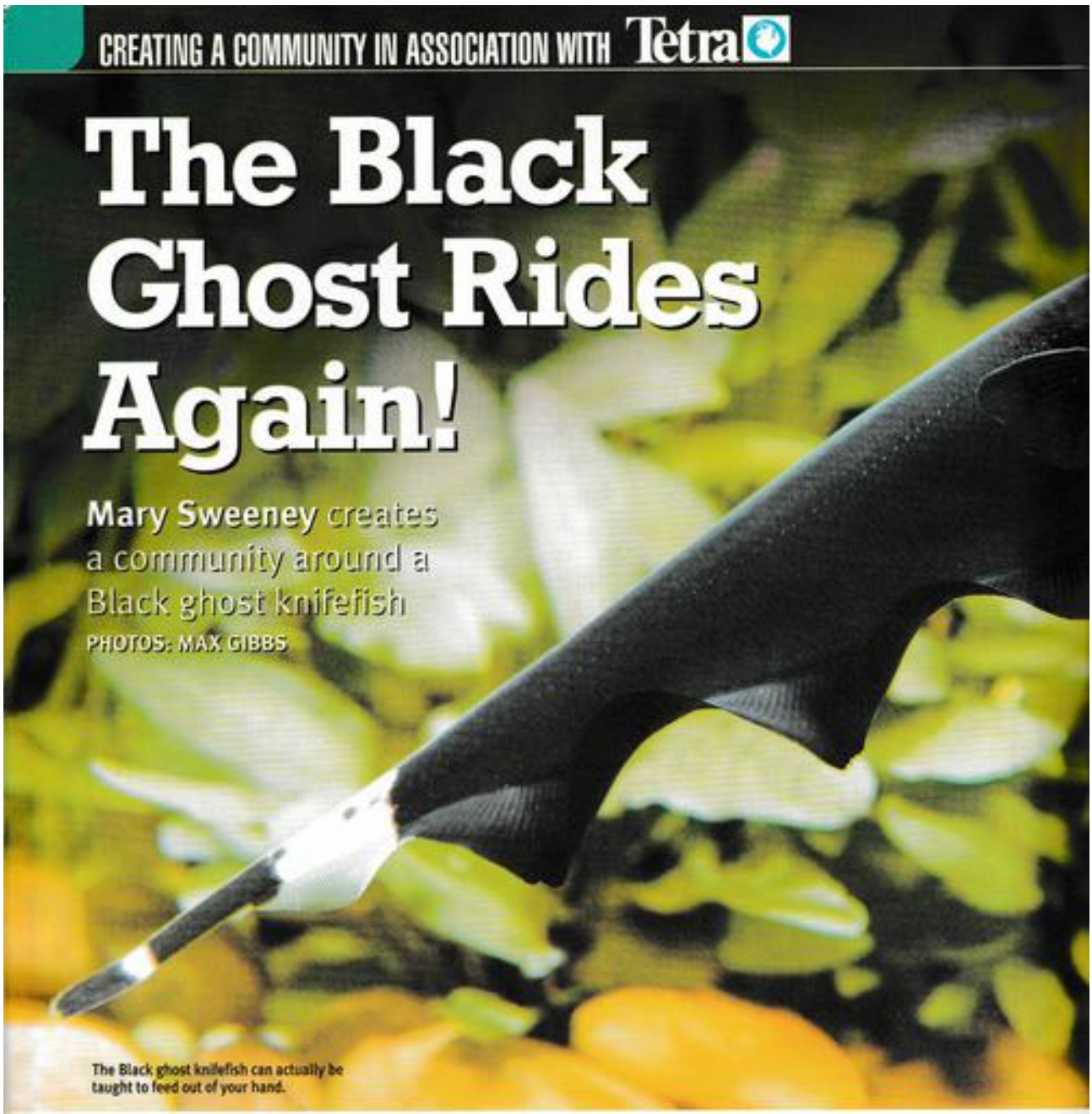
10 **Cleaning filters:** These should be cleaned once a week. If they work by biological filtration (bacteria break down the waste) and have a sponge in them, this must be cleaned in old aquarium water that is then discarded. Never use any household detergent or soap on aquarium equipment or tanks.

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.

The Black Ghost Rides Again!

Mary Sweeney creates a community around a Black ghost knifefish

PHOTOS: MAX GIBBS



The Black ghost knifefish can actually be taught to feed out of your hand.

EATS OUT OF YOUR HAND, PREFERS shrimp for dinner, is kind to peers and belongs in every Stately Home of Aquarius. The Black ghost knifefish is for the serious, contemplative aquarist who wants a little more from a fish than a mindless trophy. It will appeal to someone who has the patience and the resources to grow fish like *Botia macracanthus*, that delightful Clown loach, out to full 30cm size. Keeping a Black ghost knifefish (*Apteronotus albifrons*) with a few carefully selected mates in a l-o-n-g tank...pure class, all the way.

The Black ghost knifefish is a native of the fast-flowing waters of creeks and streams with sandy bottoms in northern South America. These conditions are easily replicated in the aquarium. A good sized one of at least 160cm to 200cm with length more important than height. Since this fish can reach up to 45cm during its long life, don't skimp on the tank size if at all possible, especially if you are planning to keep the Black ghost with other fishes. On the up side, this is a quiet, nocturnal fish, so loads of swimming room is not a prime requirement. Do, however, make sure that the water is well oxygenated and free from nitrate. The Black ghost likes it warm, so keep the temperatures in the neighbourhood of 24 to 27°C.

In common with these Clown loach, Black ghost knifefish are scaleless and may die if treated with certain medications. Prevention is always better than cure so make sure you quarantine all new tank mates for several weeks before introducing them to your aquarium.

Despite its similar, although reversed appearance, the Upside-down knifefish (*Gymnarchus niloticus*) does not make a good companion for Black ghosts. Apart from growing to 150cm and being a predator, it also has an electric organ capable of stunning even large prey.

UNUSUAL ATTRIBUTES

The Black ghost is nearly blind. This isn't a big issue since it is a night-time predator. This fish overcomes its visual impairment by the use of a weakly discharging electric organ and receptors that are placed at intervals from head to tail. It can immediately sense even small quantities of food through this special sonar like equipment. This electrical field allows *A. albifrons* to navigate and hunt perfectly well without light, a real advantage in a near blind fish. This current is not used to stun the prey, but is like the radar a bat uses to find its way. The electrical current is barely detectable by other fish and will not harm you in any way. The most you will experience is a mild tingle or not even that.

It's best not to keep the Black ghost with other electric fishes in a small aquarium, as the other's electrical field could result in confusion that would cause the Black ghost to starve to death. An exception to this is when a pair of Black ghosts is kept in a very large tank. The electrical discharge of the female is a good deal more powerful than that of the male and is thought to be used in courtship. Incidentally, more than one male should not be kept in the aquarium as they could get quite nasty with each other, even without a female to inspire confrontation.

Don't be alarmed if you discover your Black ghost lying motionless on its side during the day. It's just asleep and will rouse itself when the lights go out or it gets a sense that you have just supplied a large meal of tasty Bloodworms (Well, it could be dead, but one can usually tell the difference.)

Water Chemistry

As this fish prefers soft, acidic water with a pH around 6.3 to 6.5, the aquarium for the Black ghost should not have ammonia problems. It's nitrite and nitrate that must be kept in check for these scaleless fish. Keeping the water quality at its best will go a long way to preserving the velvety black perfection of the Black ghost's sensitive skin. As an aside here, the Black ghost is scaleless and falls into the category of fishes that may or may not survive treatment with many aquarium medications. An ounce of prevention is indicated with this fish that cannot tolerate medicinal dyes for parasites and the like. Always use good quarantine procedures to protect this fine fish.

The Black ghost swims with rippling anal fin in a style of undulation known as the gymnotiform swimming type. The unusual shape and velvety black body, with two white caudal bands, have contributed to the increasing popularity of this fish in recent years. This, plus the ability of fish farmers to breed the Black ghost, has made this fish much more readily available than it has been in the past with the prices floating down from their former stratospheric heights.

In the Aquarium

The Black ghost knifefish prefers a dimly lit aquarium with plenty of overhangs and cosy crannies. Do leave some clear swimming space, but for the most part, a shadowy tank is preferred. These fish are quite sensitive to bright lights and will do almost anything to escape very bright light. It puts them in a very stressful state and is positively unhealthy for them in the long term. Especially useful are clear plastic tubes that the fish can 'hide' in while still being perceptible to you.

To get a good look at a Black ghost going about its nightly business, you must be a bit →

Apollo sharks (*Luciosoma spilopleura*) make excellent companions for Black ghosts. They grow to about 25 cm when full grown and like similar conditions.

SUITABLE TANK MATES

Tankmates should be peaceful and of equal or near to equal size. Do not expect to keep a school of Cardinal tetras with this fish even though it is advertised as an insectivore. Needless to say, do not include any fin nippers or aggressive fishes in an aquarium with a Black ghost. It will be no contest and the Black ghost will not survive.

stealthy. Feed the fish as usual. Then turn out the tank lights and leave on a low room light. If you sit quietly by the aquarium, you will soon see that this fish is quite active and has a busy schedule in the darkness. It is quite a surprise to see just how active this fish can be when the lights go out. These nocturnal habits can be a bit deceptive. It's quite easy for small fish to disappear at night and the Black ghost wouldn't even be a suspect since it's so quiet during the day.

I have a notion that it does not like to have the tank redecorated. I have no proof of this, but it seems that the Black ghost takes a while to get comfortable again after any change is made to the aquarium décor. It may be disconcerting for this poorly sighted fish to have its driftwood shifted, so try not to disturb the tank any more than necessary.

How to hand tame your fish

The Black ghost can become hand tame and this is another of the assets that has contributed to its popularity. If your goal is to have this fish eat right out of your hand, it might be best to keep it as a sole specimen or only in the company of innocuous bottom dwellers that will not interfere with your bonding sessions.

The Black ghost is a heavy feeder. It will accept, and appreciates, a wide variety of live and prepared aquarium foods. Some suggestions include beef heart, shrimp pellets, snails, small fish, Tubifex, Blackworms, Bloodworms, Brine shrimp, Daphnia, etc. If it is not properly nourished, it will make a pass at tank mates that would not otherwise be considered food. A percentage of live foods should always be offered. The Black ghost is surprisingly fast at responding to the presence of food in the aquarium. It immediately responds to the smell of food. This eagerness is what we exploit when we want to train a fish to hand feeding. Some species are just naturally bold and will snatch food from your fingers without hesitation, but real hand feeding includes taming as well and implies conscious trust on the part of the fish. With the Black ghost, this is manifested by the fish willingly lying in your hand during your feeding sessions.

To tame a fish, you must have no negative history with it. This sounds silly, but if you treat it roughly or rudely at any point prior to trying to tame it, you should probably not expect too much co-operation from this specimen. That goes for other species as well, by the way. Be sure your hands and arms are meticulously clean (not just now, but every time you work with the aquarium). Be sure you are free of perfumes, oils, and chemicals, even soap residue before working with your fish.

To start, hold a small amount of a favourite food just below the surface of the water and let the Black ghost nibble on it. Don't let go of it right away. After several days (or weeks), the fish will come to the surface when you put your fingers into the water even without the food. Feed the fish at different locations in the tank. After the fish has become relaxed about taking the food from your fingers, place your other hand into the water as well, positioned about 15cm below the feeding hand. Don't move it around, just let it rest in the water while the fish is eating from your other hand. Over the course of several weeks bring your non-feeding hand slowly closer and under the fish. If you move too fast, you'll have to start over, but eventually the fish will lie in your hand while it feeds. Once it is comfortable with lying in your hand to feed it is only a matter of time and patience before it will rise to the surface and lie in your hand waiting to be fed. This charming trick is just one little part of the joy of keeping fishes. ■

10 Community Cautions

Big fish will usually eat small fish

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

Fish require different water temperatures

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

Fish have varying dietary requirements

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

Do not mix riverine and still water fish

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

Fish have different water requirements

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

Fill all the levels

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

Never over stock

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

Keep your eyes open

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

Provide sufficient territory

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

Differing dispositions

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

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

Q&A

A mixture of small tetras, these Black neon tetras are ideal for a BiOrb.

Which fish are suitable for a BiOrb?

Q I am an example of that most tragic of individuals; a fishkeeper with no fish. As a teenager I enjoyed the hobby for 8 years, but have since been out of it for a further 8 years for various reasons. Recently, however, something has re-awakened inside me and I find myself again thinking of my old hobby.

I would like to own a fish tank, but as I live in shared rented accommodation, my options are restricted to a small aquarium that I can keep in my bedroom. For this reason as well as aesthetic ones I was thinking of buying a BiOrb. Now I know that with a capacity of only 30 litres, the range of suitable inhabitants is fairly limited. I would rather embrace these limitations than fight against them.Therefore, I would like your opinion about which fish could be reasonably kept in this vessel.

I was thinking of having no more than four species, perhaps even just one, in a tropical set up (heater provided of course) and would like to consider the following: Serpae tetras, Glowlight tetras, Neon tetras, Black neons, Black widows, Harlequins, Tiger barbs, Siamese fighters (not with the former!) Otocinclus, Honey or Croaking gouramis, Dwarf clawed frogs (*Hymenochirrus* sp) etc. Planting would be achieved with plastics and/or some Java fern/moss, *Anubias nana* and maybe some hardy floaters such as Hornwort. Alternatively I was contemplating a 'cold water' set up with Zebra danios, White cloud mountain minnows etc. or even with just a solitary fresh water Crayfish or Paradise fish.

So which of these ideas do you think most feasible or should such a small vessel be discounted out of hand? Are there more suitable species that you could recommend? If I were to have a cold (or rather cool) water set up which other species could be kept with Zebras and White clouds?

Philip Ballard, *via e-mail*

Star Letter

A Where the volume of an aquarium is limited, I would choose a tropical set-up every time. A tropical aquarium offers you a greater range of fish from which to choose (some of which should be included to keep the aquarium clean). Furthermore, tropical fish are generally smaller and make it easier for you to keep a greater variety of fish in a limited space. I would keep the number of surface-dwelling fish to a minimum as the surface area in a goldfish bowl-style aquarium is small relative to its volume. I would choose a mix of tetras/characins, no barbs, with the obligatory scavengers such as variety of Corydoras and an algae cleaning fish (Otocinclus).

Ben Helm

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.

Too deep to grow plants?

Q **I would like to set up a tank for Rainbow fish and I would also like to grow plants. I do not want an underwater jungle as seems to be popular at the moment but I would like to grow some plants.**

The tank I have available is 120x45x60cm high. I have been told that I might have trouble growing plants in a tank 60cm high and might need extra lighting. Could you please give me a bit of guidance as to how many tubes, of what wattage, and of what type I would need. Also are there any specific plants that would suit this depth tank? What other equipment i.e. CO_2, under gravel heating etc. would you think necessary?

Terry Lewis, *via e-mail*

A I have an aquarium similar in size and depth to yours and grow plants successfully using the following method:

1. Inert gravel layered with iron-rich laterite clay.

2. Undergravel heating.

3. CO_2 fertilisation from a CO_2 cylinder and CO_2 reactor/diffuser

4. pH of 6.5-7.0 with a low KH

5. A mix of 4 x 30 - 40W fluorescent tubes - Triton/Freshwater/Northlight.

With a 60cm deep aquarium, you may be better off using 2 or 3 pendant mercury vapour lamps. These penetrate the light deeper than fluorescents, however, they make it difficult to control evaporation (and hence condensation). My lights are on in 2 shifts. 8am-12noon and 4pm to 10pm

6. Water is a mix of rainwater + tap water

7. Fortnightly water changes with addition of small amounts of fertiliser

If you are not looking for lush 'jungles' of plant growth, I suggest you choose a number of selected rooted plants that you can position and control in your aquarium. Cuttings of stemmed plants (Hygrophila, Ludwigia etc) can soon get out of control in a CO2 fertilised aquarium.

Ben Helm

A nicely planted aquarium with Rainbowfish looks very attractive. Here several other species which have been included.

Suitable companions for Kribensis

Q **I have a 90x50x50cm tropical tank and would like to keep a pair of Kribenis. My tank has Corydoras, Platies, Plecs, Pearl and Dwarf gouramis, Neon tetra, Angel fish but if some of these are not suited to Kribs I will put them in my other tank. What other fish do you think Kribs will get on with if money is not an issue? Also, what plants could survive with the Kribs and their conditions?**

Adam Scott, *Milton Keynes*

A The Kribs will not be a problem with the fish you are keeping. The Kribs will be fine with live plants and I would suggest *Hygrophila polysperma, H.difformis, Echinodorussp., Ceratopteris thalictroides* and many others. Keep the temperature around 26°C, pH around 6 - 6.5. Feed them well and they are easy to keep and an easy fish to try as your first breeding project.

Alf Stalsberg

Kribensis make good community fish which love some plant cover in the tank.

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

Sick fish after a water change

Q I have bred some Leopard Danios which are now about 2.2cm long. They are all, approximately 30 - 40 of them, in an 50 litre tank at 25°C with one large bubble-up sponge filter and the water quality is normal. They were all happy active fish when after being away for four days I did a normal 15% water change. The only difference was that I put a new heater in the tank (which I bought while away) and took the old one out. The fish had been fed Tetra Holiday and Weekend food sticks for tropical fish. That night, the whole family went down ill with something we believe we picked up while away. The next morning almost all the Danios were sitting on the bottom of the tank with clamped fins, loss of colour, hardly moving and not eating. The next day I added Tetra medica recovery aid, as the packaging said it should be used when fish show the symptoms my fish show. But since adding it I have lost 5 fish. Could it be that when I did a water change I gave them the bug they later went down with? Or could it have been a chemical on the new heater poisoning my fish?

Daniel Brain, *via e-mail*

A I'm sorry to hear about your losses. I suppose the most likely source would be the water change. It would not have introduced a bug or infection, but it could have introduced a toxin. Water companies are charged with producing potable water i.e. water fit for human consumption. They may, as a result, from time to time add any one of a variety of chemicals to normal tapwater e.g fluoride, chlorine, chloramine, pesticides and so on, all of which can be readily fatal to fish. It may be worth contacting your local water company as to whether anything was added at that time, although you would have no redress to them if they had added something – they're only doing their job. All of these chemicals are added so that there is still an active concentration of the substance at the far end of the system, so if you are closer to the source then these chemicals may be at relatively high concentrations in your tap water. In a case like this I would also recommend performing routine water parameter checks - ammonia, nitrite, nitrate and pH. Either do these yourself or ask your local aquatic retailer; most will do these tests for a small fee. As for your heater, if it's in a glass case then it is unlikely to be the culprit. If it's another casing then contact the manufacturer about your concerns.

Lance Jepson

Is there a standardised common names list?

Q I am trying to obtain an up to date list of scientific names and their corresponding common names for tropical fish. Classifications seem to be constantly changing and it would be nice to know where I can obtain an up to date listing. I am happy to pay a fee if necessary.

Andrew Collins, *via e-mail*

A Sadly such a list does not exist. Common names are a law unto themselves. In the Livebearer hobby we have a standardised list which the specialist groups use but scientists and academics generally ignore. It is a nightmare for me as I try to keep the scientific names used in the magazine bang up to date but even these are difficult to keep track of. Our specialists are pretty clued up on their own area and Fishbase is OK for many others. What you have to remember about some of the name changes is that they reflect a discussion going on between different scientists who don't agree with each other. So Limia is valid as a genus for some scientists but is only a sub-genus to others. The result is *Limia melanagaster* in some publications and *Poecilia melanogaster* in others. At the end of the day the fish remain the same no matter what their current scientific name is!

Derek Lambert

Stocking a new aquarium

Q Good day! I am looking for a little help. I have just set up a Jewel Rio 180 100x50x50cm tank and have 1 or 2 questions perhaps you could help with.

The filter system is an internal sponge type; do I have to wash the coarse pads at all? Does the carbon sponge affect plant growth and if so is it worth while removing it permanently?

On the subject of plant growth, do I really need to invest in a method of putting extra CO_2 to stimulate growth or should I stick to the liquid fertiliser I have been using?

I intend to start with a general community tank and currently have some Neons, Guppies a couple of Corys, 2 Platies and 2 Speckled mollies with a lone Pearl gourami. I want to add another Pearl and 2 Dwarf gouramis. Can you foresee any issues or do you have any other recommendations for stocking?

Andrew Hall, *via e-mail*

A Although you do not say it directly, I deduce from your questions that you wish to set up a planted aquarium, and are wondering whether your existing filtration will enable you to be successful.

1. Carbon filtration is not recommended for planted aquaria as it removes many of the elements required for plant growth, including some of those added via plant fertilisers.

2. CO_2 fertilisation is the only, virtually guaranteed method of growing aquarium plants. Even though it is called 'fertilisation', it must not be confused with the

Hybrids between Red-tail goodeids and Crescent zoe's have turned up in captivity.

Can these species hybridise?

Since my *X. eiseni* seem to attack the *Girardinichthys viviparus* and *Skiffia bilineata* living in the same 60 litre tank, I thought about changing them into another aquarium with two more robust species, *Allotoca goslinei* and *Zoogoneticus tequila* in an 80 litre aquarium.

A friend has informed me, that *Xenotoca eiseni* and *Zoogoneticus tequila* might crossbreed and that you mentioned this. Unfortunately, I seem to have missed your report - so could you please give me your opinion on this issue?

Martin Ströbel, *via e-mail*

I have seen offspring from such a cross. The fish were not "forced" to breed by being the only male and female goodeid in the aquarium, so I can only assume that there is a risk in any situation. Strangely enough the two species of *Zoogoneticus* will not hybridise but that is not so surprising as these two fish live together in nature. *X.eiseni* and *Z.tequila* do not, as far as I am aware.

Derek Lambert

addition of other inorganic compounds for the benefit of plant growth (bottled or tablet fertilisers) so it is not a case of choosing either CO_2 or liquid fertiliser. You should use both. In fact, I suggest that you can only get the best out of liquid/tablet fertilisers by complementing it with CO_2 fertilisation. In addition to these forms of fertilisation, you need to address your lighting, gravel, temperature and water chemistry.

3. Your stocking seems fine, as long as you take the stocking process slowly. If you are really looking to create a planted aquarium, concentrate on providing the correct environment for the plants and the fish will thrive.

Ben Helm

Star Letter Prize from Hagen

This month the writer of our star letter wins a 2 Litre bottle of Nutrafin AquaPlus and a 2 Litre bottle of Nutrafin Cycle worth over £50!

Nutrafin AquaPlus removes the chlorine, chloramine and heavy metals present in tap water which can be harmful to fish.

Nutrafin Cycle is the most powerful biological supplement currently available. Each millilitre contains 100 billion friendly bacteria, which help destroy harmful toxins such as ammonia and nitrite.

www.hagen.com

Q&A

Cleaner wrasse may be really beautiful, but in this sized aquarium it would be one fish too many.

In which order should I stock my tank?

I currently have a 120 x 60 x 60cm marine fish only set-up with a subsequent 90x42x42cm sump below (which contains five compartments). In terms of lighting in the tank I have two fluorescent tube lights (one moon blue and one marine white light, each 90cm long). I also have two, 90cm T5 daylight tubes. The parameters of the tank at the last reading were as follows: Nitrate - 20ppm, Nitrite - 0ppm, Ammonia - 0-0.25ppm, pH - 8.2ppm, Temp - 27°C, SG - 1.024, Total alkalinity - 125ppm. I do a 90 litre water change weekly.

The tank has been running for 2 months and the fish currently in it include:

3 Green chromis (*Chromis atripectoralis*), approximately 5cm long. 1 Scooter dragonet (*Synchiropus ocellatus*) approx 3.5cm in length and 3 Cleaner shrimp (*Lysmata amboinensis*).

The fish I would like to introduce into the tank are :-

2 Percula clownfish (*Amphiprion ocellaris*), 2 Yellow tangs (*Zebrasoma flavescens*),

1 Flame angelfish (*Centropyge loricukus*), 1 Cleaner wrasse (*Labroides dimidiatus*), 2 Regal tangs (*Paracanthurus hepatus*), 3 Yellow tail damsel fish (*Chromis xanthurus*).

I have two questions that I wish to ask. Firstly, as far as I am aware the fish I have selected are compatible with each other but can you recommend what order I should introduce the fish to the tank? Secondly, could you advise me (for the future) suitable corals both hard and soft that I could put in the tank that would be compatible with the fish and what cleaning crew would you recommend in the tank?

Ian Murphy, *via e-mail*

You will have around 400 litres of water within your system maximum, as I have taken the sump water off for the rock displacement of water within the tank. With a total of 2.5cm of fish per 27 litres of water, you can stock 37 cm of total fish length excluding the tail, so I am sorry but some fish will have to go. The following stock will be OK, only if you already have live rock or intend to add live rock. Around 40kg will be enough for this system. Two Percula clownfish, one Yellow tang, one Flame angelfish and one Regal tang. If you have no live rock then lose any one of the tangs to conform with the stocking rules that were devised long ago and have never been reassessed to compensate for the advancements in technology.

I would add your new fish in this order. The Clowns in first, followed by the Regal, then Flame angel, leaving the Yellow tang till last. Regarding inverts, it would be essential to test your calcium levels and adjust to 420ppm then keep to general soft corals and advance to more difficult corals as your experience increases. A good cleaning crew would be around 8 shrimps and 40 hermit crabs.

Andrew Caine

Plenum peril

Star Letter

I would appreciate your advice on how/what caused my plenum to compact. The sand substrate went so hard that it set like concrete. I could understand it if my Living rock, etc. was sitting on it but this is not so, I have suspended the Living Rock over the substrate using egg crate and pipe supports. My tank is 180x75x75cm with Arcadia Series 3 metal halide/actinic lighting. I have the following equipment running the system: an Aqua Medic turbo flotter 1000 multi protein skimmer, Aqua Medic calcium reactor, 30 watt UV steriliser, sump trickle tower for gas exchange and to house above equipment.

My tank parameters are as follows: Kh / ALK 14.4dkh / 5.14meq/l, calcium 450ppm, magnesium 1350ppm, pH 8.0 (constant), phosphate, ammonia, nitrite, nitrate all zero, SG 1.024 and temperature 26.1°C. Water changes are 25% every month using RO water, Kalkwasser is used for evaporation top up.

My tank inhabitants are as follows: Goniopora, Cladiella, numerous Mushrooms, Anchor, Clove, 2 Brain species, Bubble, Finger and what was sold to me as some form of Star which is spreading, 3 Cleaner shrimps, 3 Sand sifting starfish, Red leg hermits (not enough as a Mantis shrimp which finally died, destroyed most of them) and Turbo grazers. My fish stock is low at: 1 Yellow tang, 1 Coral beauty, 1 Royal gramma and a Scarlet hawkfish.

The tank has been running without any problems since February 2002 so is still in its early stages. I am keen to do the best I can do to ensure the survival of all my livestock that is why I am writing to you. I have contacted local retailers but unfortunately no success, the nearest I came to finding out anything was from my local retailer who advised that there was a reaction that he had read about which can cause this, but he was unable to find out the cause. I am very reluctant to continue to add any more inhabitants until I fully understand what caused this problem with my plenum. Hopefully you may be able to give me some advise.

Jason King, *via e-mail*

In this experimental aquarium a mangrove is growing into the plenum substrate.

I am very sorry to hear what has happened to your aquarium. The advise I am about to give will not be what you want to hear, but unless you follow it all the animals in your aquarium will die. First let me explain what has caused this to happen. Having such a deep substrate bed, with a constant pH of 8.0 and then adding Kalkwasser, the result is concretion of the bed. Kalkwasser is very insoluble in sea water at a pH of 8.0. If you take a powerful hand lens you can actually see the particles precipating out of solution as the kalk is added. These particles then find their way into the deep bed and react with the calcareous media forming a bond between the individual grains. These join together and result in a solid base over time. I am afraid that this is what has happened with your system. The best use of Kalkwasser is within a salt water medium at a pH of 8.2 - 8.4 with excess carbon dioxide present, this allows the full chemical reaction to proceed without precipitation.

I am afraid you will have to strip your tank down and remove the bed. If you do not do so, and quickly, hydrogen sulphide will form in the anoxic regions and poison your aquarium. Utilise your sump to perform your filtration along with your living rock and turn to more trusted methods in the future.

Andrew Caine

GET RID OF YOUR PLENUM

As with all new miracle systems and remedies one must always read about them with a degree of caution. Quite often the authors have a commercial interest in the product being marketed. With whole filtration systems it is best to stay with the tried and trusted methods as you know these work over time, and that is the key, time. By this I mean at least 5 years with over 100 systems successful, not the odd one hailing fantastic results.

When new systems have not been tested over time you are experimenting and you must be able to accept and cope with the possible financial loss and failure. There are many people who undertake such work, some employed to do so, but mostly amateur aquarists - all deserve appreciation by the majority of fishkeepers for without their efforts the hobby would not progress. But for most of us who want to enjoy a nice aquarium, leave this experimentation alone and read about the advancements, but dig deeper and wait five years before employing them.

Back to plenums as a whole, the first thing I would like to point out is the distinct lack of any successful systems over five years old. That should be worrying enough, and unfortunately for this reader and others who have been in touch concretion is a common problem with plenums. The main problem with plenums, however, is the fact that the whole system depends on passive flow of water through two distinct layers of substrate to an area containing only water, the lower layer of substrate should be protected from any incursion of solid detritus. 99% of plenums are constructed with the use of a gravel tidy to form the separation of the substrate. The big problem here is that the holes in the gravel tidy allow the passage of solid detritus, thus the whole system will deteriorate over time. Hundreds of plenums have been constructed yet most failed within two years, earning the sellers a lot of money, whilst the poor aquarist is left with an expensive failing system and undue stress and death to livestock, not an equal equation at all. My advice is to keep well away from plenums.

Star Letter Prize from AQUA MEDIC

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

ab Aqua Medic, the leaders in Marine Aquarium technology, is pleased to present whichever of the three volumes, normally £55.00 each - desired to this months star letter

Coldwater Q&A

Red and silver tench are occasionally seen in the trade. Their bright colours are a real asset to a garden pond compared to the natural green version.

Is there really a Redcap tench?

Q **My neighbour has some "Redcap tench" he bought from a garden centre somewhere near London when he was on his way back from holiday (he can't remember the name of the shop or exactly where it is). I have never heard of this fish before and can't find any reference to it in my garden pond book. The ordinary Tench is included in my book, as are all the other fish our local garden centre sells. Originally I thought they were just red and white Goldfish or Koi, but they don't behave like the other Goldfish or Koi and the body shape looks different. It has bugged me for the last two years but now my neighbour is moving and he has offered all the fish to me. Perfect timing for my new pond, but now I really MUST find out what they are. Do you have any idea?**

Brian Smith, *Bristol*

A Hopefully the fish you have look like those in the picture. The humble Tench has been transformed into a very attractive ornamental fish by selective breeding. Such brightly coloured sports would, of course, be eaten very quickly in the wild. In captivity, however, they have not only survived to maturity but been deliberately bred from to fix the new colour patterns. The common name of Redcap tench is new to me, but Red and silver tench would certainly fit the description. In the pond they would behave just like normal Tench do rather than like Goldfish or Koi. This means they would hug the bottom and spend most of their time hoovering over the substrate looking for any food which has dropped to the bottom, or any tasty insect to eat. Since they rarely venture to the surface, it is important to make sure food that sinks quickly is also fed to your fish. Catfish tablets are ideal for this.

Heron strike

Q **Is there any really effective way of stopping Herons from eating my fish? I have tried all the usual methods and even thought about purchasing a gun to shoot the ********! Just as my children become fond of their new pets, the pond is raided and they are in floods of tears again. I grew up with a Goldfish pond in the garden and spent hours watching the fish. Herons were never a problem then, but we lived in a city and now my house is part of a small estate in the countryside.**

Janet Best, *via e-mail*

A Complete .netting over the pond will stop the birds getting in. It may not be the most attractive way to protect you fish but it is the most effective. You might want to spare a thought for pondkeepers in North America. They not only have birds after their fish but racoons that will pull up a net and go fishing in their pond!

Sea view

Andrew Caine turns his attention to a tasty tang and adds a little green stuff to you tanks

A plant for you

MARINE MACRO ALGAE *(CAULERPA SP)*

QUITE OFTEN MARINE KEEPERS WILL FANCY A LITTLE BIT OF GREEN PLANT WITHIN THE system, they may want to view it as a glorious piece of nature within the display reef aquarium. They may want to have an aquarium theme surrounding algaes instead of a reef. Algae may be utilised in a refugium to help with filtration and pH control. Many people think you can just plonk the algae in an aquarium and it will grow. However, it is not as simple as that. Get it right and it's smiles all round, get it wrong, and , in some cases, tears could flow.

Which species?

There is a minefield of *Caulerpa* species, some very delicate, some very hardy and tolerant to a wide variety of water conditions. Many different species will look alike, and one species could produce different growth forms under different growing conditions, so true identification can be, shall we say, somewhat difficult. So we shall leave that aspect for now, and look at the general care of algal species within the main aquarium.

Selection is important, algae is mostly offered of sale attached to rock, so a good covering is essential, with no thinning out apparent. A vibrant coloration that screams at you is a must, if it has a pale coloration leave it alone for you could be wasting £14-£18. You need to acclimate it as you would all animals, just because it's an algae does not mean you can shove it in, the shock will kill it

Assuming you have no Tangs or other heavy grazing fish or urchins, the algae will look fine in the morning. If you have these beasts, there will be no algae left next morning! The algae piece will gain most of its nutrition from the aquarium water. If you do add iron be **very** careful or this enrichment of the water will cause bad algal blooms of the type you don't want. Under normal circumstances you should not need to add such supplements. High intensity lighting will give very good growth deep down in the aquarium, with lower intensity lighting the stone must be placed higher up on the reef.

How to prune

As your algae takes hold and starts to spread you will need to trim it back to keep the covering under control and off your corals. Often your local shop will be glad to buy it from you, however trimming is not as easy as it seems because algae bleed. At the position of the cut apply pressure with your fingers for a few minutes and then proceed to cut with your fingers, this will stop the loss of fluids and death of the algae. If you are really unlucky your algae will sexually reproduce and all that will be is left is a white husk. If this happens apply carbon for 24 hours to remove the resulting organics. ■

PROFILE

Family
Caulerpaceae

Name
Coulerpa sp

Location
All temperate and tropical seas

Feeding
Good lighting, additional feeding should not be required.

Size
Very varied

Water flow
Low to medium

Lighting
Best results with high intensity lighting

Difficulty
Easy

YELLOW TANG *(ZEBRASOMA FLAVESCENS)*

A fish for you

WHEN YOU LOOK AT THE WAY conservation organisations market campaigns they always show off Whales, Dolphins, Pandas, Seals etc, these are termed charismatic species because they are the ones that generate the most interest and curdle the emotions. So without further ado let me introduce to you the charismatic species representing the marine aquarium, featured in every television and advertisement aquarium, please stand and raise your glass to the Yellow tang, a beauty that everyone knows, or thinks they know. They will enhance any aquarium, are easy to keep if treated correctly, if not treated in such manner the beauty will indeed turn into the beast. So what are the common pit falls in the care of such dazzling popular fish?

Firstly when introducing to your aquarium, you must not have any *Zebrasoma* species already or hell on earth will erupt before your very eyes, resulting in the death of one fish. Death is either from being harassed constantly (the weaker fish cowers in the rock work until it passes away from stress) or one will be sliced to bits from the razor sharp spine at the base of the tail. Yellow tangs are a good shoaling fish so add them all at the same time and in even numbers like four, six etc. If you want to add a pair then the following method must be adhered to. Make sure you get a good size difference between them to allow the formation of a pair. A single beast should be added late in the fish stock additions to avoid territorial aggression. The stress of bagging and shipping can cause an outbreak of white spot or black spot so, if possible a quarantine tank should be utilised.

In common with all Tangs, they need aquariums of over 250 litres with plenty of open swimming space and loads of mature live rock to graze over. They will require at least two feeds per day of algae enriched foods supplemented with dried seaweed or any vegetable stuck to a lettuce clip, **every day**. Constant food supply reduces stress and aggression.

When choosing Yellow tangs look for any signs of disease in any aquarium fish in the shop not just in the Tang tank, if found leave alone. Good looking, brightly coloured and, most importantly, fat fish are best. If they are a bit thin in the gut area, have subdued coloration then again, leave them alone. Healthy fish have a good immune system that will reduce the chance of disease due to transport stress. Always turn your lights off when introducing any fish but particularly something like this.

These are one of the most popular marine fish, one that will give you years of unadulterated pleasure if treated correctly. Enjoy them my friends. ■

PROFILE

Family
Acanthuridae

Name
Zebrasoma flavescens

Location
Central and South Pacific

Feeding
Vitamin enriched small meaty foods, dried seaweeds etc..

Reef Compatibility
Excellent

Tank mates
Peaceful companions

Size
20cm

Difficulty
Hardy fish, if treated correctly

So you want to grow Small Polyped Stony Corals

Part Four

This photo shows the very first *Acropora* colony to be grown in captivity growing out of live rocks in the aquarium of Dietrich Stuber, Berlin in 1985

TO GROW SPS CORALS WE HAVE DISCUSSED the importance of water stability and the critical importance of the correct chemical make up of that water body. We have to dose the major elements on a regular basis to keep the chemical balance correct. You can do this with equipment designed to inject elements or additive bottles along with equipment designed to remove some undesirable chemicals, these all act together to produce high quality water.

The main elements you will be adding are Iodine, Strontium, Calcium, trace elements, and purified water, the two major elements you will be removing are phosphates and nitrates. To do this you will be requiring some specialist kit,you will also need hard spare cash to invest and a tissue to wipe away the tears.

Iodine, Strontium and trace elements are the easiest to deal with as these all come in bottles but you add them differently. It is best to add on a daily basis, not weekly, as this stops the element being depleted and keeps the concentration at a stable level. So do a bit of maths and find out the amount required each day for your system, then do not forget to add it daily. Enter the peristaltic pump, designed to move liquid at low rates, utlise a timer and your daily dosing is spread out over 24 hours.

Calcium is a different ball game. Long term use of additives derived from "off the shelf products" will cause an ionic imbalance within the system, this is a FACT. It is cheaper in the long run to add a calcium reactor and 'Kalkwasser' stirrer, both of which produce the correct form of calcium, to avoid a calcium ionic imbalance with long term use. The reactor should only run in the daylight hours of the aquarium, with the "Kalkwasser" stirrer being employed in the night time. Cost can be high, but the effects of them are priceless.

The last thing we need to add is the auto top-up system, this injects purified water into the system as you lose water through evaporation. Keeping the whole volume of water constant and , therefore, the chemical composition of the water body constant. Remember that magic word, stability.

We already have good biological filtration removing ammonia and nitrite but what about the constant production of nitrates? Removal by water changes is not good enough. Enter the next bit of kit, the nitrate filter, this constantly removes our nitrates and keeps the level very very low thus making our corals very happy indeed.

The dreaded phosphates are produced within the aquarium, every living cell contains phosphates, as these break down within the confines of the aquarium the phosphate levels increase. It is essential to remove these as they are produced. Special media and reactors are available to eradicate phosphate problems, utilise them and happiness abounds within the aquarium.

So that's it my friends, countless five pound notes and great efforts in time and study will produce the correct environment for our SPS corals to grow and thrive. Is it worth the effort and expense? Don't take my word for it, look around and find pictures of aquariums full of hard corals a few years old, then make up your own mind. Mine was lobotomised to hard corals many years ago, and I still get the same wonderful feeling today as I did back in my early days.Small polyped stony corals are worth every penny and drop of sweat.

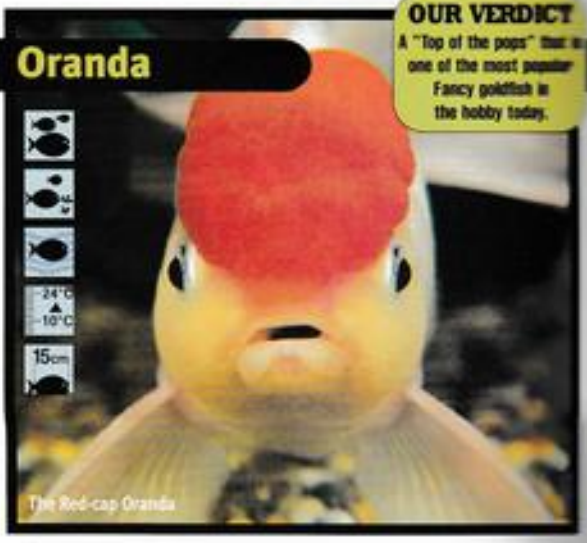
Top of the Pops
Fancy Goldfish

Who are "*Top of the pops*" in the fish world? Fancy goldfish have been with us for about 1000 years now. During that time fashions have changed and what were the most popular varieties a few hundred years ago have fallen by the wayside in recent times. So which ones are "Top of the pops" now and who are the "Wannabes?"

PHOTOS: MAX GIBBS

Oranda

OUR VERDICT
A "Top of the pops" that is one of the most popular Fancy goldfish in the hobby today.



The Red-cap Oranda

Scientific name:	*Carassius auratus*
Aquarium type:	90x30x30cm
Distribution:	World-wide
Diet:	All commercial and live foods.
Companion species:	Other Fancy goldfish varieties and peaceful coldwater fish.

Fantail

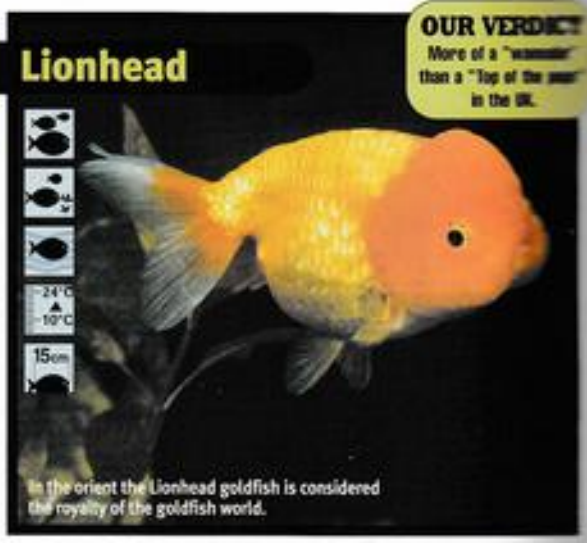
OUR VERDICT
A "Top of the pops" in all its colours. Probably the most popular Fancy goldfish in the hobby today and certainly the hardiest.

Fantails come in several different colours, this is a Calico fantail.

Scientific name:	*Carassius auratus*
Aquarium type:	90x30x30cm
Distribution:	World-wide
Diet:	All commercial and live foods
Companion species:	Other Fancy goldfish varieties and peaceful coldwater fish.

Lionhead

OUR VERDICT
More of a "wannabe" than a "Top of the pops" in the UK.



In the orient the Lionhead goldfish is considered the royalty of the goldfish world.

Scientific name:	*Carassius auratus*
Aquarium type:	90x30x30cm
Distribution:	World-wide
Diet:	All commercial and live foods.
Companion species:	Other Fancy goldfish varieties and peaceful coldwater fish.

SEE KEY TO SYMBOLS ON PAGE 5

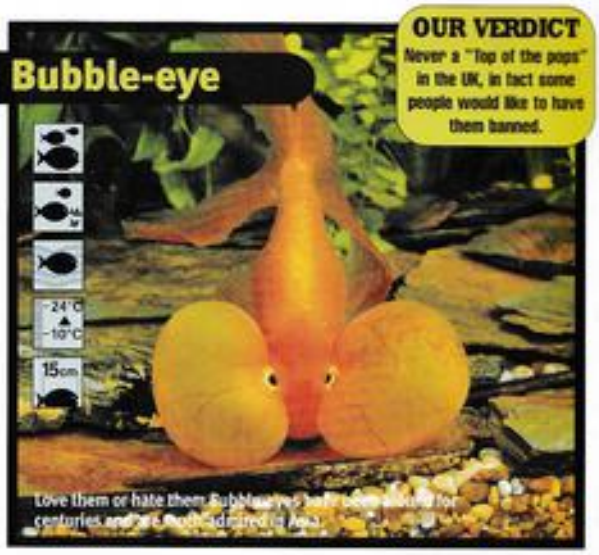
Pearlscale

This Red Pearlscale is a good example of the pure form of this fish. Very few Pearlscales now imported have the correct finnage for our standards.

OUR VERDICT
Never really a "Top of the pops" variety but it does have a devoted following who keep and breed this 'Clockwork orange' of a fish.

Scientific name:	*Carassius auratus*
Aquarium type:	90x30x30cm
Distribution:	World-wide
Diet:	All commercial and live foods
Companion species:	Other Fancy goldfish varieties and peaceful coldwater fish.

Bubble-eye



Love them or hate them Bubble-eyes have been around for centuries and are much admired in Asia.

OUR VERDICT
Never a "Top of the pops" in the UK, in fact some people would like to have them banned.

Scientific name:	*Carassius auratus*
Aquarium type:	90x30x30cm
Distribution:	World-wide
Diet:	All commercial and live foods
Companion species:	Other Fancy goldfish varieties and peaceful coldwater fish.

Moor

Originally they only came in black but recently this blue form and a black and white type have been imported.

OUR VERDICT
A "wannabe" just 10 years ago, it has now become a "Top of the pops" with those who want something a little different from just gold coloured goldfish.

Scientific name:	*Carassius auratus*
Aquarium type:	90x30x30cm
Distribution:	World-wide
Diet:	All commercial and live foods
Companion species:	Other Fancy goldfish varieties and peaceful coldwater fish.

Celestial

Celestials are perfectly adapted for their original home - a large ming china bowl worth hundreds of thousands of pounds today!

OUR VERDICT
A "Top of the pops" when originally produced in China hundreds of years ago. Too weird for British tastes.

Scientific name:	*Carassius auratus*
Aquarium type:	90x30x30cm
Distribution:	Worldwide
Diet:	All commercial and live foods
Companion species:	Other Fancy goldfish varieties and peaceful coldwater fish.

This beautiful male *Gambusia melapinnis* gained 92 points out of a maximum of 100 and 'Best Fish in Show'. Such high marks are very rare on the show circuit and what made it more remarkable still was that this strain of livebearers had been bred by the exhibitors for more than 20 generations! As Roy says "*It's not just winning that counts – it's how you win*".

Show stoppers

With the start of the show season nearly upon us, **Roy Osmint** has some handy tips for the first time shower

ALTHOUGH IT WOULD BE TRUE TO SAY THAT exhibiting fishes for competition is not everyone's 'cup of tea', it must also be said that for those aquarists to whom this aspect of the hobby finds appeal, there really is nothing quite like it!

Certain prize winner

I suppose in many respects this operates in much the same way for dog lovers, cat fanciers and for that matter many other animal keeping groups, insofar as not all have the desire to parade their pets before a judge's critical eye, but for those that do its effect is frequently found to be totally absorbing and fulfilling. On countless occasions over the years I have come across non-showing hobbyists, who, having acquired or reared an apparently

On the way to a show. A hatchback or estate car helps a lot!

particularly fine fish, proudly pronounce it *"a certain prize winner"*.

That they are so enthusiastic and derive such pleasure and gratification from their charge is both commendable and understandable, such is the nature of fish keeping. But as to whether the specimen concerned would in fact emerge with honours if entered in competition is another matter entirely! In most instances the question, and indeed the answer, is likely to remain hypothetical. The only satisfactory way of determining if the fish does possess the presumed 'show-stopping' qualities is, of course, to enter it.

If this were done it is perfectly possible that its overall excellence may be confirmed by the presentation of a winner's award. The owner, returning home delighted and justifiably proud of his or her achievement. Unfortunately, it is also possible, indeed quite probable, that the treasured fish may well be completely overlooked by the judge. The dejected aquarist, leaving with all the inevitable feelings of disappointment and disillusionment that come from unsuccessful endeavour.

In many instances the experience of failure at your first show is enough to put the would-be exhibitor off for life. After all, the fish was a superb specimen of its species, with magnificent coloration and perfect finnage! What can have happened? How could the judge have failed to recognise its quality? Such questions are, of course, in many ways understandable though in themselves not particularly helpful. There may be many reasons why the fish failed to impress.

It could be that it really was just not up to the required standard despite the owner's high hopes. On the other hand, it may be that the fish did possess potential 'star quality' but was unable to demonstrate it on this occasion through poor presentation or preparation.

REALISTIC EXPECTATIONS

Generally speaking, it is unrealistic to imagine that you can enter a fish in a show for the first time and expect to emerge victorious. It can, of course, happen but don't bank on it! Successful showing is a skill in its own right. There is much to learn and as with all things there is no substitute for experience! Some basic training is called for, not only for yourself but also the fish!

Reasons for failure

As a starting point, I would invite you to consider the following! When purchasing a fish from your local retailer's display tank it is first of all pursued and netted, with varying degrees of skill. Then it is hauled out of its natural element and unceremoniously dropped into a polythene bag! The motion of the car during the journey home ensures that it is both shaken and stirred, after which it is released into a completely strange environment once the now widely differing water temperatures have been equalised. Does the fish now look at its best?

The answer to the question is, of course, that it does not look at its best. In all probability it in fact looks something approaching its worst! It will often take some considerable time to become acclimatised to its new circumstances. Only then will it begin to regain its former glory.

To start with the colours of the bewildered and frightened fish are likely to appear washed out and drab. Fins, previously proudly erect and splayed, may for the time being remain relaxed and flaccid as the unnerved creature cowers in some obscure corner. Only gradually, as it becomes acclimatised to its new environment does confidence begin to return and with it coloration, composure, deportment and poise - essential elements in successful showing.

What all this is coming to of course, is that even though a particular fish might possess all the necessary qualities to in theory become a real 'show-stopper', if on the exhibiting bench it is not seen to maximum advantage, all will be lost!

Well, not exactly! But it can, to some extent, be made aware of what to expect and thus reduce considerably the stress levels experienced. But more about this later!

The same goes for you. Until a knowledge has been acquired of the way in which fish shows operate, the rules, regulations, categories, procedures, judging methods and the way in which everything eventually comes together, you are at a severe disadvantage and your chances of success must be regarded as slim!

Study the fishes on display noting the sizes of different species and the way in which they are presented. Pay special attention after judging to the winners. What have they got that runners up and losers in the same category have not?

Try to have a chat with one of the judges explaining that you are interested in future showing. Talk freely, but without making a nuisance of yourself to exhibitors, in all probability there is a wealth of experience and knowledge assembled here. Most will be only too pleased to pass on valuable tips, all of which will help your interest to develop and confidence to grow.

Today's top tip

Would-be exhibitors should remember that preparation and familiarisation is the key. Before any attempt is made to enter a competition go to a show, or better still a number of shows, in a viewing only capacity. Observe carefully what goes on! Make notes! Learn the ropes!

Ways to become successful

Given, that in order to be entered into a competition the fish must obviously be caught, transported and set up at the show venue, everything must be done to make this as painless as possible. This begs the question, can a fish be taught or trained to take this in its stride?

Whatever the species of fish and wherever the show you need to find out the rules and standards you will be showing to. In this Guppy show in Denmark, the tanks are supplied by the people organising the show, and international standards are used, however, three matched males will be shown as a team.

Getting started

One of the very best ways of getting started is through your local aquatic society. This holds generally true for all branches of fish →

It doesn't matter where in the world you are. This mess is on its way to a show in America, but the same mix of tanks, water and fish can be found in any showman's hallway. This lot belongs to Mike Schadle who is a very experienced exhibitor, as a beginner it is far better to take just a few fish and make the experience a bit of fun rather than hard work.

Today's top tip

Try to catch the chosen fish as quickly and skillfully as possible. If it proves too elusive, give up for the time being and allow it to settle down again. Another attempt can be mounted later. Obviously some species prove more difficult in this respect than others.

keeping, but is probably especially so for showing. Here, you will not only benefit from the resident expertise, but also from the 'in-house' table shows that many societies organise at regular intervals throughout the year. These club night events are an ideal training ground for would-be exhibitors as well as providing a gentle introduction to the world of fish showing.

It should be borne in mind that the majority of society shows are of necessity relatively small, low key, affairs, with often greatly restricted species categorisation. It will consequently be realised that the result of such competitions will not, in many cases, necessarily be representative of what might happen in a large open show.

Open shows are obviously governed by more specific, nationally agreed rules, the nature of which must be established by the entrant in advance. Here there are likely to be many classes, with only fishes from a particular class directly competing against each other. A major significance of this being that although a particular specimen may not have finished "in the frame" when judged against fish from other classes, in its own class it could turn out a winner!

Judging methods may also differ. In a large open show a qualified judge will be appointed who's experienced eye will assess the competition in a disciplined and dispassionate fashion, based on a series of established standards. Whereas, in many small club table shows an experienced member or guest will often be nominated to officiate. Although normally satisfactory, this does introduce the opportunity for a greater level of personal preference to enter into the decision making process.

Producing a show winner

Although it is possible to purchase, at a cost, a high quality 'ready made' show fish from a dealer or enthusiast, I am firmly of the opinion that far greater satisfaction is derived if you can initially identify a potential winner yourself, raise it to show standard and then enter it into competition. In other words, its not just the winning that matters, but how you win!

Getting a specimen ready for the show tank requires patience, from both yourself and the fish. As previously indicated, it is quite unrealistic to imagine that a fish, no matter how high its quality, can suddenly be removed from a relatively previously undisturbed environment, transported, set-up in a small unfurnished show tank, be ogled by dozens of pairs of eyes and still be expected to look its best.

So what can be done to make the whole experience less stressful? The answer is try to reduce the fear of the unknown through rehearsal. By getting the fish slowly accustomed to being caught and placed in a show tank, its stress levels can be significantly lowered. An important aspect of this familiarisation programme is reward! As a start, place the show tank adjacent to the fish's main quarters and leave it there well in view. When the time comes to commence training fill the show tank with water siphoned directly from the main aquarium. No new tap water should be involved.

Once successfully netted place the fish in the show tank and leave it completely alone to come to terms with its new environment. After about twenty minutes or so introduce a favourite food delicacy in small quantity. At this stage it may or may not be interested. After approximately one hour the fish should be gently returned to its main quarters. The first phase of acclimatisation, having been completed.

The same procedure should be followed on a regular basis over the coming weeks. On each occasion you are likely to develop greater dexterity in making the capture, the fish increased confidence in the outcome. In some cases even eventually starting to see it as a means to an end - a tasty titbit!

Keep notes

It is a good idea to make simple notes from the start on the way the fish reacts, that way you can more accurately monitor its progress and gauge how the training is coming along. It really is quite surprising the improvement that can often be seen, even after only a quite short period.

As mentioned at the outset fish showing is not to everyone's taste. In fact, broadly speaking, aquarists seem either to love it or hate it! To those who's appetite may be whetted, go along to a show! If nothing else, it will provide a fascinating few hours spent in the company of other fishkeepers within an atmosphere of common interest. On the other hand it could perhaps mark the start of a passion. ■

Lurking in the leaves

Dr Peter Henderson and **Kathy Jinkings** look down at their feet and search through the Amazon leaf litter to see what lurks there.

PHOTOS: PETER HENDERSON AND MAX GIBBS

The leaf litter which gathers in small streams like this is full of a fascinating fish and animals.

SMALL STREAMS WITHIN THE FOREST ARE usually blackwater, although they may occasionally be clearwater. Regardless of water type, they are flowing across the old Amazonian sediments, which have long ago been leached of easily dissolved minerals and nutrients. They are, therefore, poor in nutrients and with a low pH. Measurements from the Tarumã-Mirim, a stream about 35 km long which drains primary tropical rain forest, gave a pH of between 2.8 and 3.5, far lower than the blackwater Rio Negro into which it runs. The flowing shaded water is usually between 24°C and 27°C in midstream, although stagnant water, above leaf litter deposits or during the flooding, can reach 30°C. Because the streams are shaded by the trees, there is insufficient light to support many plants, and therefore herbivorous fish are also rare.

Fungi reign supreme

However, leaves, fruits and insects regularly drop into the stream from the forest above. As the waters are acidic, bacteria are inhibited. The job of breaking down this forest detritus therefore falls to fungi, which themselves offer a food source to aquatic insect larvae and some prawns. These small insects and crustaceans support small fish and larger predatory insects, with the large dragonfly larva at the top of the leaf litter food chain, eating smaller insects and crustaceans as well as small fish. Early studies concluded that the high acidity and low nutrient content of the waters had led to an impoverished fauna. As the forest streams curve their way around trees, the fast flowing areas (which are swept clean of detritus to show clean white sand) encounter backwaters and meanders where the flow is reduced. Detritus and sediment is dumped here, with large leaf litter banks accumulating.

At first sight these leaves appear to be well mulched down, and although small fish can be seen in the stream above the leaf litter, it seems unlikely that any would choose to make their home actually in the litter. A few net-fulls of leaves serve to dispel this impression, and show that these waters are far from impoverished in their fauna - the leaf litter banks are as populous with fish and crustaceans as piles of leaves on land are populous with insects and worms.

Searching through the leaf litter is a painstaking process best conducted sitting down!

In-depth study

One particular leaf litter community was studied in depth, that of the Taruma-Mirim. However, investigations in the region of Tefe also found a similar leaf litter community, suggesting that similar fish may be found in leaf litter communities across the Amazon basin. The study was performed during the low water period, when the leaf banks are easily accessible; during high water the surrounding low-lying forest floods.

The fish fauna of the Taruma-Mirim leaf litter communities must be one of the most remarkable vertebrate communities on earth, and certainly comprises the smallest species yet described. However, although these micro-fish are small, and their size and habitat makes them unsuitable for aquarists, they still exhibit the same types of behaviour that makes their larger cousins of interest; parental care, territoriality, and pair bonding all occur among these tiny communities.

Like a miniature coral reef, a few square metres show a community of high diversity (with 20 species recognised) and high density. The litter banks have a characteristic structure. Recent litter is deposited near the edge and over the surface, while in deeper layers and nearer the land the leaf litter is older and more compact.

Focus on the leaves

The study was only concerned with the community of the leaf litter - there are other fish in the streams that may swim over the leaf litter or prey on its inhabitants, but mainly reside in open water. An example of such a fish is the Electric eel, *Electrophorus electricus*. As the eels grow to over two metres, they are unsuited to hiding in the leaf litter, but nonetheless have been observed patrolling the river bank for prey in the evenings. Other fish also patrol the litter searching for food. About 2 cm above the litter surface *Nannostomus* spp. wait with their heads pointing upwards. A species of Rivulus stays at the very edge of the water. Rivulus occasionally can be found out of the water - especially when people are stomping around collecting fish →

Pyrrhulina brevis patrols the edge of the leaf litter at around 0.5cm from the water surface on the off chance of catching some live food.

One of the most unusual inhabitants of the leaf litter is this red worm-like fish. A member of the *Phreatobius* the species has yet to be positively identified.

Elochocharax pulcher makes its home at the surface of the leaf litter. These tiny fish are almost never imported for the aquarium hobby but would make fascinating subjects for a small single species aquarium.

they can leap and cling to a tree root, watching the proceedings from a safe vantage point. This habit makes them difficult to contain in collecting boxes, as they have a habit of crawling up the sides and wandering off. *Apistogramma cf regani* can be found in small groups resting on the surface of the litter, but when danger threatens they dive into the protection of the leaves. These small Cichlids were found close to the water's edge towards the upstream end of the banks.

Fish being fish, one would expect them to actually live in water, but a pygidid catfish actually lives in the leaves above the water surface. This *Phreatobius sp* resembles a worm, with no visible eyes or scales, and is bright red when alive, probably due to high haemoglobin levels. Like worms, it burrows through damp litter and was found up to 0.5m below the litter surface and can be viewed as semi-terrestrial. At the water surface the water is drawn up some way into the leaf litter, and a number of fish can be found technically out of water, just above the water surface.

A number of fish make their home at the litter surface, where the leaves are relatively new and there are reasonable cavities between them. *Elochocharax pulcher* is a small fish about 2cm long, which is chocolate brown with irregular off-white vertical bars. It has never been observed in open water, and appears to be territorial, remaining in a small area for long periods of time. When all is quiet they hunt at the surface of the litter banks. They are common, with an average of 8.8 fish being found per square metre, although in a few places their population density is greater, with about 33 fish per square metre.

Lying in ambush

The large leaves at the surface of the litter banks are ideal lurking place for an ambush predator, and this role was filled by *Crenicichla notophthalmica*. This aggressive predator is solitary, and was distributed randomly through the areas surveyed.

A small goby, *Microphylipnus* sp., is also found living in the upper layer of the leaf

SHRIMP COCKTAIL

Just one of the many shrimps which are part of the leaf litter community.

A number of species of Knife fish were found, of which the commonest was *Hypopygus* sp. (this is *Hypopygus lepturus*). At least during the day the fishes remain burrowed within the litter.

litter, but unlike *Elachocharax* it rarely exposes itself to view from the water. These tiny fish (adults may be less than 13mm long) are poor swimmers, and have high densities in some areas. The average for the areas in which they were found was 44 individuals per square metre, but in some places this number was as high as 560 per square metre. These almost transparent fish, with brown dots along the ventral surfaces, prowl the leaf litter feeding on micro-invertebrates.

A *Characidium* species also preys on micro-invertebrates, but prefers a good flow of oxygenated water. These were found in new unbroken leaves where the water entered the meander and in deeper waters. These curious little fish appear rather goby-like, and also are almost transparent with brown or black markings. On average 18.8 individuals were found within a square metre, although the maximum density found was 60 fish within one square metre.

Like the Gobies and Characidium, there is also a Catfish who has found no need for colour in the dark world of the litter banks. *Chasmocranus* sp. burrows into litter at a deeper water depth, and is almost completely colourless. It has poorly developed eyes, and avoids exposure to light.

Juvenile Swamp eels, *Synbranchus marmoratus*, also found a refuge in the leaf litter, burrowing in areas close to the waters edge with a reduced flow and low oxygen levels. These appear to be solitary hunters, with only one fish per square metre. Their snakelike form enables them to move through older, more compact litter.

At great risk

The leaf litter community appears to be of great importance in assimilating energy from the forests and making it available to the blackwater aquatic system. Also, if the leaf litter community were not there, many nutrients would be lost to the forest, as all the material that fell into the streams was washed downstream. Although we have all become much more aware in recent years of the deforestation of the Amazon ecosystem, some habitats are much more vulnerable than others, and if they do not boast large or beautiful inhabitants do not seem to gain as much public concern. Because the community of the black water streams is entirely dependent on the production of the forest, these tiny communities are extremely vulnerable. Loss of forest cover not only reduces the amount of leaves and debris falling into the streams, but the increased sunlight could be expected to promote primary productivity. Fungi-feeding species would lose out to herbivores such as snails; even small changes can cause a habitat to change dramatically. ■

The leaf litter community is not composed solely of fish. Shrimps are the dominant invertebrate group. Three species, *Eurythynchus amazonensis*, *Pseudopaelamon chryseus* and *P. amazonensis*, could always be identified, but two species of *Macrobrachium*. *M. natterri* and *M. inpa*, could not be distinguished from one another as juveniles. These *Macrobrachium* species were the dominant prawns both in mass and number with a mean density of 7.9 individuals per sample and were calculated to have a bio-mass of 2.85 g dry weight per kg of litter dry weight. Although only eleven species of insect were collected in the leaf litter, the insect fauna is likely to really be much more diverse. Over forty-four species were found as part of the gut contents of fish analysed.

READER OFFER

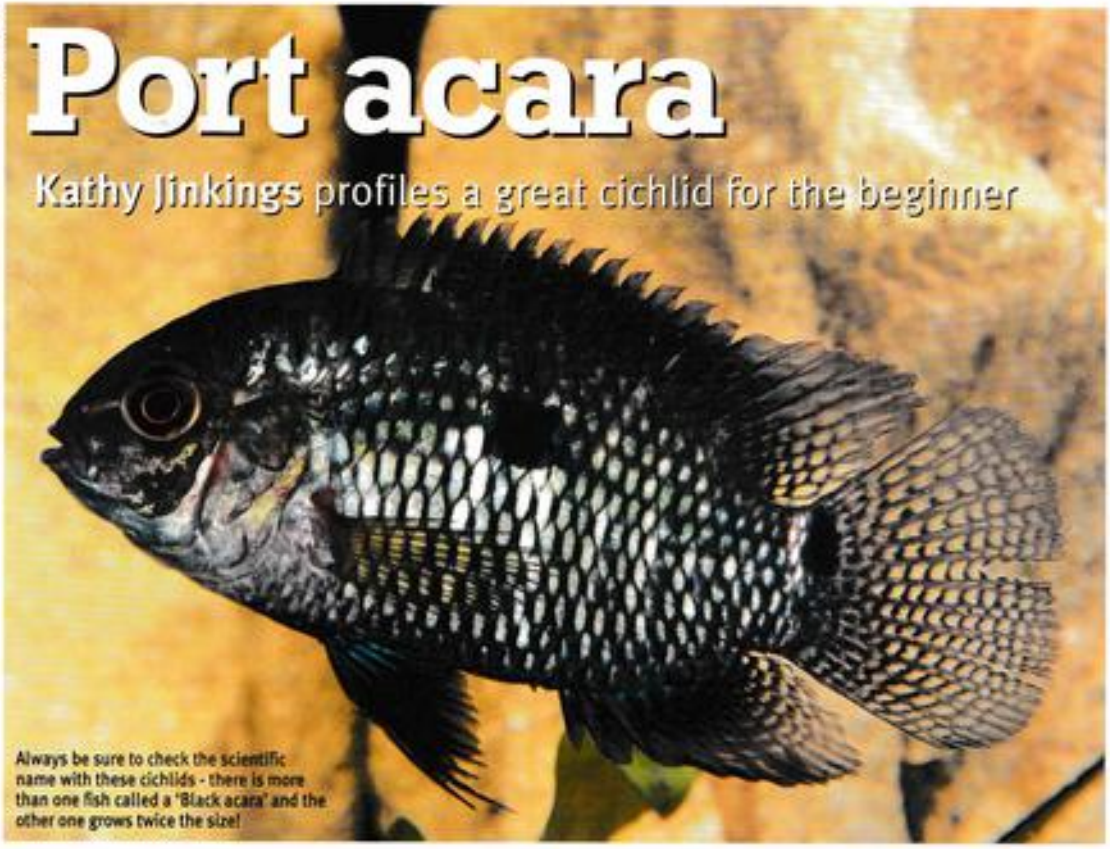
Peter Henderson has produced a CD entitled Amazonian Fishes and their Habitat priced £40. This is one of the most complete reference works about the region ever published and covers all Amazon habitats and the fishes that live there. This CD is not generally available through aquatic shops so *Today's 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:

Today's reader offer,
Pisces Conservation Ltd.
IRC House, The Square, Pennington,
Lymington, Hampshire, SO41 8GN

Port acara

Kathy Jinkings profiles a great cichlid for the beginner



Always be sure to check the scientific name with these cichlids - there is more than one fish called a 'Black acara' and the other one grows twice the size!

BLACK OR PORT ACARAS, AS THEY ARE sometimes called, are an attractive and easy to keep cichlid which is ideal for someone with a medium sized tank who wants to try a cichlid species. As with all these fishes, their interesting spawning behaviour outweighs their appearance, but they are nonetheless striking fish that will be a worthy addition. Although they will become aggressive when spawning, the rest of the time they are reasonably docile with other fishes, for the most part reserving their aggression for those of their own kind. If you plan to keep them in a community the best tank mates are fish of similar size that are reasonably hardy. As they are mainly aggressive towards one another, they are best kept as a pair. Unfortunately, it is not that easy for us to differentiate between the sexes, although often males tend towards the greenish, while females tend towards the brownish. However, the fish themselves do not find differentiating the sexes a problem, and if you get a small group of juveniles then they should sort themselves out so that a least one pair team up. These fishes mate permanently, so once a pair has formed all the others will just be irritations, and can be returned to the aquarium shop.

When ordering your fish, be sure to do so by their scientific name, as 'Black acara' is not a unique title. It also refers to *Cichlasoma bimaculatum*, which, at 30cm long, is unlikely to be interchangeable with the 15cm *C. portalegrensis* in your planned setup.

The aquarium should feature plenty of rocks and roots for hiding, as they can be shy without sufficient cover. Floating plants are best, but if you choose to use rooted plants select very hardy ones - these are burrowing fish and their gravel shifting operations may mean that your plants spend more time uprooted than rooted! Java fern is a good bet, as it doesn't mind the occasional float round the tank, or can be attached to bogwood or stones instead of rooted into the gravel. There should be some flat stones and open areas. When you discover that both the fish have turned black there is no cause for concern - they are not suffering from some horrible disease but have decided the time is right for spawning. The pair will carefully clean their chosen spawning site, and then up to 500 eggs will be laid. At this time tankmates are likely to get a raw deal, and will end up squashed together at the other end of the aquarium. The situation will only become worse as the eggs hatch and the fry become free swimming, as at this time the little family will be moving around the tank in search of food, with the parents forming a mobile attack unit! Removal of the other fishes during spawning will reduce stress all round, and increase the survival chances of the fry. The hungry little fish will eat just about anything that fits in their mouths, and will be perfectly happy with proprietary fry preparations.

Although not suitable for the average community tank of guppies and tetras, these fish are among the least aggressive cichlids, and an ideal cichlid beginner fish. ■

PROFILE

Name
Black acara, Port acara

Scientific name
Cichlasoma portalegrensis

Size
15cm

Aquarium type
Suitable for a community of similar sized fish, a peaceful cichlid community or a species tank.

Distribution
Brazil, Bolivia, and Paraguay

Diet
Live foods, flakes and tablets

Temperature
16-24°C

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.

Tanks that breed like fishes!

Star Letter

Karen Bowyer has gone from no interest, to keeping Discus and two tanks in 9 months.

Thanks for a good magazine, I just subscribed because I saw it at the Festival in Bracklesham Bay, my first ever outing to a fish show and I really enjoyed it. Imagine my immense pleasure when I opened the magazine and saw the spread on pages 46 to 47. There in the second frame at the All Clear stand is Karen, my wife, paying for a purification system!

You ought to follow her progress, she's gone from no interest, to keeping a few Discus and two tanks in nine months and she seems to know what she is doing, and is an encouragement to others just wanting to start up. If you are interested in charting this sort of progress let me know.

Keep up the good work, I have read most tomes now and yours is pretty good, hope it continues to succeed.

Jack Bowyer

Fish behaviour

I doubt if my experience is unique, but to observe the unexpected or documented antics of Discus, and my Malawi Zebras prompted me to put pen to paper. In my aquarium I have 7 Discus plus other fish. Two of the Discus paired up and prepared a site on the internal filter, one of the other Discus decided he wanted some of the action, flirting and pecking at the same site. The pair deposited the eggs, the male fertilised them and after 24 hours the other male returned to clean the eggs. At first I thought he was eating them, but that wasn't the case, and still the flirting persisted. I believe the water parameters were the cause of failure to hatch. pH 6.0 - MS 400 using a digital meter, and they all turned white. As to the Malawi Zebras (in another tank), I know exactly when feeding time is as the constant splashing at the water line at 10am and 6pm persists until the food is supplied. If my daughter hadn't bought me a 60cm tank for my birthday two years ago I wouldn't now have three 120cm tanks, one 150cm, two 90cm tanks and a 60cm, not including the first one!

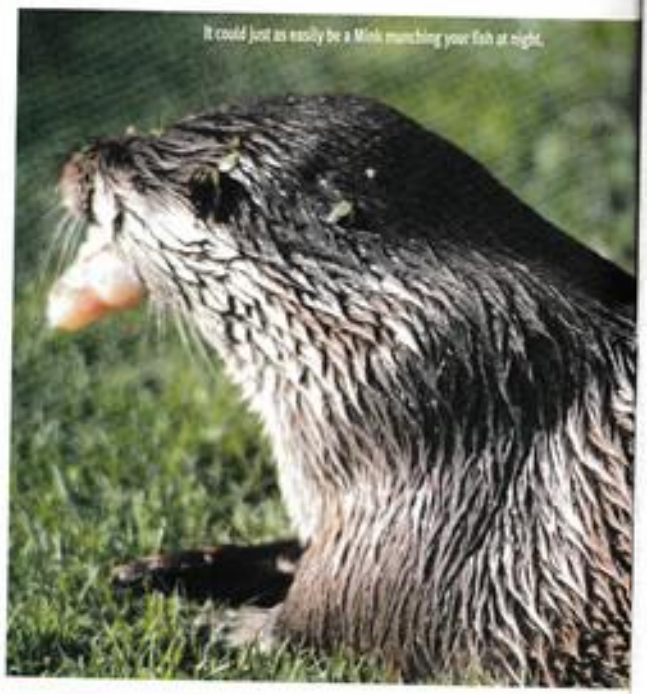
Bob from North Shields, Tyne & Wear

Not always an Otter

Whilst reading through your top quality mag (Jan 03) I felt the Ponderings article about Otters could be a little misleading. Sure Otters will take a fish or two a night, and providing they're residents as opposed to transients, returning on following nights to empty the pond (even quicker if they have a family). However, no mention was made of American mink, an escapee from fur farms, and with a fleeting glimpse most likely at night to the untrained or trained eye they are very similar in appearance. The most obvious sign that a mink has visited is all the fish gone in one night as they will hoard their booty to be eaten at a later date. The only small consolation is, if you do have resident Otters you will not be troubled by American mink, Otters will drive out any Mink in their territory. Not all the blame must fall on the native Otter.

Gordon Gauld

Ed note: Thank you Gordon for your interesting comments about the American mink. I'm thinking about sending Dave out with his camera to see if he can spot any, although as he photographed the otters he'd have to look elsewhere for American mink.
Over to you Dave.



It could just as easily be a Mink munching your fish at night.

Surprises, surprises!

Today's Fishkeeper visits ***Waterlife and Pet Centre*** at Bridgford Garden Centre, East Bridgford, Nottingham

To reach the Waterlife and Pet centre you have to walk all the way through the normal garden centre and through to the building at the back.

Shop details: Waterlife and Pet Centre, Bridgeford Garden Centre, Fosse Road, East Bridgeford, Nottingham, NG13 8LA. Tel 01949 20055

Shop opening hours: 9am-4pm during January, 9am-5pm February to December, 7 days a week.

Staff knowledge: General manager Gary, Tropicals & Marines, Ray, Ponds & Marines, Fran, Small animals & pets, James, Tropicals.

Number of tanks: 43 Tropical, 47 Marine, and 10 Coldwater. Large indoor pond and approximately 10 vats outside.

Display tanks and ponds: 1 Tropical and 2 Marine

Specialities: All things aquatic

Additional services: R.O. Water

Brands stocked: All major brands including a full range of Deltec equipment.

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

THE TREND TOWARDS aquatic outlets teaming up with garden centres is well established now and generally proving a great hit with fishkeepers everywhere. In many ways the Waterlife and Pet centre at Bridgford Garden centre is typical of this new generation of aquatic outlets. The garden centre is well up to standard with a really good range of garden plants, equipment and other garden accessories. It was to visit this garden centre, rather than to visit the aquatic outlet that we stopped here.

Once we walked into the aquatic and pet shop tucked away at the back of the premises we were really surprised. As you would expect the shop itself is spacious and well laid out, with plenty of room to walk around the tanks and dry goods displays. All the tanks were spotless and obviously well maintained. Unlike some stores they were not jam packed full of stressed out fish, but moderately stocked with healthy lively fish which any aquarist would be happy to own. What really surprised us though, was the choice and quality of fish, invertebrates and plants. Many of these garden centre shops tend to stick to the safe common species that used to make up over 90% of the trade. This shop had as wide a range of species as we have seen in many stores which claim to specialise in the rare and unusual. True none of the very expensive L number catfish were present or non-community cichlids. What was here were fish like the Moustached danio (*Danio dangila*), Clipper barbs (*Barbus callipterus*) and other more unusual community fish.


The shop is well laid out with plenty of room to move around.


We visited before the coldwater season was up and running so the pond area had yet to be stocked with fish.

It was obvious that someone here had a passion for the more exotic, but also had the good sense to only stock the fish which would be happy in a beginner's community aquarium, which makes up the vast bulk of this shop's customers. That person turned out to be the new manager Gary Clarke. As a keen fishkeeper himself, he likes to stock as wide a range of fish as possible. That interest extends to the marine side of the business as well and here we saw a nice range of very good healthy fish and corals. The marine display tank was a joy to behold and an inspiration to anyone thinking of starting out with marines. ■

Our verdict

An excellent shop for beginners but also a good place to visit if you are looking for more than just the 'bread and butter' tropicals for the community. The tanks, fish, inverts and plants were all in the peak of health and well displayed. More could be done with regard to labelling up the fish with size etc. but overall this is a good outlet well up to the standard of even the most specialised aquatic shop.

Gary's verdict on the manufacturers

Which manufacturer has the best range of products in your opinion? *Hagen*

Which company gives your customers the best service? *Hagen*

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

NEW START FOR *DUPLA* AND PLANT GROWING IN THE UK

TOP GEAR

Product reviews and all the new products from the industry

The Dupla logo will soon become much wider known.

ONE OF THE biggest growth areas in aquarium fishkeeping in the UK is that of planted aquariums, although we are still a long way behind our European neighbours when it comes to growing and maintaining beautifully planted aquariums. In Holland and Germany for example, many hobbyists keep open-topped aquariums so that the plants can continue to grow unrestricted by the height of the aquarium in which they have been planted. America and Japan are also way ahead of us with both plant growing and the creation of beautiful aquascapes.

Part of the problem has been the difficulty of obtaining the correct equipment for growing plants. The good news for the UK hobbyist is that one of the leading planted aquarium equipment manufacturers is just about to descend upon the UK in a big way.

Dupla GmbH is the German company that has pioneered the planted aquarium market for over 25 years. They are believed to be the first to develop CO_2 units, substrate heating and specifically developed plant fertilisers for aquarium plants. In the past, various people have taken over the UK distribution but rarely made much of an impact in aquarium shops. Now, however, Dupla is about to be launched in the UK as one of Interpet's brands. Interpet has long been regarded as the most innovative and well established UK aquatic equipment manufacturers and Dupla has been added to its portfolio.Dupla's philosophy for growing aquarium plants is based on over 25 years of experience.and is proven to work and need not be expensive.

Aquarium plants have three basic requirements in order to flourish: Heat, light and food. Dupla manufactures a range of products to suit all these requirements.

Dupla is able to offer high quality metal halide and compact fluorescent luminaires. There are a variety of designs to suit all tastes and most wallets! CO_2, an

For guaranteed success with plant growing, CO_2 fertilisation is a vital element, yet for years obtaining the equipment to add CO_2 to the aquarium has been both difficult and expensive. With Interpet's superb distribution system Dupla equipment like these CO_2 cylinders should be available at all good aquatic shops.

Undergravel heating is an integral part of the Dupla system.

Dupla's lamps are designed specifically with plant growing in mind.

integral part of successfully maintaining a planted aquarium, is supplied by one of Dupla's 3 CO_2 systems. These range from the simple biological process used in the CO_2 Omega, to the high precision CO_2 Set DeltaS which can be fully automated through the use of a pH controller.

Root heating is supplied by a very economical and simple to install cable heating system and plant fertilisation is simple, yet highly effective, with Dupla's 3 step approach.

The three components

Dupla has a simple three component system DuplaRoot (and Root K), DuplaPlant and DuplaPlant 24.

DuplaRoot is a root fertiliser, which is used in new aquariums. Its composition copies almost identically the substrates in which aquatic plants flourish around the world. High in natural laterite content, DuplaRoot is mixed into the aquarium gravel and because of its hard granule form acts as a long-term plant food. The advantage of using DuplaRoot is that all the nutrients are taken in through plant roots, and the aquarium water quality is not adversely affected. In nature, plants access substrate nutrients by the break down of root acids which occurs due to the activity of bacteria that inhabit the substrate. To replicate this in the aquarium, DuplaRoot comes supplied with unique bacteria cultures that immediately commence their function and reproduce independently within the substrate.

For re-fertilising the substrate approximately 18 months to 2 years after having used DuplaRoot, or for fertilising the substrate of an existing, previously unfertilised aquarium, the fertiliser tablets DuplaRoot K are ideal. The composition of the tablets is the same as DuplaRoot but have the added advantage of being convenient to place in selected areas of the aquarium.

Some nutrients are absorbed from the water by aquatic plants through the leaves, so you need to supply a basic liquid fertiliser in the form of DuplaPlant which is added direct to the aquarium water during set-up of a new aquarium and after water-changes.

The final fertilisation stage, Dupla say, is essential to prolonged successful plant growth. DuplaPlant 24 is a daily use fertiliser that supplies those nutrients constantly depleted by plant consumption. Many essential nutrients are either broken down or absorbed by the plants on a daily basis. Simply follow the instructions, feed your plants when you feed your fish, and see the results as your plants grow into strong healthy specimens.

Keep an eye out for Dupla products appearing in your local aquarium shop shortly.

FURTHER INFORMATION

For further information you can email dupla@interpet.co.uk for a brochure on how to maintain a planted aquarium. Alternatively contact Interpet at: Consumer Advice Department, Interpet, Vincent Lane, Dorking, Surrey RH43YX. Tel 01306 743747.

THREE MORE NEW PRODUCTS FROM AQUA MEDIC

This powerful new airpump is quiet and will last for many years.

MISTRAL 300 AIRPUMP

As usual with all Aqua Medic products the Mistral 300 has been built to last with a cast aluminium housing ensuring long life and quiet operation. This is a powerful aquarium diaphragm air pump with an output (maximum 380 Litre/per hour) which is adjustable with a slide control. The Mistral 300 has been designed to be ideally suited for air lift filters (under gravel and box), air stones and protein skimmers using either ceramic or wooden air diffusers.

WATER PUMPS FOR AQUARIUM OR POND USE

The Ocean Runner pumps are powerful universal pumps that can be used as circulation or current pumps, both in saltwater and freshwater aquaria. The Ocean Runners are supplied with a rugged pump housing, an energy saving motor, a polished ceramic shaft and ceramic bearings. All these qualities ensure a quiet and maintenance free performance for many years. The Ocean runner pumps are also available in outdoor proofed version with 10 m rubber cable for ponds. These are available in 4 sizes: OR 1200, OR2500, OR 3500 and OR 6500, with flow rates from 1200l/h to 6500 l/h depending upon size.

The Ocean runner pumps come in four different sizes.

NEW REEF SALT

Aqua Medic say they have captured the secret of the sea water and used it for the new formula of Aqua Medic Reef Salt. This new salt is the result of their 15 years of experience in the production of aquarium sea salt and their latest discoveries concerning the needs of corals, invertebrates, plants and fish in the coral reef aquarium. Aqua Medic Reef Salt consists of chemically pure raw materials and is produced under stringent quality control in their laboratories. It has got a high calcium content, an additional pH puffer and is free of harmful chelators.

Aqua Medic Reef Salt contains all positive trace elements and is accumulated with Iodine and Strontium. It is free of nitrate and phosphate and dissolves quickly without residue. Using Aqua Medic Reef Salt they say will create the best conditions for the successful care and reproduction of sensitive corals, fish and reef mussels. Available in 2 kg for 60 Litres, 4 kg or 20 kg which makes 600 Litres.

A couple of months ago we visited Hydrascape in Nottingham where Jamie and Tim run an excellent marine shop. They swear by Aqua Medic's Reef Salt, use it in all their own tanks and recommend it to all their customers.

TOP GEAR

All the new products

POND EQUIPMENT FROM LAC

LAC not only produce a range of aquarium products but actually have some pond products as well. These are limited to a few pond pumps, fountains and lighting systems at the moment but no doubt they will be adding more as time goes by.

There are five pond pumps in the AP range. Flow rates range from 3000L/H with a maximum head of 2.6m (AP6500) up to 9000L/H with a maximum head of 4.5m (AP9000). The three smaller pumps use between 120 and 140watts which is very reasonable for the work they do. The largest two jump up to 240 and 300 watts that may work out a little pricey to run long term.

LAC produce a range of pond pumps suitable for most ponds. This is the AP 6000.

LAC has one other pond pump called the 5320. This is a different design than the others and has a maximum flow rate of 4000L/H and a maximum head of 5m.

Quite why anyone would want a bright red pump in their pond is anyone's guess, but you have to remember these pumps were originally made for the Asian market where tastes are very different from ours. Needless to say, all pumps come in a variety of colours.

LIGHTING UP YOUR POND

Lighting your pond will make all the difference to how it looks during the evening and night. LAC have several different lighting sets ranging from a single plain lamp up to a dual model with various coloured filters. The bulbs are 20 watts each and will throw enough light to illuminate your favourite statue or plant. Even a wildlife pond can be brightened up with this sort of lighting and the frogs don't seem to mind if they have a spotlight on them whilst mating!

This is the larger set of LAC lighting with coloured filters.

TOP GEAR

INTERPET LAUNCHES NEW FLUORESCENT LIGHTING

Interpet already have a well-established range of aquarium lighting in their *'Triton'* range. They are now, however, launching the new *'Daylight Plus'* fluorescent lamp range. These use a unique 4-band phosphor mix which is able to supply bright, daylight balanced lighting to suit the requirements of a wider range of plants and corals than is possible with their old triphosphor technology resulting, they say, in spectacular plant and coral growth.

The original Interpet Triton lamp was the first triphosphor (3-band) lighting tube on the market and significantly improved aquarium lighting performance. *Daylight Plus* builds on this heritage as Interpet's first 4-band lamp. *Daylight Plus* has a high CRI, resulting in intense yet natural coloration of aquarium fish, plants and corals, so is ideal for tropical freshwater, marine fish and reef aquariums.

It's long life and extremely competitive pricing ensures this new range of lighting represents good value for money. The new tubes range in size from 18" to 48" with prices from £8.99. For more information about the *Daylight Plus* range of lighting contact Interpet on 01306 743747.

NAUTIC TREASURES

Interpet make a wide range of products for the aquarium, some of which might be described as a little 'off-the-wall'. These include sunken ships and other such ornaments. This year they are adding to its already very popular range of *Nautic Treasures* with the 'Bridges' collection. These are made to the same high quality specification as the rest of the range from non-fade, non-toxic, poly-resin. Each model pays excellent attention to detail and if you like this sort of thing the collection will enhance any aquarium.

The 'Bridges' collection comprises three new designs: High Bridge and Low Bridge (both of which are available in a small and large design) and the Ancient Bridge. *Nautic Treasures* are available from many pet and aquatic stores with prices starting from as little as £4.99, alternatively call Interpet on **01306 743747 for further information.**

Napo cory

Corydoras napoensis

Today's Diary Dates

March's show, auction and club meeting dates

Copy for Today's Diary Dates

Copy for Today's Diary Dates should be sent to Today's Fishkeeper, Winchester Court, 1 Forum Place, Hatfield, Hertfordshire, AL10 0RN Telephone 01673 885352, fax 01707 269333 or e.mail derek@trmg.co.uk copy deadline 6 weeks before publication date.

Sat 1st

Sun 2nd
Ashby Open show and Auction. Contact 01724 347995

Mon 3rd
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 605272
Reigate & Redhill A.S. Contact 01293 781287
Merseyside Aquarist Society meeting. Contact 0151 260 3664
Warrington A.S. Contact 01925 483979

Tues 4th
Southend Leigh & D.A.S. Contact 01702 305740
Paisley & District A. S. meeting. Contact helenburns@thefreeinternet.co.uk.
Dunstable & D.A.S. meeting. Contact 01582 707280
York & D.A.S. meeting. Contact 01904 414272
The Irish Tropical Fish Society meeting. Contact 01 4561836
Halton A.S. meeting. Contact 0151 289 8190
North Bucks A.S. meeting. Contact 01908 377333
Oldham A.S. meeting. Contact 0161 281 3725
Preston A.S. meeting. Contact 01772 32114
Lang Toun Aquarists and Pondkeepers Group meeting. Contact 01592 595825

Wed 5th
Corby & D.A.S. meeting. Contact 01536 790932
Oasis Fish Club (Sunderland) meeting. Contact 0191 384 1433
Perth A.S. meeting. Contact 01738 621704 or 01506 520558
Clacton Fish Keeping Club meeting. Contact 01255 428065
Portsmouth A.S. meeting. Contact 01673 885352
Bracknell A.S. meeting. Contact 01344 485287
Workington A.S. meeting. Contact 01900 67951

Thurs 6th
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

Fri 7th
NorthWest Cichlid Group meeting. Contact 019422 707593

Sat 8th

Sun 9th
Greenock & District Open show and auction. Contact 01475 704219 jim.sheek@virgin.net

Mon 10th
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 0208 550 7329
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 mdtalbot@corydoras.freeserve.co.uk

Tues 11th
Darwin A.S. meeting. Contact 01254 701925
Northwich A.S. meeting. Contact 01606 882566
Caer Urfa A.S. meeting. Contact 0191 523 7464
Telford & D.A.S. meeting. Contact 01952 409721 or 01952 616410
Lang Toun Aquarists and Pondkeepers Group meeting. Contact 01592 595825
Northern Goldfish and Pondkeepers meeting. Contact 0161 969 7567
Greenock D.A.S. Meeting. Contact 01475 704219
Bangor Aquarists & Breeders Society Contact 028 9187 3539
Clyde Aquarist Society meeting. Contact john@tannant.freeserve.co.uk

Wed 12th
Linlithgow Aquarist Society meeting. Contact 01506 520558
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 13th
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 14th
South East Marine Aquarist Society. Contact 01279 301542
Yorkshire Cichlid group meeting. Contact 01924 367086
Basingstoke A.S. meeting. Contact 0118 970 1461
West Cornwall Fishkeepers meeting. Contact 01209 614158

Sat 15th

Sun 16th
Catfish Study Group meeting. Contact 01704 213690

Mon 17th
Kirkcaldy A.S.meeting. Contact 01738 634689 or 01592 205565
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 605272

Tues 18th
Southend Leigh & D.A.S. Contact 01702 305740
Greater Manchester Cichlid Society meeting. Contact 01706 810284, 01706 353363, 0161 766 4457 or 01422 942 755
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

Wed 19th
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 Gill Utting 9 Inverness Rd., Gosport, Hants.
Perth A.S. meeting. Contact 01738 621704 or 01506 520558
Bracknell A.S. meeting. Contact 01344 485287

Thurs 20th
April 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 21st
Eastbourne & District Pondkeeping. Contact 01323 731369
Discus Ireland meeting. Contact 061 328593

Sat 22nd

Sun 23rd
British Livebearer Organisation - Viviparous Livebearer Auction, Chesterfield Hotel. Contact Alan on 01782 317741 or check out the web site for directions www.viviparous.org.uk
Three Counties group auction, Bracknell. Contact 0118 970 1461

Mon 24th
Kirkcaldy A.S.meeting. Contact 01738 634689 or 01592 205565

Tues 25th
Northwich A.S. meeting. Contact 01606 882566
Lang Toun Aquarists and Pondkeepers Group meeting. Contact 01592 595825
Greenock D.A.S. meeting. Contact 01475 704219
Croydon Aquarist Society meeting. Contact 0208 654 0984

Wed 26th
Hounslow D.A.S. meeting. Contact 0208 890 6933
Halifax A.S. meeting. Contact 01274 880471
Tameside A.S. meeting. Contact 0161 339 6593
Workington A.S. Contact 01900 67951

Thurs 27th
Mid Sussex A.S. meeting. Contact 01273 602407

Fri 28th
West Cornwall Fishkeepers meeting. Contact 01209 614158

Sat 29th

Sun 30th

Mon 31st
Kirkcaldy A.S.meeting. Contact 01738 634689 or 01592 205565

Livebearer auction

Knife livebearers and many other rare or difficult to find livebearers are on sale at the Viviparous spring livebearer auction.

Viviparous web site

Why not visit the new Viviparous web site and find out more about the group at www.viviparous.org.uk There is a large gallery of unusual livebearer photographs to be seen and a number of articles are there for anyone to read. There is also an on-line forum where livebearer questions will be answered. Forthcoming events for 2003 are also posted there.

THE START OF the club season begins very early with the first Specialist Society event being the Catfish Convention on Sunday 23rd February. Some excellent speakers have been lined up for this event which will be reported on in the April issue.

The British livebearer organisation - Viviparous will be holding events throughout the UK this year from Scotland to the south coast of England. The first event of the year will be its spring Livebearer auction. Over the years this event has traditionally kicked off the livebearer season in grand style, with members bringing along the fish they have been busy breeding all winter. Whatever type of livebearer you want whether it is Fancy guppies, highly endangered Goodeids, or one of those pretty wild livebearers you see in all the books but find almost impossible to buy in your local shop, then this auction is the place to be. It is being held on Sunday 23rd March at the Chesterfield Hotel, Chesterfield commencing at 1.30p.m. For further details contact the PRO, Alan Rothwell Tel 01782 317741 or check out the Viviparous web site. Apart from regular auctions, shows and a weekend convention with an overseas speaker Viviparous produces a magazine 4 times a year. This has two colour information sheets and articles contributed from members all over the world. ■

Darlington and Stockton Aquarist Society

A new club is being formed in the Stockton/Darlington area. New and old fishkeepers will be made very welcome. Meetings to be arranged. Anyone interested please call Andy Coakes on 01325 255093 mobile 07780 983091.

NATIONAL SHOW LEAGUE

Today's National show league winner will be announced at the Viviparous spring auction and the results and presentation of the trophy will take place just before the start of the auction. A special gala Sunday lunch will be held for the top exhibitors.

Want to take part in 2003?

The rules are simple. For any show's results to count towards the show league, it must have its date and contact number published in *Today's Fishkeeper* prior to the show. This means that the information must be with the editor two months before the show. Hopefully, clubs will send this information in themselves, but any exhibitor who wants the show to be included can send the details in.

To register your points (3 for a 1st, 2 for a 2nd and 1 for a 3rd) send a photocopy of your certificates or other proof of your awards to Today's Fishkeeper, National Aquatic Show League, Winchester Court, 1, Forum Place, Hatfield, Herts. AL10 0RN. Joint exhibitors are allowed to enter providing that they keep their fish together.

Cutting Edge: Catfish Special

Today's Guide to...

Zebra plecs

and their relatives

Top German aquarist **Erwin Schraml** is considered one of the great experts on Catfish. With the expedition to the Rio Xingu coming up in a couple of months time, we asked him to try and sort out the taxonomy of Zebra plecs and some of their relatives which will be caught on this trip...

Cutting Edge: Catfish Special

Hypancistrus zebra – L250 – L173 – L236

WHEN THE GENUS *Hypancistrus* was described in 1991 by Isbrücker & Nijssen, it had only a single representative, the popular Zebra plec (*H. zebra*). This fish had been known since Sept. 1989 as L 46.

In the middle of 1992 a further *Hypancistrus* was introduced (L 98). This form seemed to be limited to a single specimen and was presumably only a colour variant from the norm. Initially, it was stated that the single specimen could be disregarded. This statement was revised on the introduction of L 173, chronologically the next *Hypancistrus*. This was introduced in August 1994, at which time both were considered unique and possible "deformities". However, this assertion appears to be incorrect for L173, as again and again Catfishes were imported, which had the same colour pattern, although the shapes of the undulated lines looked somewhat different in each animal, while in the true Zebra plec they are almost identical in each specimen. There are, however, no statistics about how frequently a variant occurs in the true Zebra plec. In fact, it appears that few individual specimens seem to be strikingly different.

More species join the genus

L 173 and L 174 were simultaneously presented and Stawikowski mentioned both L 174's similarity with a *Hypancistrus* (colouring and dentition), as well as an evident difference (clumsier body shape). Only very much later (Dec. 2000) a whole series of further species were indicated by Ingo Seidel as belonging to *Hypancistrus* which were still undescribed, but known by us aquarists by an L or LDA number. Seidel placed these species together in this genus mainly because of their reduced oral dentition. That is quite correct because, up to now, no other genus of plated Catfishes described displays these characters in the same combination as is shown in these species.

Nevertheless, I do not entirely agree with this placement. Isbrücker & Nijssen have indicated a flat body as a characteristic feature in their genus definition. This is a rather vague word, because nobody would expect an Angel fish- like body in a plated Catfish. All of these fishes are flat, it's just a question of degree. Some plated Catfishes are simply


L46, the well known Zebra plec


L250, from rio Iriri


A rare variant of *H. zebra*


What's this, a variant of L173 or L46?


L173


Another individual of L173


Specimen showing pattern of L173 and L236


Specimen showing pattern of L236 and L173


Typical L236


Specimen with mixed pattern of L236 and L173


Another specimen with mixed pattern of L236 and L173


A third specimen with mixed pattern of L236 and L173


Typical half grown L201, *H. inspector* from Venezuela


Adult male of *H. inspector*


Half grown L201 with similar pattern of a L102


Adult Snowball plec (L102)


Half grown L201 from Colombia


Adult L201 from Colombia


Half grown L201 with very tiny dots


Adult L201 with very tiny dots


L201 with hardly any dots on the body


Hypancistrus sp. 'Crow-Star'


Half grown L201 with patterns of a juvenile Baryancistrus


Baryancistrus sp. "LDA 33"

flatter than others. For example, the body in a species of the genus *Pseudolithoxus* is much lower than in *H. zebra*, but a whole series of the species which were placed by Seidel into *Hypancistrus* are clearly much higher. They all have a wider head (the moderate width of the head is a further diagnostic characteristic in the original description of *Hypancistrus*) and, as I have pointed out already, they have clearly different secondary sexual dimorphism. All in all, are these indications for a different genus affiliation?

Hypancistrus inspector (L 201) and 'Crow star plecos'

These differences, however, had apparently not been noticed by scientists, as was the case with the only other officially described *Hypancistrus* species recently diagnosed from the second group. Armbruster (2002) calls the species *H. inspector*. He describes animals, which have been known to aquarists for a long time as L 201. These fish (according to their place of capture but also within fish from the same location), are very variable in the round dot size. Animals with very large spots scarcely differ from some *Baryancistrus* species in the juvenile stage, those with medium-sized spots look like juvenile Snowball plecs (L 102, likewise a *Hypancistrus* species). Animals with minute points, where the spots sometimes have disappeared on the body, would not been classified together as belonging to the same species.

A shipment that arrived some time ago from Roraima (Brazil) at Aquarium Glaser, contained animals which were named 'Crow star pleco'. It's almost impossible to tell the difference between them and the dotless variant of *H. inspector*, which occasionally comes along in one bag with the typically coloured L 201 from Colombia. If one touches the 'Crow star plecos', one ascertains that their plates have an extremely rough cover, but a visual difference cannot be ascertained with the naked eye. Armbruster, for his description, only had animals from the drainage of the upper Rio Orinoco and upper Rio Negro in Venezuela. Aquarium imports originate from there as well as from the Colombian part of the same drainage system. But how far the distribution area really extends has still not been recorded. →

Cutting Edge: Catfish Special

A similar variability has also been found among other species from this group. Just recently André Werner (Aug 02) has offered some representatives of *Hypancistrus* from the Rio Jari (a northern influx of the Amazon about the same latitude as the Rio Xingu). One of the two species (L 316) was shown in two variants in photographs, a further (L 318), having even larger differences, was treated as a species in its own right. But are both really different species?

L 270 and its doubles

Let us take as an example L 270 from the Rio Tapajós. No two individuals of this species look exactly the same. The pattern on body and fins are so different, that as a single constant feature only the difference remains. It is doubtful if the light stripe, which runs from the operculum up to the forehead, is really found in all specimens of this species, especially when we consider a further very similar species, which Aquarium Glaser has received via Manaus. These animals seem to originate from an unknown drainage system of the Rio Negro. They also have, as a common feature, the different shape of the pattern on body and fins. In this species, however, the variability doesn't stop in the light operculum bar, which is clearly distinctive in most of the animals. In some individuals it is very narrow or does not extend completely down to the end of the gill opening. This species shows clearly extended odonticles, especially around the caudal peduncle, at barely 68mm standard length. Therefore it might be nearly fully grown, and, as I see it, belongs like most of these species to *Hypancistrus* sensu lato. These catfish look very much like a *Peckoltia*, however, they do have the greatly reduced dentition of a *Hypancistrus*, with four deeply forked teeth per side in the lower jaw and seven to eight long, bent (only at the ends) forked teeth in each side of the upper jaw.

A further double of L 270 lives in the upper Orinoco drainage system. This species has become known from the border zone of Venezuela and Brazil as L 199 and is exported very frequently from Colombia. This species is very variable in its pattern of curved lines, and it's impossible to distinguish it from some variants of L 236.

L270

Mouth of LDA 76, notice the typical Hypancistrus dentition

LDA 76 with similar pattern like a L270

Typicall L270

Adult LDA 76 with different pattern

L270

L199

L199 with different pattern


Common form of L66


Variant of L66


Adult King Tiger plec, L66


Variant of L66, rather similar to L236/L172


Variant of L66


Another variant of L66


For comparison: variats of L173/L236


For comparison: variats of L173/L236


For comparison: variants of L173/L236


Juveniles of L173/L236


Juveniles of L173/L236


Hypancistrus sp. "L260"]

Do all waveline patterned species have individuals which look unique?

L 250, in my opinion, belongs to *Hypancistrus* sensu stricto. This species originates in the Rio Iriri, an influx of the Rio Xingu. I only know of it from the photo in DATZ (Dec. 1997) and from a single further living specimen. And already this second specimen is, despite its clear affiliation and its similarity, drawn differently from the first. Is it a general feature of *Hypancistrus* species with waveline pattern, that no individual looks just like another?

Let us test this hypothesis now with a further species: L 236. It originates likewise from the Rio Iriri and indeed the few imported catfishes looking like this one are drawn individually showing a great difference. With a sufficiently large number of individuals, transitions of characters in the pattern can be found easily from this form to L 173. I am therefore today of the opinion that L 173 and L 236 represent individual morphs of one species. Further, completely different colour morphs were found, which could be treated (without the knowledge of their joint import) as further L or LDA numbers. The question now has to be asked. How could we name them correctly? Naturally, it would be possible to call them L or LDA XY a, b, c etc., but has the alphabet enough letters to satisfy the moods of nature?

Problems with "King tiger plecs (L 66)

The problem does not end here. A species that has, up to now, always been imported with a relatively constant colour pattern is the 'King tiger pleco' (L 66), which originates from the Rio Xingu. It was known that these animals assume a different pattern at the juvenile stage to the mature one, and also that they lose, with increasing age, their high-contrast colour pattern and assume, especially when breeding, a more lacklustre appearance. The individual, considerable variability in coloration, which Seidel (2001) mentioned, showed up in a recent import at Aquarium Glaser for the first time. Again, all forms of transitions were present, from the long known colour pattern up to animals, which lay in the range of L 173 / L 236. Additionally, further completely different colour variants →

occurred, like some with dissolved dotted patterns. It was thought that L 66 had only a relatively limited distribution area around Belo Monte. Evidently, now that new areas have been discovered, which lie geographically much closer to the Rio Iriri, some animals were caught which display in their colour pattern intermediate stages.

L 260, that originated in the Rio Tapajós, is thereby separated with its extremely fine waveline pattern from the range of the known variability of L 66. There are still no transitional forms known in this species(?).

What will the future bring?

The situation has become quite confusing. From the photos the differences can be clearly seen. Is the intraspecific variation regarding the character of the pattern bigger than the interspecific one? There is no doubt, in my opinion, that L 270 is not identical with either L 199 or L 173, or the species from Manaus. But how can we identify these Catfishes correctly, and how can they be named when an end of imports of new forms is not yet in sight? ■

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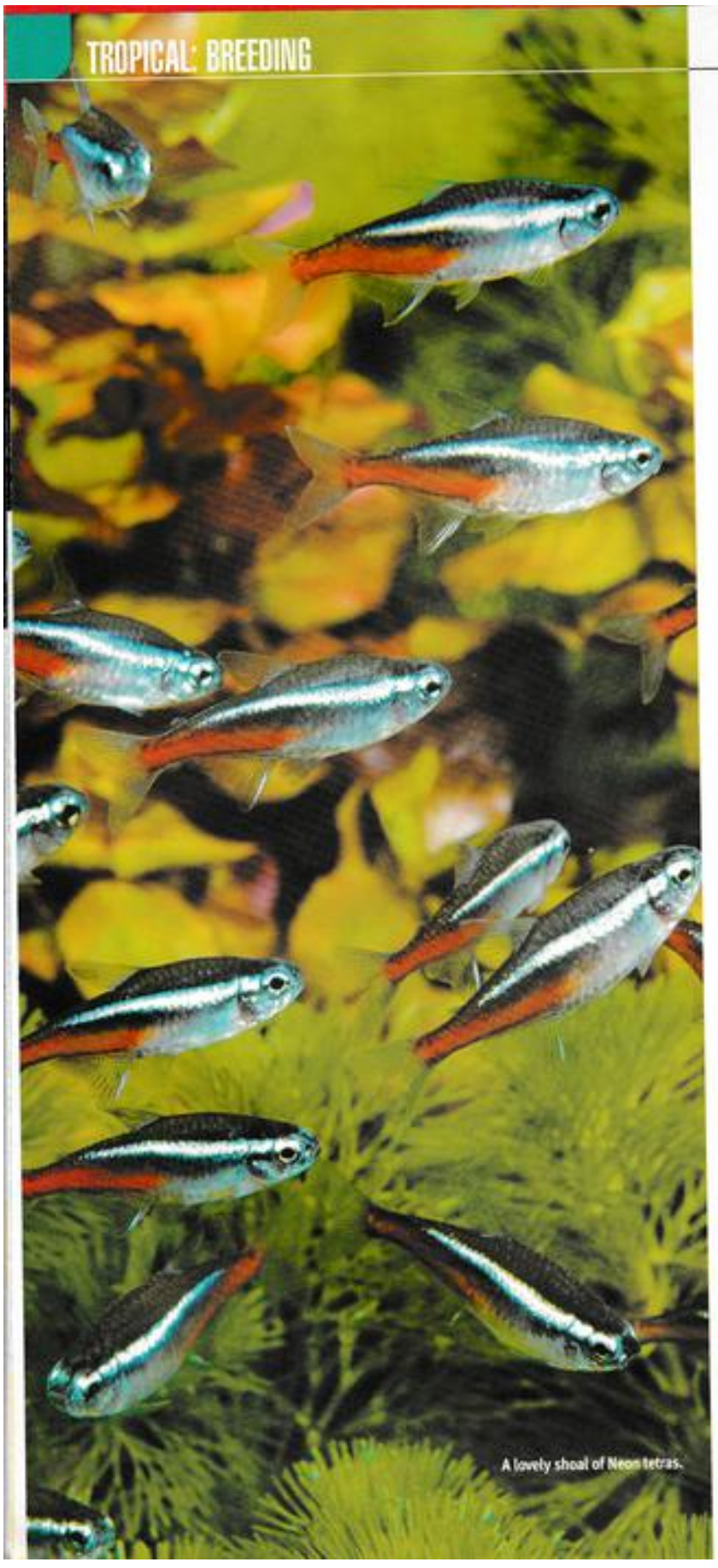
Lithoxancistrus, a very flat Loricariidae

L28, according to Seidel a Hypancistrus, but with a higher body than H. zebra

The same species from above: a much wider head and elongated odontodes around the caudal peduncle are different features as *H. zebra* has them



A lovely shoal of Neon tetras.

"Eur

THE NEON TETRA IS ONE OF THE MOST common and frequently imported tropical fish. Native to the upper Amazon River drainage, it was reported from Sao Paulo de Olivença to Iquitos and upriver, especially the Rio Putamayo. It used to be in *Hyphessobrycon*. Its relatives include the Cardinal tetra and the Green neon tetra, all

The Green or False neon tetra, *Paracheirodon simulans* has a different colour pattern to normal Neons as well as a different number of chromosomes.

three differing in the red and green coloration and in the number of chromosomes.

The literature

Most of what you and I have read about breeding Neons is similar: they're hard to breed, often infected with Neon tetra disease which destroys their gonads, and you need rain water with black water extract. I thought I'd bred them many years ago, but as I raised none, I wasn't sure and didn't try again until recently. The hobby has changed from when I was a kid and what was difficult then is not today. I was fiddling in my fish room when my eye was caught by (1) some empty 45 litre breeding tanks, (2) the soft sediment on the bottom of a 180 litre Daphnia culture that was full of infusoria, (3) a 22 litre bucket of water-logged peat moss with a black water overlay (used to soak peat moss for breeding killies), (4) my R.O. unit's almost full 136 litre reservoir next to the reef tank for which I bought the unit. "Eureka!" I exclaimed.

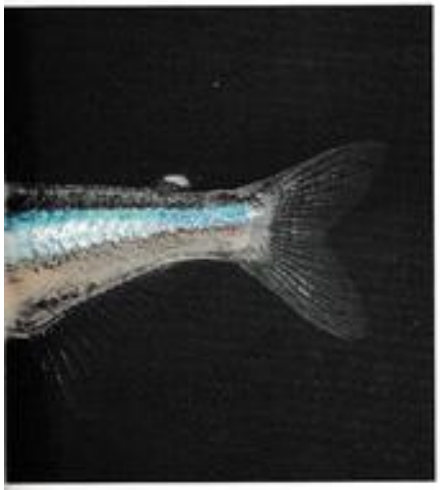
The ultimate challenge

We all consider the Neon tetra the ultimate breeding success. According to everything

eka"

Dr Robert Goldstein turns his hand to breeding Neon Tetras

I've ever read (and you too), Neons need rain water, black water or peat extract to acidify and darken the water, and the eggs and fry must be protected from light until a few days old. Other things I've read include hatching at two or three days and the fry free-swimming in about five days. None of this is quite accurate.



You don't need rainwater. My R.O. water is mineral-free (or almost free). I don't get any test kit hardness reading at all. You can get R.O. water at a pet store selling reef corals or purchase distilled or deionized water at a supermarket. R.O., distilled, deionized, and rainwater are equal for fish breeding.

Peat moss extract filtered through a coffee filter.

I keep a bucket of soaking peat moss for my soil-breeding annual killifishes, so I have plenty of peat extract. You can buy peat moss at a garden shop, put it in a bucket of hot water, and in a few days you'll have all the blackwater you'll need. The Germans write about Alder berries to acidify water for tetras. I spawned Neons with and without them; it makes no difference.

For the spawning medium, I used Java moss. I breed everything in this miracle stuff, which also sucks up wastes and nutrients, metals, and toxins and provides hiding places for overworked and under appreciated females, and a grazing platform for fry. I use 45 litre tanks painted black on all sides except the front, with gentle aeration or sponge filtration.

CONDITIONING THE ADULTS

My six adult Neons were fed live baby Brine shrimp, Daphnia, Blackworms, and frozen Bloodworms and adult Brine shrimp. I don't use dry food.

A pair of Neon tetras. The female is the plumper upper fish.

When I was able to sex the Neons (the four females became swollen with roe), I separated them by sex for a couple of weeks. Then I put all six into a 45 litre blackened tank with R.O. water, black water, and Java moss with gentle aeration. The first couple of times I added alder fruits, but not later.

My fish didn't read the books

According to the books, the fish should spawn the next morning. My fish didn't read the books. Three or four days later I spotted a male driving one female and then another, while the other male did nothing. As the females were still swollen, I left the group together longer. I added a styrofoam cover on top to block out the overhead fluorescent light as Neon eggs are supposed to be light sensitive.

The next day I spotted a couple of minute glasslike babies on the black-painted side glass and removed the adults, even though the females were still swollen. I added rotifer culture, green water, and sediment from a Daphnia tank, but did not raise a single fish from this spawn. Whatever fry were produced did not survive, and I suspect (a) a small spawning and (b) overfeeding, which is a bad habit I've never overcome.

On the second attempt, again they did not spawn right away. I finally saw a male driving a female about three days later. I removed all the parent fish and covered the tank to darken it from overhead light for two days. About a week later I saw the first baby on the side glass. Since then I've raised four batches of four to a dozen fish each time. That's not much, but for me it's a success since I never raised any before.

My spawns have been consistently small. I found the fry did not become free-swimming for a long time. They first →

FEEDING THE FRY

I use sediment from my Daphnia culture for infusoria, as it's more diverse than lettuce or banana peel cultures. After a week, I start feeding newly hatched (24-hour) *Artemia* nauplii, but continue the infusoria as long as I see babies too small to eat Brine shrimp. Eventually Daphnia from eggs or nauplii in the sediment grow up and thrive in the baby tank, and that probably helps water quality.

You can just see the minute head standing Neon baby against black tank wall in this picture.

appeared on the (blackened) glass about a week after the adults were put together. The fry appeared to be attached with their backs to the glass and I suspected adhesive head organs. As they grew, I saw there were no adhesive organs, and this was just hiding behaviour. They did not swim, but seemed to glide over the surface of the vertical glass extremely slowly, when they moved at all (seldom), and probably only in response to food coming close enough to grab. Some fry appeared to rise up from the peat moss sediment on the bottom of the tank, but had trouble swimming. I'd see them erratically rising like killifish belly-sliders to grab live *Artemia* nauplii out of the water, jerking upwards and then jerking backwards down again. It was obvious that they had switched to Brine shrimp from Infusoria; their swollen bellies had changed colour from white to orange, and looked like pimples.

Even at 1cm, the fry on the side glass continued to glide with their backs against the glass. Only after 1cm did some of them start to swim in open water, although mostly near the bottom or side. They avoided open water until they'd grown to almost 1.5cm, which is huge for a baby fish. The fish didn't show colour until 1cm, and some of them, not even then. Coloration seems to come late. At 1cm I used a soft net to move some to larger quarters.

Discussing and comparing results

I spoke with Frank Chapman discussing my few small spawnings and his own results. Right from the start, he anticipated that my spawns would be small, and then advised me to raise and then breed these fish, when I could expect better success. Then he explained why.

What he did not include in his published paper was why these imports were such poor producers. He had noticed that the imported Asian fish were only about 1.25cm, yet fully coloured, whereas fish he raised (same apparent age) were weakly coloured or just beginning to colour at about a month of age or 1.25cm

Chapman thinks that the Asian fish are fed commercial chow that contains testosterone. It's a common ingredient in feed for bringing out colours. He thinks the Neons are being fed too much and while it makes them pretty and marketable at a small size, it is probably decreasing the females' fertility. His own fish are less colourful at the same age, but when they grow up are far more fertile than their parents.

I also asked Chapman about larvae hugging the glass sides, and he said he did not observe it. However, he noticed that the babies were extraordinarily inactive for Tetras, and only came to life when he put food in the tank. So my fish hanging against the glass or coming up out of peat moss on the bottom is just a particular version of the general condition of hiding quite still to avoid predation, and only moving to feed. He also noted that you can overfeed Neon babies, which will stuff themselves with live baby Brine shrimp and actually tear their stomachs and body walls. I noticed too that baby Neons don't swell like other baby fish, but instead the stomach protrudes like a long pimple. So I've reduced my feedings.

If you can raise four to six fish a batch, be happy. Do this often enough and you'll build up a breeding stock of tank-raised Neons. Once you've got that valuable stock, you can expect them to be as productive as other Tetras, and not difficult at all. And by the way, forget all about blaming low fertility on *Pfiestophora* (Neon tetra disease), which probably has nothing at all to do with fertility. ■

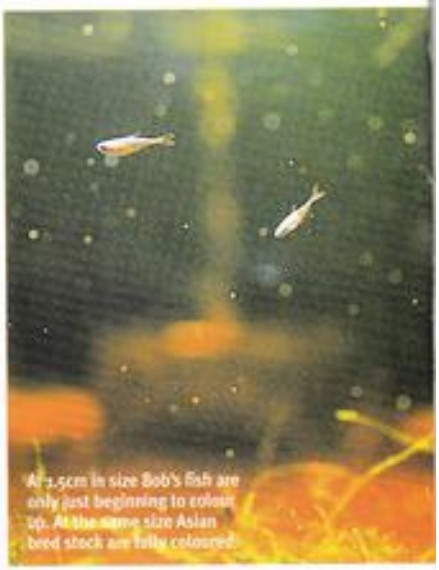
CHAPMAN'S RESULTS

Later I came across a paper by Chapman, F. et al., 1998, Controlled spawning of the Neon tetra, Progressive Fish-Culturist, vol. 60, pp 32-37. Frank Chapman and his colleagues reviewed trade in Neons and reported on breeding success in their lab.

Chapman et al. used well water filtered through an R.O. unit, 10 litre tanks, and two bottle brushes per tank as spawning media, water acidified with phosphoric acid, and coloured with Tetra's Blackwater Extract. He used brood stock fish imported young from Hong Kong (cultured) and from South America (wild), grew them up, and then bred them. All told, they had 961 successful spawns as the basis for their report. The adults were conditioned on beef liver, live *Artemia* nauplii, and BioKyowa, a prepared food used in aqua culture. The fry were fed rotifers and boiled egg yolk when they started to feed a few days after hatching, and later switched to live baby Brine shrimp. All breeding and raising was at about room temperature. Fry were transferred to 45 litre tanks for raising.

His data are instructive. Female neons average 50 eggs per spawning (5-400). Nearly 90% of spawns occurred within 48 hours of putting the fish together, and spawning occurred in 60% of trials. The embryos hatched at room temperature after 24 hours. The top spawn of almost 1000 spawns produced 386 larvae.

The suprising key finding was that Chapman's tank bred stock was far more fertile than the cultured Asian or wild South American imported fish. He did not speculate but merely concluded that Florida farmers should expect small spawns at first, but then expect greater success with their own tank-raised fish.



At 1.5cm in size Bob's fish are only just beginning to colour up. At the same size Asian bred stock are fully coloured.

THE NEON AND ITS RELATIVES

Technical name	Chromosomes	common name	Native range
Paracheirodon innesi	n=18	Neon tetra	Brazil, Columbia, Peru
Paracheirodon simulans	n=25	Green neon tetra	Brazil, Columbia, Venezuela
Paracheirodon axelrodi	n=26	Cardinal tetra	Brazil, Columbia, Venezuela

The 'Löbbecke Kalkreactor'

In the final part of **Alf Nilsen's** calcium trilogy he looks at the pros and cons of using a 'Löbbecke Kalkreactor'.

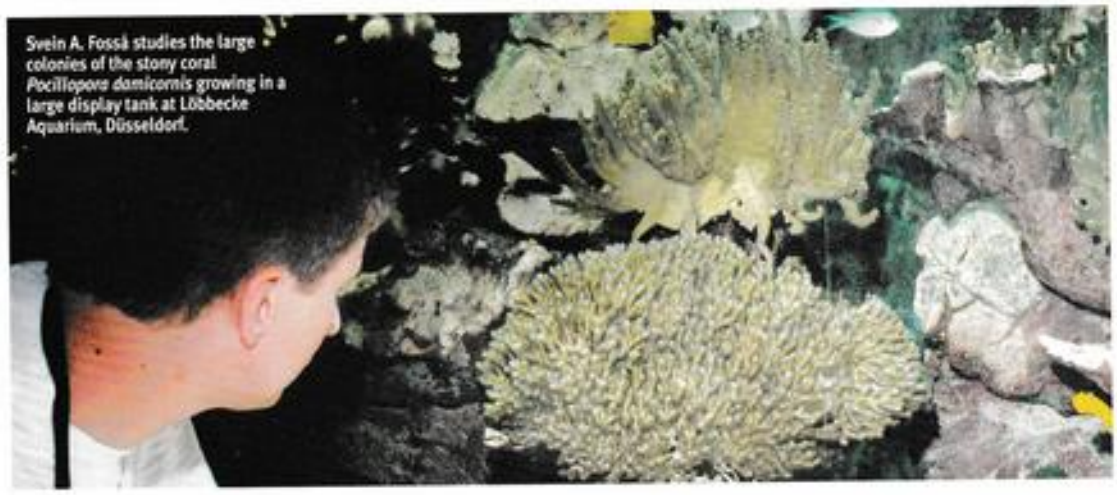
IN THE SECOND PART of the trilogy on calcium we saw how 'kalkwasser' was influenced by pH. If the pH in 'kalkwasser' decreased, the amount of dissolved calcium ions also decreased. If the pH shifted from 12.5 to about 10, the concentration of calcium dropped from about 820 to 6mg/l. The diagram displayed in part 2 (February issue page 61) is important in this connection, and you need to keep an eye on the curve when you read this part as well.

If we pick up the thread here, we need to remind ourselves of what happens with calcium as CO_2 is added to 'kalkwasser' causing the pH to decrease. Calcium carbonate precipitates and when the pH has reached 10, the concentration of Ca^{2+} reaches minimum when only a fraction of the dissolved calcium ions are left in dilution. If we continue to add CO_2, the pH will naturally drop further. Calcium carbonate is being dissolved and calcium ions are again added to the solution. At the same time bicarbonate is formed. When the pH has reached about 6, the amount of calcium ions set free has reached about 450mg/L. The bicarbonate that has formed will be reflected in the KH-value, which will be high.

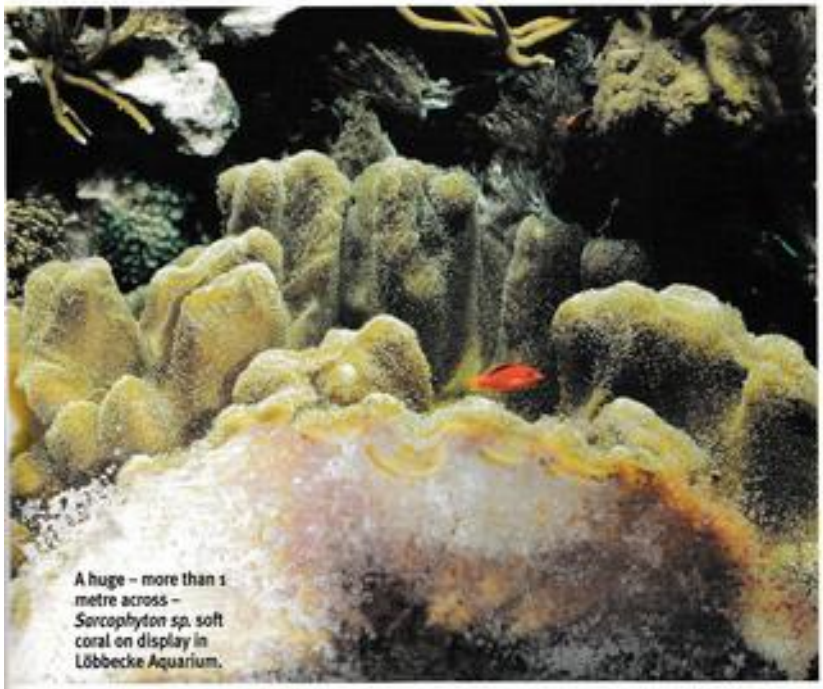
If we put this in other words, what we are saying is: "Lower the pH and you will dissolve calcium carbonate and set free calcium and bicarbonate". Or..."if the amount of CO_2 dissolved in the sea increases, the pH lowers, the calcification stops and solid calcium carbonate (coral skeletons and live rocks) are being dissolved". The increasing amount of CO_2 in the Earth's atmosphere – probably caused by the burning of fossil fuel – may decrease the calcification processes in the sea, but this is another story.

If we could lower the pH in the marine aquarium to about 6, we would create a natural source of calcium by dissolving the decoration, and at the same time maintain the buffer capacity of the water. This is of course not possible! However, it is still possible to utilise the chemistry involved to the benefit of the marine aquarium. It was the clever aquarist Ralph Hebbinghaus of Löbbecke Aquarium in Düsseldorf, Germany that first did this (Hebbinghaus, 1994). Löbbecke Aquarium is really worth a visit if you are ever in that area of Germany.

What Hebbinghaus did was just as simple as it was ingenious! He used a small container with a pump (such as a canister filter) and filled it with calcareous gravel. The pump drew the water from the aquarium through the canister, but instead



Svein A. Fossä studies the large colonies of the stony coral *Pocillopora damicornis* growing in a large display tank at Löbbecke Aquarium, Düsseldorf.



A huge – more than 1 metre across – *Sarcophyton sp.* soft coral on display in Löbbecke Aquarium.

of returning to the aquarium directly, the flow re-circulated through the canister and by the use of valves only a tiny amount of the flow was returned to the aquarium. Simultaneously CO_2 gas was added to the loop of water. The pH inside the canister was thereby lowered to about 6.5 resulting in the dissolving of the calcareous gravel into calcium ions and bicarbonate.

A few words on buffer capacity

The buffer capacity of seawater is the solution's ability to keep the pH-value constant at about pH 8.2. The pH is the concentration of hydrogen ions (H^+) in solution. When water dissociates into ions we get:

H_2O H^+ + OH^-

Per definition the pH is defined as the negative logarithm of the concentration of hydrogen ions ($pH = -\log_{10}[H^+]$). At pH = 7.0 the amount of hydrogen ions equals the amount of hydroxide ions:

$[H^+] \times [OH^-] = (1 \times 10^{-7}) \times (1 \times 10^{-7}) = (1 \times 10^{-14})$

The product of the ion-concentrations must be equal to 10-14 all the time. At pH = 8.0 we have:

$[H^+] \times [OH^-] = (1 \times 10^{-8}) \times (1 \times 10^{-6}) = (1 \times 10^{-14})$

This means that there is 100 times more hydroxide than hydrogen causing the solution to be a base. Measured with aquarium test kits for pH, the indicator will turn blue.

Seawater usually does not show great variations in pH, but remains rather stable at an average pH of 8.2. Large amounts of acids and bases are introduced into the ocean every day without causing obvious variations of the pH value. The ions that help to stabilise the pH of sea water most of all are carbonate ions (CO_3^{2-}) and hydrogen carbonate ions (HCO_3^-). This stabilising effect is referred to as the buffer capacity of the water. The buffer capacity is roughly described by this formula:

$2HCO_3^-$ CO_2 + H_2O + CO_3^{2-}

The buffer capacity is also influenced by carbon dioxide, which reacts with water, producing carbonic acid (H_2CO_3), which then dissociates into carbonate and hydrogen carbonate ions. The chemical reaction can be described like this:

CO^2 + H_2O H_2CO_3 H^+ + HCO_3. $2H^+$ + CO_3^{2-}

An addition of carbon dioxide pushes the equation to the right and an increased amount of H^+ ions. A consumption of carbon dioxide, e.g. by the photosynthesis of the algae, causes the reverse effect shifting the above reaction to the left side.

When we measure the buffer capacity we measure the alkalinity of the water, which is explained as the sum of all the negative ions that react with acid (H^+). In principle we concentrate on bicarbonate and carbonate ions and say that we test the carbonate hardness (KH or KdH) of the water. Natural seawater has an alkalinity of 2.1 - 2.5 meqv/liter equal to a KH of 6 - 8.3 KdH.

When we add 'kalkwasser' to the aquarium, we indirectly keep the pH-value stable (or even higher than the normal 8.2 value) as we add a lot of OH^- ions that are sacrificed to neutralise organic acids produced in the system. With the 'Löbbecke Kalkreactor' we produce bicarbonate ions that directly affect the buffer capacity.

What happened in the large aquarium at Löbbecke?

In the 20,000 litres test aquarium Hebbinghaus started with a return flow of water from the reactor (canister) of 15 l/h and an amount of CO2 of 150 bubbles per minute (counted with a bubble counter mounted in the flow). After gathering experiences with the set-up these value were increased to 45 l/h and 350 bubbles per minute. The pH stabilised on values of 8.2-8.3, the KH settled on 12 KdH and the concentration of calcium ions on 400 mg/L See Hebbinghaus (1994) for details.

Today the 'Löbbecke Kalkreactor' is very popular among European marine aquarium keepers. In many instances it has taken over from 'kalkwasser'. A number of designs and brands are manufactured and sold worldwide.

Summary

It is obvious that some kind of calcium-adding is necessary in the modern coral reef aquarium. It is also obvious that the chemistry involved with the 'calcium problem' is complex and not easily →

The tiny return flow of water from the Löbbecke Reactor to the author's previous aquarium where the device was tested.

PROS AND CONS

TABLE 1
Changes in pH and [PO_4] when the adding of 'kalkwasser' was replaced with the use of Löbbecke Kalkreactor. At day 120 the reactor was shut down and again replaced the adding of 'kalkwasser'.

Day	pH Aquarium	pH outflow PO_4 from reactor (mg/l)	Aquarium (mg/l)	PO_4 outflow from reactor
0	8.55	-	00	-
60	8.10	7.45	-	-
90	8.20	7.30	0.20	0.50
120	8.20	6.60	0.70	1.50
150	8.45	6.90	0.50	1.00
190	8.55	8.50	0.50	0.70

If we compare the values, which are rather typical for tanks equipped with the 'Löbbecke Kalkreactor', with those normally achieved using 'kalkwasser', there are some interesting things to notice. Regarding the pH this parameter will, when using the 'Löbbecke Kalkreactor', normally be lower than in tanks using 'kalkwasser'. The constant use of CO_2 in the reactor will push the pH downwards also in the aquarium. The buffer system of the seawater will normally stabilise the pH around 8.2 (7.7 or even less in the morning and 8.3 in the evening are normal minimum and maximum values), but there is a real danger that the pH can drop to lower and dangerous levels. It is therefore advisable to install an automatic pH-switch that shuts off the flow of CO_2 to the reactor if the pH reaches a certain minimum level (such as 8.2). Automatic pH-controllers can be bought as separate units consisting of a magnetic valve, a pH-probe and a pH-meter, but the feature is also part of 'aquarist computers' like that sold by IKS.

There are, however, a couple of side effects caused by the pH being 'low' that we need to take a closer look at. A pH of 8.2 causes about three times as much CO_2 to be dissolved in the water compared to a pH level of 8.5. This will affect the growth of algae in the system directly. If you shift from using 'kalkwasser' to using 'Löbbecke Kalkreactor', you will often notice a change in the growth of algae in your system. Part of this is due to an increased amount of CO_2 available to the algae (they use the compound in photosynthesis), another part is caused by the fact that the decreasing pH causes phosphate to dissolve in the water. Phosphate is an important algae nutrient. The combination of an increased amount of CO_2 and phosphate can result in a dramatic increasing of algae. The increased amount of CO_2 dissolved in the water does also feed the symbiotic algae directly and thereby it increases the calcification indirectly.

Another thing to consider using the 'Löbbecke Kalkreactor' is the quality of the material used as calcium source inside the reactor. This material has to be of high quality and free of nutrient, such as phosphate. If it contains phosphate a lot of algae nutrient will be set free and flow to the aquarium when the pH inside the reactor is lowered to 6.5. Luckily several manufactures produce calcium carbonate gravel that is free of phosphate (and other 'polluting' compounds). These products can be bought in well-equipped aquarium stores. It is highly advisable to use such material. Never use cheap calcareous gravel designed for agricultural use - they contain a lot of pollution that will be set free under low pH.

The big pros of using the 'Löbbecke reactor' are an increased amount of calcium ions added in combination with maintaining the buffer capacity of the water.

TABLE 2
Comparison of the different methods for supplying calcium. Modified from Fossä & Nilsen (2001), based on Brockmann & Nilsen (1995).

	$CaCl_2$ methode	'Kalkwasser'	'Kalkwasser' and CO_2	'Löbbecke kalkreactor'
Costs involved	low	low	high	high
Altering of ion-balance	high	low	low	low
Unwanted ions added	many	few	few	few
Amount of Ca^{2+} added	high	low	low	medium
Impact on KH	none	decreases KH	normally decreases	KH increases
Stability of the solution	stable	unstable	unstable	-

understood. And it is clear that there are several ways to go. Table 2 gives a rough summary of the pros and contras for each of the methods described in this trilogy of columns. Please continue to discuss this topic with other enthusiasts, bring the discussion alive in clubs and at meetings and do continue to study the calcium chemistry in theory! Good luck! ■

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Ponderings

With spring finally beginning to show itself **Dave Bevan's** regular column on ponds and pondlife really comes alive

Once the breeding season is over Common frogs will still spend a lot of their time in and around a wildlife pond.

THE COMMON FROG

If you have a wildlife pond then the arrival of the frogs to spawn last month was probably one of the highlights of the year. The majority disappear as suddenly as they arrived, but a few will always remain behind in the wildlife friendly garden, taking up residence in and around the pond.

With a smooth moist skin, common frogs display a variety of colours and patterns making it easy to distinguish individuals. Some people, myself included, get to know their frogs on an individual basis, which makes the Common frog one of the most popular garden animals.

Hiding amongst the damp vegetation, close to the pond by day, the frog is out and about as dusk gathers, particularly on warm damp evenings. He hunts for slugs and snails around the pond or sits motionless on a lily pad, waiting for a fly or other insect to come within range of his long sticky tongue.

PLANT LORE

The Water hawthorn was originally from South Africa and is also known as Cape pondweed. A deep-water plant, the Water hawthorn represents excellent value for money. Provided it is planted in water of around 90cm depth it can withstand the worst of our winters. Whilst it is best in the full sun, it can also tolerate a reasonable amount of shade.

The tuberous rootstock is best contained within a planting basket and once established will send up bright green oblong leaves that float on the surface providing shade for the fish below. The flowers that are white with dark chocolate-tipped stamens, are arranged in two opposite rows and give off a vanilla like smell. They flower from early spring right through to autumn and beyond if the weather remains mild.

Look out for the yellow flowered species *A. desertorum* that is occasionally available but is more tender than *Aponogeton distachyos*.

The Water hawthorn is a very pretty deep water species which has a very long flowering period.

POND PROBLEM

One day in February last year a friend of mine went to his small garden pond to find several adult frogs floating dead on the surface. A more thorough search revealed 15 more. What had happened? Prior to the disaster there had been a long cold spell with the pond completely frozen over. This had been preceded by a warm spell, which had brought the frogs out of hiberration. The most likely explanation is that they were trapped below the ice, which would not allow the natural gasses of decomposition to escape to the atmosphere, and they were poisoned by the methane. However, it was not the total disaster it appeared to be, because most of these frogs were males which had either spent the winter buried in the mud at the bottom of the pond or had arrived in advance of the females. As the males usually outnumber the females by around 2 to 1 they were not missed when the breeding season started some weeks later.

CATCHING FISH

Occasionally it is necessary to catch and remove a fish from the pond. An operation that can, not only prove stressful for the fish in question but also for the other inhabitants of the pond and the pond owner.

Two nets, or a net and a pole, are always better than one net for a quick result. Once caught bring the fish slowly to the pond edge and lift clear putting the net into a pre-prepared container of pond water.

Soak an old towel in pond water and lay it on top of the fish whilst slowly gathering up the surplus net. Wrap the towel round the fish making sure the head is completely covered and lift clear of the net.

The fish rarely struggles once covered and can be easily placed in a transport container or laid on a flat surface for examination and treatment.

EQUIPMENT CORNER

In the battle against green water probably the best quick fix with continuous control is the UV clarifier coupled to a mechanical foam filter. During the winter months it can be turned off as the algae do not grow, but you need to be sure that when it is turned on next month it will perform.

1. Replace the UV tubes.
2. Check out the quartz sleeve that protects the tubes from the water flow. They need to be clean and free from scale if the rays from the lights are going to penetrate the water and kill the algal cells.
3. Check the flow rate. The water content of the pond should pass through the tube every 4 to 5 hours. If it takes longer then the efficiency will reduce and algae may start to build up. There are many factors that can affect the flow rate. They include too small a bore or kinked pipe work, partially blocked impeller or impeller chamber, pipe work which is too long or contains too many bends and ,finally, the size and number of holes in the spray bar distributing the water over the filter.

GUDGEON FACTFILE

Species: Gudgeon: (*Gobio gobio*)

Other names: None

Other forms: None

Size: 8 to 14cm but rarely more than 12cm.

Weight: About 10 grammes

Availability: Can be obtained from most aquarist outlets.

Habitat: Will thrive in larger well-oxygenated ponds or even a well balanced wildlife pond, but in the wild they favour well oxygenated streams with a stony bottom.

Identification: Long slim fish with a silvery body and row of darker spots along the flank characterised by a pair of downward facing barbels.

Habits: A bottom dwelling fish at home among the moss covered stones of a fast flowing stream.

Pond fish value: Rarely seen in the pond as it remains on the bottom but of some value in the artificial stream.

The best weapon in our armoury against green water is a UV clarifier, but only if it is maintained correctly.

TALL STORIES

Everybody needs to make a buck and in the aquatic trade most are prepared to do it fairly, but there are a few claims that are somewhat exaggerated or can easily be taken out of context.

1. Grass carp will eat blanket weed - yes they will, along with many other plants some of which they prefer and then only in quantity once the temperature rises to around 20ºC.

2. Freshwater mussels will clean up a dirty pond - actually they require good quality water from which they extract their food. Put them in an unbalanced pond and they usually die simply adding to the problem.

3. Snails will control your blanket weed - they will eat blanket weed, but only in small amounts if there is no other tender plant material about.

4. Bullfrogs can be put in a wildlife pond. It is now illegal to offer them for sale and in no circumstances should they be released into a garden pond.

FASCINATING Fact

In the dog eat dog world of the garden pond you occasionally get a surprise. The mussel and bitterling are two creatures that actually help each other to survive. Bitterlings lay their eggs inside the mussel, whose hard shell protects them from predators, until they are old enough to fend for themselves. In return the Bitterling carries the baby mussels, attached to its fins, to pastures new enabling it to increase its breeding range.

This natural looking pond is lined with clay, but in areas with a very high water table you may not need a liner at all.

BELOW THE SURFACE

Under most circumstances using a pond liner is the easiest, cheapest and most versatile pond option. That is unless you have a naturally high water table, particularly if there are springs in the area. What will happen - all may be fine until there is some heavy rainfall and then your liner will start to leave the sides of the pond and balloon upwards as the water pressure from below increases.

One solution is to dig a sump adjacent to the existing pool but not too close as to cause subsidence. The new sump should be deeper than the existing pond and lined with blocks or bricks to prevent wet soil from slipping. Install a pump with a float switch that turns on the pump when the water rises.

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

DISCUS PROBLEM SOLVER

Tony Sault answers your questions

A group of young Turquoise discus like these will be three years old before they reach their full potential.

PHOTO: MAX GIBBS

Q **My first 'pair' of Discus have begun spawning but the eggs always get covered in fungus. I am sure the male is doing his job as he follows the female up the eggs as she is laying them. All my water conditions are normal pH 6.5, 0 Nitrite, 0 Nitrate and temperature of 28°C. Can you help?**
Alan Littlewood, *Manchester*

A Your conditions are fine but one vital piece of information is omitted - the age of your fish. Even though the male appears to be fertilising the eggs he may be only going through the motions, generally the female will produce a batch of eggs from approximately 8 months old, males are not fully fertile until 12-15 months old. If the male is old enough then there are a number of measures that you can take to help them. First you can add 1 drop per 5 litres of a broad spectrum bactericide/fungicide to the water a few hours after spawning. This will dampen down the tank bacteria and give the eggs a better chance. Also you can tweak the temperature up to say 30°C this will shorten the hatching time of the eggs and hopefully beat the onset of fungus.

Q **My water conditions are all normal pH 6.8-7.0, GH 8, KH 4 , Temperature 30°C but my shoal of Discus are all very nervous they scatter around the tank at the slightest movement. I am sure that the problem is the water so I change 10% every other day, but this does not seem to help is there anything else that I can do?**
J.Mason, *Newcastle*

A I am sure your fish will settle if you cut back on your water changes, all you parameters are fine and your fish are feeding OK. A 10% water change every 2 days is a little too much, all you are doing is keeping the water in a constant state of flux by removing aged water and replacing it with new that then starts to age again. Cut back to 10% once a week and this will give the water time to age and your fish time to settle.

Q **One of my Discus has a nasty scratch on its side that is now covered in white fur, I have used fungus treatment in the water but this does not seem to help, how can I cure it?**
Mrs J.N.Kieren, *Belfast*

A You are correct in your diagnosis and treatment the white fur is most certainly fungus that has invaded the wound and the fungus medication that you have used will work much better if applied directly to the scratch. With a little preparation this can be done as follows, lay a wet cloth on the tank top, soak a piece of cotton wool or a cotton bud in your medication, net the fish and lay it still in the net on the wet cloth, fold the wet cloth end over the head of the fish to effectively put it into the dark, this will calm it. Now gently wipe off the fungus with the cotton soaked in medication applying a liberal amount to the wound then replace the fish back in the tank.

Q **First may I say that my Discus are fine and I do not have a problem as such, but I have often read that stress is a big cause of problems with Discus so can you tell me what are the common causes of stress in a Discus tank?**
Ken West, *Southampton*

A I am glad to hear that your fish are all fine and yes you are quite correct stress can be the onset of many problems for all animals and Discus are no exception. Common causes of stress are over stocking the aquarium, bullying from other Discus, the presence of fin nippers in the tank such as Tiger barbs (definitely a no no in a Discus tank) and drastic changes in water parameters. If these can be avoided the likelihood of stressing your fish is drastically reduced.

Q **My shoal of Discus are now about 1 year old and all between 10 - 12 cms in size from the smallest to the largest. Can you tell me how old they are before they are full-grown and how big do they grow?**
Sean Can, *London*

A Congratulations 10-12cms in the first year is a good growth rate. You can expect them to grow to 15cms body size between 1 to 2 years old, but a 15 cm Discus is 3 to 4 times the body mass of a 10 cm Discus. Place a small side plate in the centre of a dinner plate and you will get an idea of what I mean. Then from 2-3 years old the fish gain weight and males in particular broaden across the forehead, so they really take 3 years to attain their full potential. My oldest Discus died when it was over 11 years old. To answer the last part of your question, on my travels I often come across 20cm fish not counting the tail. ■

Mangroves for the Marine Aquarium

From Seed to Tree. **Anthony Calfo** discusses the selection and care of mangroves.

Mangrove trees in Fiji during low tide. Note the typical roots.

MUCH HAS BEEN WRITTEN ABOUT THE ecological enormity and importance of mangrove trees in the marine environment. At first glance, we can see that they provide habitat for countless life forms above and below the surface and at the very water's edge. Birds, reptiles, mammals, fishes and invertebrates exploit mangrove communities for food, shelter and reproductive activities. The utilisation of these communities as a nursery environment for larval species has extraordinary ramifications far up the web of life. The very structure of these tangled trees is crucial to coastlines for protection from erosion and storms, and in the stabilisation sediments from run-off that could otherwise pollute the reef community and subsequently destroy the fish and invertebrate life forms dependant on all. The protection of mangrove habitats is crucial for the survival of coral reef ecosystems and all who depend on it from the fisherman to the fished and down to the living substrate.

Three genera of mangrove are commonly recognised, but aquarists are predominantly interested in the most aquatic variety: the Red Mangrove (*Rhizophora mangle*). The Black Mangrove (*Aviccenia germinans*) and the White Mangrove (*Laguncularia racemosa*) are not readily tolerant if at all of full submersion in seawater.

Red mangroves

For our aquaristic purposes, we address the Red mangrove specifically. Indeed, they are the first species likely to be encountered by aquarists. They are the most commonly photographed for their magnificent aerial prop roots (the arched and exposed knobbly knees plunging into the coastline and shallows). And they are by far to the most important genera of this family to marine environments.

It is their very elaborate and extensive root system that we must give due regard for in the aquarium. Even a seedling mangrove can develop a formidable root system that can stress or damage glass or acrylic refugiums in as little as three years. We recommend that

you pot mangroves in containers and vessels that are as large as possible (to reduce future disturbances of the tree) without making it overly difficult for you to service for transplantation if necessary. Rest assured that growth is so slow (and ultimately managed easily) that these fascinating Angiosperms can be enjoyed perhaps indefinitely in your aquarium system.

Although the collection of mangrove trees is forbidden in many areas, the harvest of their abundant seeds (known as propagules) is fairly unrestricted on the whole. Un-sprouted propagules look like long green cigars with a narrowly tapered end (where the leaves and branching canopy will sprout from) and a thickened, blunt end (often tinged brown). The blunt end of a propagule is appropriately weighted by design to increase the likelihood of finding its way into a substrate when cast or carried adrift (if it does not have the good fortune of finding itself plunged into the sand from a straight drop from the parent canopy).

Mangrove tree planted in a small coral reef aquarium.

SUMMARY OF EACH MANGROVE TREE:

RED MANGROVE
(Rhizophora mangle)

1. can live as submerse, emerse or fully terrestrial (if well-hydrated)
2. tolerates fresh, brackish or full sea water but cannot be freely moved between gradients
3. favours fine sand or muddy substrates but can be grown in course substrates or none at all (hydroponics)
4. is the most temperature sensitive of three genera listed here- requires warmer temperatures
5. is the most sensitive to pruning. Immature or improper cuts can harm or kill some trees

BLACK MANGROVE
(Aviccenia germinans)

1. can live as emerse or fully terrestrial
2. tolerates some salted air and water but favours fresh environments
3. favours substrates with a decidedly significant soil or muddy component, and tolerates sand
4. is reasonably tolerant of pruning and tolerates mild frost conditions

WHITE MANGROVE
(Laguncularia racemosa)

1. lives as a fully terrestrial plant
2. naturally must tolerate salted air (coastal) but suffers excess salted water
3. is very tolerant of pruning
4. is moderately to very tolerant of occasional frost conditions

WHAT TO BUY

Un-sprouted seedlings can survive out of water in temperate conditions for up to a year. Propagules can be sprouted in fresh, brackish or saltwater and will do so even fully submerged (although this is not recommended for aesthetics and the cultivation of prop roots if nothing else). One thing is certain, though - you cannot move a mangrove between saline gradients quickly if at all! Aquarists are strongly advised to only acquire un-sprouted seedlings. If there are any roots or leaves in evidence on arrival, you simply must be told what salinity the propagules were sprouted in. Failure to abide by this advice is likely to be fatal for the seedling, evidenced by a shrivelled desiccation and demise within weeks (the propagule takes on a wrinkled appearance from the "osmotic shock").

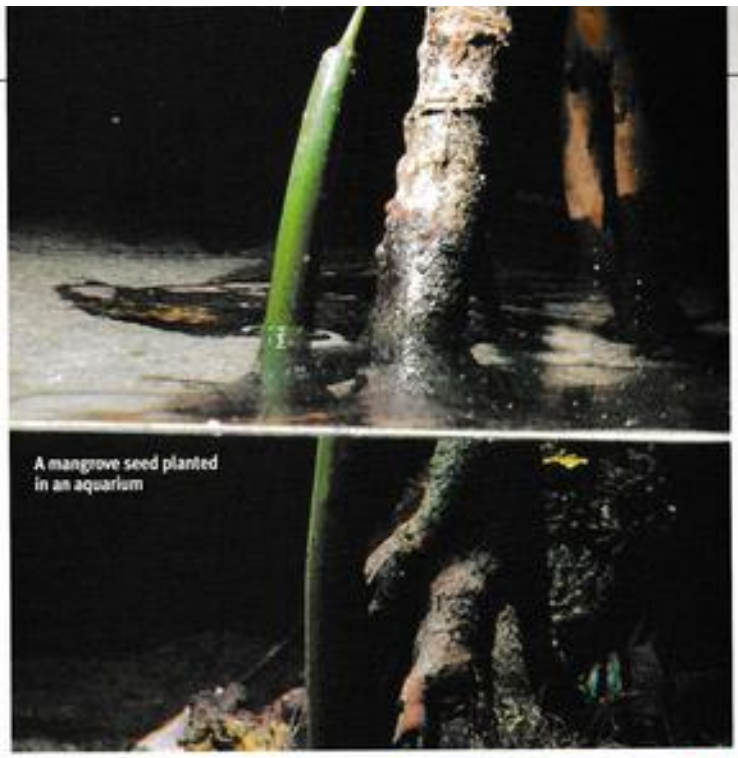
Planting time

After determining the nature and need of your seed or seedling, a serious planting decision must be made. The matter really boils down to long term plans versus short term (or open-ended) residence... and the encouragement of aerial roots versus profuse establishment of capillary roots in a substrate. When mangroves are used markedly for the aesthetic, the encouragement of decorative aerial roots is a large factor. One will find that the cultivation of arched prop roots on mangroves is very easy to encourage, or fail to encourage, despite the lack of tide cycles in the aquarium.

In the absence of tidal cycles, Red mangrove propagules can be trained to develop noble aerial roots by beginning life tied gently with flexible gardener's tape (available at a landscape or garden centre) to a thin plastic pipe or rod. Be sure to use flexible tape as a rigid tie otherwise will cut →

into the plant as it grows. An un-sprouted seedling can then be tethered at a depth where only the lower 1/3 of the propagule (the thick, blunt discoloured end) is initially submerged in water. Roots will sprout, incidentally, before leaves will. As roots begin to grow and develop, the body of the plant is slowly moved upwards on the stake. In this teasing manner, strong roots will grow thickened and extensively to support the weight of the body above the water. It will take many months before the body of the propagule can be liberated from the water with an arched and anchored root system. The plant will likely need to be rooted in the future, but only after satisfactory roots have developed above the water surface.

If instead you simply stick a propagule into a bed of sand like a dart, root development will occur fast and profusely. However, prop roots are unlikely if possible here at all without a replication of tides and the exposure of some roots to air. Red mangroves will grow in a wide range of substrates but prefer fine sand and muddy sediments ideally. Fertilising the substrate may be helpful but unnecessary or dangerous in average aquariums where levels of dissolved organics are typically (and nutritively, in this case) high. One exception to the matter may be elemental magnesium; mangroves have been implicated in aquariums as depleting Mg to the point where it skews the balance of minerals. Trace elements may be supplemented deliberately if tested for and monitored. Or, one may simply rely on regular partial water changes for this and contributions to overall water quality. Like most vegetable filters and refugiums, a mangrove basin (aquarium, inline bucket, etc.) should be fed raw overflow water from the display for opportunities to exploit dissolved and particulate matter. It would be counterintuitive to feed mangroves clean-filtered water given their natural habitat and abilities.



A mangrove seed planted in an aquarium

LIGHTING

Lighting is a simple matter with mangroves. They are quite adaptable to a wide range of light but prefer bright illumination. Expensive reef aquarium fixtures are not necessary however, common plant bulbs from the local hardware store are fine. Fluorescent lamps are found in useful spectrums but lack intensity in all but the closest applications with mangroves.

Many aquarists have grown good mangroves under incandescent (including mercury vapour and metal halide) plant-growth spectrum floodlights or spotlights.

Pruning and other care

Pruning Red mangroves is a sensitive matter and rather a moot point for most because they grow so slowly in captivity. If you must trim your tree, be sure to resist any pruning until after the axial tip has branched. Damage to the lead tip before splitting can be fatal for young specimens. While we are on the topic of growth as well, it should be interesting to note that irrigation of the leaves is nearly as much of a limiting factor of growth in *Rhizophora* as light and nutrients! Misting the leaves daily (or at least several times weekly) with purified water helps to rinse away the salt crystals exported through the leaves of this marine plant- a fascinating adaptation! With other aspects of good mangrove husbandry in order, a lack of leaf irrigation will still significantly reduce growth.

It is surprising to hear aquarists debate the efficacy of mangroves in the marine aquarium as vehicles for nutrient export when you can weigh their functional abilities clearly against their growth, which is dreadfully slow. In fact, their naturally sluggish growth is recognised by numerous governments on native coastlines where legislation controls or forbids pruning. At large, even occasional storm damage can be devastating. *En masse*, in wild habitats, they are outstanding vehicles for nutrient export - fixing nutrients in their enormous and collective bio-mass. In the aquarium, however, you do not have a forest of 8 to 10 metre tall mangroves... you don't even have one that big! The scrappy little seedlings that you do have, instead, demonstrate leaf growth concurrent with leaf drop at times. The proof is in the pudding, as they say: they are weak nutrient export mechanisms in the aquarium because they do not produce stable or harvestable mass quickly.

There are many aesthetic and mildly utilitarian applications for mangroves in aquaria with few notable disadvantages. One of the best and most natural ways to enjoy this rare flowering marine plant is in an upstream, fishless, deep sand bed refugium. Beyond significant natural nitrate reduction (NNR), you will enjoy the copious production of natural plankton and epiphytic matter in a mock mangrove microcosm. If we compromise on the fishless requirement, lets consider a display of Cardinal fishes living in a magnificent commensal display with the remarkably agile *Diadema* urchin. You are limited almost only by your imagination in applications of mangrove trees in the captive marine aquarium. ■

Today's top tip

If you are looking for a vegetable filter, there is a long list of algae (and even plants like some Sea grasses) that are more efficient than mangroves.

Today's Surgery

IN ASSOCIATION WITH
AQUARIUM PHARMACEUTICALS (UK) LTD

Lance Jepson, our resident vet, deals with Fish Lice (*Argulus* sp.)

ARGULUS ARE EXTERNAL PARASITES THAT are so large that adults can be seen with the naked eye. The two commonest species are *Argulus foliaceus* and *A. japonicus* although others do occur. They can have a length up to 6 to 7mm (female) or 4 to 5mm (male). They are parasitic crustaceans - the group of invertebrates that includes crabs, shrimps and copepods.

In appearance they are often a green/brown colour, flattened and disc-like so that they can attach closely to the fish without the risk of becoming dislodged in the water flowing over them. Beneath the disc there are four pairs of legs with which this parasite is able to crawl on its host or swim between them. There is a small tail at the back end of *Argulus*, whilst at the front are two antennae plus a stabbing mouthpart called stylet with which this creature is able to pierce the skin and feed on body fluids. On the top of the disc two eyes, looking like black spots, and two obvious suction discs are visible.

At temperatures above 16°C, mature females will lay batches of up to 400 eggs in long strings draped over submerged plants. These hatch out after 15 to 55 days and the immature stages will seek out a suitable host , usually a fish but amphibia can be infested as well, on which it will attach and feed. If the newly hatched *Argulus* does not find a host in 2 to 3 days it will die. There are several stages before maturity is reached, which is usually after 30 to 35 days. At lower temperatures it can take up to 100 days however. The adults can survive up to 15 days off the host fish.

These parasites feed by punturing the skin with the stylet and sucking up tissue fluid. It is thought that toxins are introduced with the saliva; small fish can easily succumb to these toxins. *Argulus* has also been linked with spreading certain diseases such as Spring Viraemia of Carp and *Aeromonas* bacteria. Lesions have been described in Koi, that on histological examination were very suggestive of an allergic reaction to *Argulus*.

This Swordtail has a large Fish louse on its head. Adult specimens like this are easy to see and treat in quarantine.

WHAT MAKES THE FISH SUSCEPTIBLE?

High stocking densities, and so multiple choices of hosts, will enable the parasite to build up into large numbers. Because these parasites will often congregate on the underneath of the fish, large infestations may not become apparent on pond fish for some time. Eggs can be introduced on aquatic plants.

DIAGNOSIS

Species susceptibility

All freshwater species are potentially susceptible. Large fish can carry heavy burdens whilst small fish can be easily killed. Although cyprinid pondfish and coldwater fish such as goldfish and Koi are commonly affected, it can occasionally crop up in tropical aquaria.

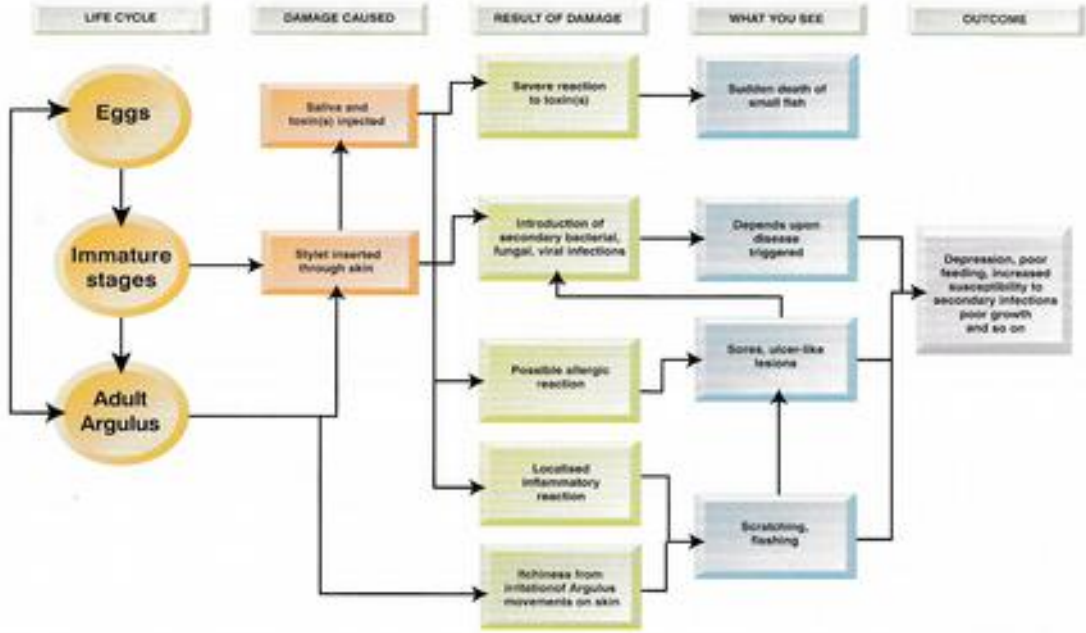
Recognisable signs of disease

Fish may show signs of itching by scratching and flashing against rough surfaces. Bacterial infections may occur. The presence of the parasite is diagnostic.

Microscopy

Technically unnecessary, but a beautiful parasite to look at if you have the opportunity!

Argulus (Fish Lice)



Treatment

One or two parasites on a single fish can be easily removed. Net the fish out and apply a small drop of alcohol on to the parasite - this will anaesthetise (inebriate?) the parasite so that it relaxes its grips for long enough to allow removal with a pair of forceps or tweezers. Placing fish in a Potassium permanganate bath at 100ppm (mg/l) for 5 to 60 minutes can be used to rid both individual fish and plants of this parasite.

Treatment of a pond infestation is problematic. First of all the parasite itself is hard to kill. In the past, and still in some other countries such as the USA, organophosphate compounds such as Malathion were used. These are now illegal in the UK. In addition the eggs are very resistant to chemical attack, with recommendations even going so far as to include emptying ponds and liming them to destroy the eggs.

Until fairly recently there has been nothing of real effectiveness available. However, there is now a product available from veterinary surgeons called Program. It contains a substance called lufrenon and is used as a flea-control agent in dogs and cats. It works by affecting the ability of the flea larvae, or as used here, the immature *Argulus*, to moult correctly, thereby causing their death. I have used it a few times to treat *Argulus* infestations in Koi ponds and it appears to work well and safely.

Disease Lookalikes

Any ectoparasitic infection can mimic an *Argulus* infestation. Occasionally other large crustacean parasites can be encountered such as *Livoneca* the South American Fish Louse, usually found on wild-caught South American tropical fish. Other large crustacean parasites would include Ergasilus (Gill maggot) and Lernea (Anchor worm). ■

PREVENTION

Scrutinise all new fish for these parasites and carefully check all new plants for strips of eggs. As ever quarantining is invaluable. Place newly purchased fish in a salt bath at 35g/l for 3 to 5 minutes. This should kill off most of the immature stages and may trigger the adults to leave the fish.

PROGRAM IS NOT LICENCED FOR USE ON FISH. Should your vet feel it is appropriate to dispense this product for your fish, neither the vet nor the drug company can be held responsible for any side effects or mortalities. It must only be used for ornamental fish. The product is thought to be quite persistent in the environment and I would not recommend its use in natural ponds where serious damage to the pond's ecology could occur.

CAN MARINE FISH HAVE FISH LICE?

Most *Argulus* species are freshwater. There are, however, some that are marine such as *A.fundulil* that has been found on Spotfin butterfly fish (*Chaetodon ocellatus*), although little is known of their effect on their host fish.

Plant profiles

This month we have four more plants for your aquarium, but these are not the run of the mill species you will find in every aquarium shop

Double-red Osirus (*Echinodorus x barthii*)

The Double-red Osirus is very similar to *E. osirus* except it generally doesn't grow so tall and has more attractively coloured leaves. These emerge deep red in colour and as they grow change to a lovely dark green. These colours are best displayed when the plant is well lit, has plenty of nutrients in the substrate, and the aquarium has CO_2 added to it. A mature plant can be expected to reach from 25 to 50 cm in height with a spread of 20 to 30 cm. Established plants usually only put out one new leaf per month. A member of the family Alismataceae, this plant is believed to be a cultivar rather than a true species in its own right. It is often sold as "Double-red Sword plant".

AQUARIUM CONDITIONS FOR DOUBLE-RED OSIRUS

Light: Medium to very high
Temperature: 16 to 28°C
Hardness: Soft to hard
pH: 6 to 9

Star rotala (*Eusteralis stellata*)

Star rotala is a member of the *Lamiocesae* family and can be found growing in tropical Asia and Australia. It has the reputation of being a difficult plant to cultivate in the aquarium and certainly requires excellent lighting. It benefits tremendously from the addition of CO_2 to the tank. It grows to a height of 15 to 25cm in a couple of months and, once established, will have a spread of about 10 to 20cm. Under good conditions you can expect a plant to put on about 5cm growth per week. The problem is that even established plants may just stop growing for no apparent reason. Plants sold in aquarium shops have usually been grown in marshy conditions and are rather compact in their habit. Once completely submerged they extend their leaves and reach their full potential. This is a very pretty plant well worth the extra effort needed to grow it in an aquarium.

AQUARIUM CONDITIONS FOR STAR ROTALA

Light: High to very high
Temperature: 22 to 28°C
Hardness: Very soft to medium
pH: 5 to 7

Pot grown Star rotala can be found in shops which specialise in the more unusual plants, or can be requested in as a special order by your local aquarium shop.

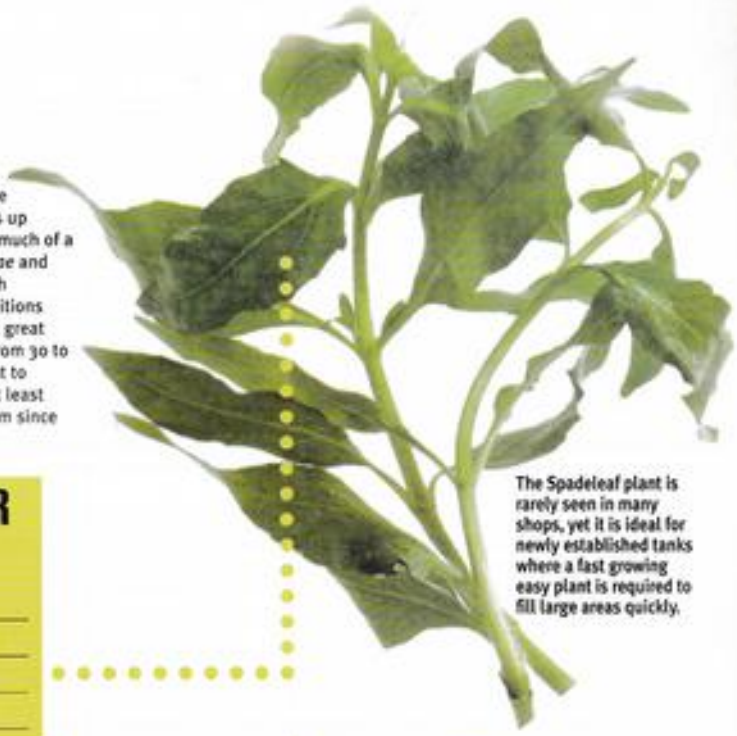
PHOTOS COURTESY OF INTERPET PUBLISHING

Spadeleaf plant (*Gymnocoronis spilanthoides*)

This plant is one of the best available to counter the problem of algal blooms. It grows so fast and sucks up nutrients at such a fast rate that algae don't stand much of a chance against it. It belongs to the family *Asteraceae* and can be found growing in marshy conditions in South America. Despite this, it adapts to deep water conditions very easily and its light green fleshy leaves make a great contrast with other plants. It grows to a height of from 30 to 60cm and a spread of 10 to 20cm. It is an easy plant to propagate by cuttings, although these should be at least 20cm long when taken. This is usually not a problem since stems can grow more than this in a week!

AQUARIUM CONDITIONS FOR SPADELEAF PLANT

Light: Medium to very high
Temperature: 15 to 30°C
Hardness: Soft to hard
pH: 5.5 to 8



The Spadeleaf plant is rarely seen in many shops, yet it is ideal for newly established tanks where a fast growing easy plant is required to fill large areas quickly.

Water hedge (*Didiplis diandra*)

This difficult foreground plant belongs to the *Lythroceae* family and comes from North America. In bright lighting it develops bright red tips to the shoots which make an excellent contrast to other plants. It grows to a height of between 10 to 25cm and usually has a spread of between 2 to 4cm. It is a demanding plant that requires bright lighting, softer water, the addition of an iron fertiliser to the substrate and ideally, the addition of CO_2 to the aquarium as well. In excellent conditions it can be expected to grow about 10cm a month, although in most tanks it will only manage 5cm.

AQUARIUM CONDITIONS FOR WATER HEDGE

Light: Medium to very high
Temperature: 20 to 26°C
Hardness: Very soft to medium
pH: 5 to 8

Water hedge is sometimes sold as *Peplis diandra*.

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

Koi world

Bernice Brewster keeps us up to date with what's going on in the Koi World.

Wrapping up your Koi in winter

UNTIL THE BEGINNING OF DECEMBER 2002, we had experienced a warm autumn and really very mild winter and then a weather front moved in from the east bringing bitterly cold winds direct from Siberia. On one of those days, I was moving some fish and despite neoprene gloves, my fingers have never been so cold and it is extremely painful. The reason for the intense cold was the wind chill factor, which fortunately does not necessarily affect the Koi in our ponds. Water responds slowly to changes in temperature, so a period of cold weather must be prolonged to have a significant effect in most instances. Another factor which helps to keep the water warmer is the fact that most ponds are sunk into the ground, and the soil responds even more slowly to temperature change which also helps to keep the water warmer. Even those ponds that are raised out of the ground with a brick surround are still partially buried in the ground, which helps maintain warmer water.

Keeping the heat in

In recent years, many Koi keepers have installed some form of heating to the Koi pond to help keep the water temperature warmer through the colder winter months, or simply to prevent temperature fluctuations. One of the problems with heating any pond is that unless you cover the water surface, most of the heat will simply be lost to the atmosphere, which of course is expensive. A solution to the heat loss problem, is to put a cover on the pond, which will reduce heat loss and therefore the overall cost of heating the pond.

The best method for covering the pond is to build a wooden frame and either tack a lightweight plastic sheeting, such as bubble wrap to it, or fit heavy duty plastic panes, similar to those used for greenhouses. There is one very important factor in all of this, which is that there must be adequate ventilation, to allow exchange of gas at the water surface. Any frame should be constructed so that it can have areas which open rather like windows to allow air to circulate over the water surface, even on the coldest of days! Because the water is heated, oxygen concentrations are less than in cold water but more significantly, if there is inadequate ventilation, carbon dioxide will accumulate in the water. Carbon dioxide is actually very poisonous and even at low concentrations can lead to crystal like formations in the kidneys, a fishy equivalent of kidney stones, known as nephrocalcinosis.

From a purely selfish point of view, long may this mild winter continue but do remember that even in January and February, the sun is starting to get some heat and the temperature can rise quite significantly under the snug warmth of the plastic covering. Remember that as the water temperature increases, the dissolved oxygen concentration will decrease. On warm days, it may be better to remove the cover completely but return it to the pond, in the afternoon, once the warmth has gone from the sun and especially if there is any chance of overnight frost. ■

One of the frequently promoted ways of conserving heat in the Koi pond has been the floating of bubble wrap on the water surface, with just a small area exposed for 'gas exchange'. Personally, I do not believe the small area of exposed pond water is adequate for gas exchange and certainly, there is no circulation of air and adequate ventilation, so this is a method of heat conservation I would actively discourage.

PHOTO: DAVE BEVAN

Cautionary tales

Bob & Val Davies give some good advice before you are tempted to buy any reptiles

Before looking at the husbandry of various species we thought a little cautionary advice would be useful for beginners or less experienced keepers on the potential pitfalls /dangers of succumbing to the temptation of choosing certain species.

SNAKES

Possibly the first creatures one should think about very carefully before being tempted are the large snakes, when one considers the eventual size and strength which some achieve. All the largest snakes have been available, often as baby specimens, which may seem attractive and innocuous especially since baby specimens are often colourful and nicely marked (although with some species this fades as they age). Purchased as babies and regularly handled most snakes do become very tame, but since snakes tend to react to scent and movement accidental bites can happen, and a bite from even a moderate-sized python or boa can cause a severe injury especially if it is a feeding bite. Since most snakes have recurved teeth getting one's hand out of the animal's mouth could be extremely difficult. These large snakes all constrict their prey and there are claims of dogs and children being eventually devoured by pythons - the latest in Africa, a Rock python , was reported to have eaten a child. At least two attacks on children in Australia by Amethystine pythons have been reported in the last two years. The large species we are referring to which are available as babies include Anaconda (eventual size up to 9 m); Burmese python (eventual size up to 4.5m); Reticulated python (eventual size up to 10m); Rock python (eventual size up to 6m). The boa constrictors have a somewhat better reputation than the above but if not handled regularly they may strike out. Although some common boas can attain 3m they are a little more slender than the big pythons. A feeding bite from any of the above would probably be followed by attempted constriction which occurs very quickly. A cardinal rule with any large snake is to have a second person present if opening the vivarium whether for feeding or cleaning. Snakes respond to movement and scent so food should be offered in long forceps, snakes should not be handled if you have handled either food items or another snake. Obviously children should not be allowed near these large creatures.

Baby Burmese python becomes a large, powerful constrictor.

WARNING

Placing snakes around people's necks can be dangerous. Even the most silly tame large snake can suddenly decide to bite, as one very experienced large snake breeder in the USA found to his cost when handling a large python that he had frequently taken into schools for lectures. His face was scarred and he narrowly missed losing an eye.

Baby bosc monitor - cute and cheap as babies but can become awkward creatures.

LIZARDS

Another consideration with any large reptile, for the animal's welfare, is adequate living accommodation which many people cannot provide. Although lizards do not grow as large as the above snakes the size of some can cause problems because they are more active. Green iguanas which are usually bought as 30cm (total length) babies are very appealing creatures but can reach 1.8m in length and lose their beautiful emerald green coloration as they age. They possess sharp teeth, very long, sharp claws which can produce scars in branches and a long, powerful, whippy tail which can be exceedingly painful across one's face (as we well know). Males in particular, once mature, can attack their owner or other people when in breeding condition. Male aggression in many lizards is a natural part of the mating process.

MONITOR LIZARDS

Other lizards to be carefully considered are various monitors. Monitors, like snakes, have recurved teeth, very powerful jaws and will hang on doggedly. Relatively few species are available cheaply, the most common being Bosc monitors. These are normally imported in Spring as captive-farmed attractive babies about 15cm total length but can quickly attain 1.2m. We have seen fully grown captive-reared specimens which were tame enough to sit on a shoulder all afternoon and others, half grown, which would launch themselves up at anyone opening the vivarium. Nile monitors and water monitors are sometimes available. These can grow into fierce monsters over 2m in length. One large adult was kept in a garden shed with a stable type door into which the owners did not dare enter but just dropped in food through the top door. How they managed to clean it we didn't ask! Some time ago a dealer was showing us a golden water monitor from Indonesia - certainly an impressive animal which made an impression on his hand - the jaws has to be prised open with a metal bar. Dwarf monitors are becoming popular as captive-bred babies and seem to present fewer problems but although not heavy weights and reaching only 45cm they still have sharp teeth. Other lizards to be cautious about include Tegus - again large and with powerful jaws.

Juvenile golden water monitor - nice but can be nasty - needs a lot of space.

TURTLES

Although the importation of red-eared turtles is now banned large older specimens can still be found in some shops for sale. Other turtles available which need careful consideration are Snappers and Softshells. All these tend to outgrow their quarters and the latter two can give a nasty bite.

Snapping turtle - can seriously endanger fingers.

We do know people who keep and breed most of the above creatures successfully and we are not saying they should not be kept but a plea for common sense is being entered here. Think carefully before succumbing to temptation. Some people may want to get rid of a creature which has outgrown its welcome - it may be offered cheap or even free - but it's a case of 'buyer beware'!

BLACK-BELT CICHLID
Vieja maculicauda
27°C
23°C
35cm
PHOTO: M.P. & C. PIEDNOIR
TODAY'S FISHKEEPER
TFISH 82
TFISH 82

...End Point

Kathy Jinkings profiles a lovely brackish goby which often dies through ignorance of its needs

Pretty as a picture, these two Gobies need brackish conditions to survive in captivity

PHOTO: IAN GIBBS

THE BUMBLEBEE GOBY IS A BEAUTIFUL AND endearing little fish, who requires little space and is more than happy to spawn in the aquarium. They are also often available in aquatic outlets. Their bold black and yellow-banded bodies with rounded faces are indeed reminiscent of little busy, fat bees. With all this going for it, you would think that Bumblebee gobies would be widely kept, but not so. This is for one simple reason - the fishes are usually sold in the freshwater sections of shops. Carried home by their proud purchasers, they are introduced into the freshwater community where they slowly fade, eventually succumbing to stress-induced diseases such as whitespot and fungus before finally passing on. At this point many people put them on their mental 'difficult list', and never try again. All this can be avoided by keeping them in brackish water. As brackish water fish they will thrive, showing their glowing colours, and if provided with a small cave may well reward their keeper with a batch of closely guarded eggs.

Although territorial, they are small fish with small territories, and are usually gentle and peaceful except when guarding eggs. By decorating the aquarium with plenty of rocks, caves, and plants (java fern can cope with brackish water, or there is always the option of the plastic variety) then many small territories can be established out of sight of one another.

DIETARY REQUIREMENTS

Flake food is usually regarded with disgust - these are live food feeders. They will, however, condescend to eat frozen Bloodworms, Mosquito larvae and others, and as they are only small fish this should not present too much of a problem for anyone with a freezer. Unlike many gobies, they are good swimmers. This not only means that they often make a good showing at all water levels, but they are also able to compete for food at all levels and do not require specifically sinking varieties.

Not easy to sex

They are not easy to sex, so you may have to buy a small group and hope. The female is often fatter (although in the freshwater tanks of the shop they are unlikely to be in breeding condition, so this isn't much of a guide). However, once established in your brackish tank the males will be noticeably more colourful, and the females may start to have visible ovipositors - the sign that the fish are in the mood for starting a family. A temporary (short) reduction in salinity will often induce spawning, and an inverted plant pot will provide the ideal nursery. If all goes well the male will vanish inside to guard his new family of up to 200 eggs. At this time he will be extremely territorial, but provided no tank mates attempt to enter his pot it is unlikely that there will be trouble. After about four days the tiny fry will be free swimming, later descending to the bottom to grow. They will require plenty of tiny live foods to thrive, and their small mouths will at first require the smallest of foods, such as infusoria. Baby gobies can sometimes be fooled about what is alive though, as with any water movement very tiny particles will move about, so often they will take proprietary fry foods. Once past this crucial stage they can be moved on to baby Brine shrimp, and then to the larger foods of the adults. The male will continue to guard the fry, but in a community tank some opportunists may manage to make a tasty snack of the fry anyway - moving them to a spawning tank may be a better bet if you hope to rear many. Even if you do not plan to breed them, these cute little fish are well worth the additional trouble of providing brackish water and live food, and your brilliant little bees will amaze anyone who is watching their own slowly fade away in unsuitable conditions. ■

FACTFILE BUMBLEBEE

Name
Bumblebee goby

Scientific name
Brachygobius xanthozona

Size
4cm

Aquarium type
Suitable for a community of similar sized fish with the same water requirements.

Distribution
Vietnam, Thailand, Java, Sumatra, and Borneo

Diet
Small live foods and their frozen equivalents

Temperature
25 to 30°C.

A & P (Today`s Fishkeeper) March 2003