

Today's Fishkeeper

JUNE 2002 £2.95

Fish profile **GOURAMIS**

**Fishkeeping
Answers**

**We solve all
your problems**

PONDS

**Buyers'
guide to
pond pumps**

TROPICAL

**Killies for
communities**

INSTANT AQUARIUM

WIN a complete set-up

FROM BEGINNER TO ADVANCED





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Printed by

HEADLEY BROTHERS

Distribution

COMAG (01895 444005)

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ISSN 1473-8708

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Welcome

Since we launched the GM fish campaign last month the phone has almost burst into flames. Shopkeepers, members of the public and even journalists from national newspapers have wanted more details. I now have a little more information to hand and it makes worrying reading. Not only do we have GM Zebra Danios which glow either green or red under UV light to contend with, but fluorescent greenish yellow Medakas (originally *Oryzias latipes* but with an added jellyfish gene would the scientific name still apply?). These are ready for their international launch into the aquarium trade.

The Medakas (Talkong Corporation's TK-1 Fluorescent Transgenic Fish) have been created in the laboratories of the Talkong Corporation in Taiwan. To protect their investment this corporation will be selling only triploid or tetraploid sterile fish. This is planned as only the first of many such fish and Talkong are only one of a number of companies involved in this sort of project.

Other companies are working on "improving" colour, shape, growth rates, disease resistance and even tolerance to lower temperatures. Many of these projects are being supported by government offices and research institutions. Of all of these the one of most concern has to be temperature tolerance. Piranhas which could survive in our waterways would become a major problem for everyone!

Obviously it is money which is driving this sort of research and it is money which will stop it. If after spending huge sums developing TK-1, Talkong Corporation find there is little or no market for them, then they will discontinue both the production of TK-1 and any development of future Transgenic Fish. We can help make this happen simply by signing up as many shops as possible to our GM fish campaign.

Until next month,
Happy fish keeping



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JOIN THE CAMPAIGN

Today's Fishkeeper, while supporting aquarists everywhere in their right to keep and breed cultivated fish of all types, is asking the industry not to even start stocking these GM Fish. Take your copy of Today's Fishkeeper into your local aquatic shops and show them this editorial. Tell them you are supporting us in this campaign and if they want to do the same to phone Derek Lambert on 01673 885352 or e-mail me (derek@trmg.co.uk) and I will send them a form to fill in pledging their support. In return they will receive a certificate showing their support for this campaign and have their shop's name and contact details listed in the magazine.

Join the campaign now to help stop GM fish from even going on sale in the UK.



What's in this month issue of Today's Fishkeeper?

THIS MONTH WE HAVE A NUMBER OF IMPORTANT articles for Koi keepers in the magazine. John Dawes can finally release all the information about KHV. This makes very positive reading after all the doom and gloom this virus initially caused. (Page 35) On a much less positive note many Koi shows have been closed down because the dealers can't sell fish at them. This means it will be almost impossible to make them financially viable and will also impact very badly on the numbers of people attending. (Page 66)

For those of you interested in marine fish and their habitats Alf Nilsen has been exploring the Phi Phi Islands of Southern Thailand and Andrew Caine explains why the boundary layer could be the cause of so much algae in your tank.

Tropicals are not overlooked with Oliver Lucanus introducing a new Danio, Barb, Anabantoid and Cichlid you are unlikely to find in any of the books. In our Top of the Pops feature we focus on Gouramis and just a quick look at this month's cover will tell you why they are so popular. Ever thought of keeping killifish but don't have the room to keep them by themselves? We have a special feature on which species can be kept in a community and what to combine them with. Finally in our instant tank feature just add water we are giving away a £5000 complete aquarium set-up. Since this tank is ideally suited to an office situation why not take your copy of this month's Today's Fishkeeper to work with you and see if your colleagues can come up with a winning reason why they should win the tank for your office!

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Cover Story



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Worth £40

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KEY TO SYMBOLS:

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

	COMMUNITY		NO WATER
	NO COMMUNITY		SYSTEM
	CARNIVORE		TEMP
	INVERTEBRATE		10cm
	HERBIVORE		ICE
	SURFACE		NOT SUITABLE FOR KEEPING IN CAPTIVITY



Starting Point...

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

LET'S ASSUME YOU HAVE SELECTED YOUR community of fish with care and only introduced compatible species which you have been told are good community dwellers. Unfortunately, as many an experienced fishkeeper has found, in that well balanced community set-up there can be a rogue fish. This happened to me when I had been keeping fish about six months. One fish, one of a normally peaceful species, turned round and started killing off its tank mates. I noticed a couple of dead fish in the tank one morning, they hadn't been sick, so I wondered what was

going on. Then I saw the rogue attacking several fish and actually killing one. I was just going out so I netted the offending fish and floated him in a container until my return, I would decide what to do with him

later. Unfortunately, later was too late as he had jumped out of the container and continued with his death dealing activities. I have no idea what made the fish behave in this way but it certainly taught me something about fish. Within

a species, individuals do not always behave in the way we expect them to. Close observation helps to prevent a problem like this from turning into a disaster.

Pat's tip



Always isolate a bully fish completely until you decide what action to take.

Talk about throwing out the baby with the bath water!

Indian fern is a very decorative plant which has light green fronds which grow straight from the soil. It will tolerate a wide range of conditions. The problem I found with it was the way it would grow thickly at the surface, so preventing the light from reaching the lower part of the plant. When I started keeping this plant I thought the "bits" that floated on the surface were broken off bits and threw them away. I have since discovered that young plants appear on the leaves, shooting out thread like leaves which break away from the parent plant and float to the surface. I think this is a little unusual in aquatic plants and the "bits" that I was throwing away were young plants.



A HEAVENLY BEAUTY FOR YOU

I really like Rainbowfish. The large ones are very showy and you have seen many photographs of the large Rainbows in issues of this magazine. But my favourites, which are suitable for the smaller aquarium, are the little ones such as the Fork-tailed blue-eye. This small Rainbow is my choice for this

month as it is a real star. It has a big advantage over the big ones as you may have to wait quite a while for the large Rainbows to colour up, but this small jewel shows off its full colours quite quickly, and what beautiful colours it displays. All the fins have bright yellow and black coloration and the throat is a

gorgeous orangey yellow, the females have smaller fins and lack this throat colour. These are a small species only growing to a maximum size of 5cm. They are generally peaceful, although males tend to spar a little. These fish make a wonderful display in your community tank.



Fork-tailed blue-eyes (*Pseudomugil forcosus*) are a real beauty.



Think hard before you buy a Puffer fish, beginners are often attracted by these weird but cute fish.



Green Puffers are most often sold as *Tetraodon lineatus* but the up to date name is *Tetraodon nigroviridis*.

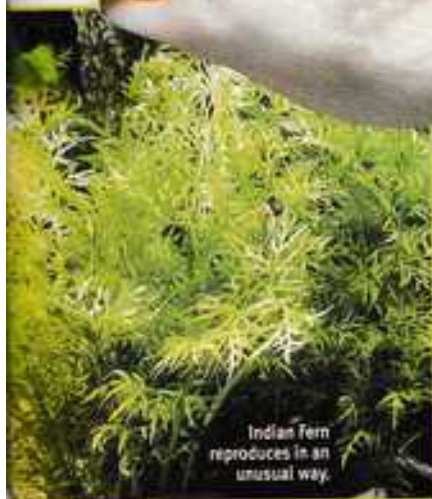
A strange looking fish for you

I know that many beginners are attracted to Pufferfish, they buy them first and then wonder how to keep them. These are strange looking creatures with a not too friendly nature towards their own kind and should only be kept with other fish greater than their adult size which is 15cm for the Green pufferfish. (this one is commonly seen for sale). Puffers do consider smaller fish a delicacy for their dinner. They have a beak-like mouth with which they crunch snails, so you won't have a small infestation with these fish around.

The upper body of the Green pufferfish

is yellowish green and white underneath. The body is overlaid with big black spots. It's called a Pufferfish because it sucks in water which puffs up the body like a balloon, it does this to ward off aggressors when it feels threatened.

There are many species of Pufferfish of varying sizes but only a few species are exclusively found in freshwater. The smallest grows to 6cm but the Giant puffer reaches 75cm. So, if you are tempted by these interesting fish, make sure that you get the right species for the tank conditions you are providing.



Indian Fern reproduces in an unusual way.

THE HEAT IS ON

The normal parameters for tropical fish are always stated in books or magazines when discussing species, but how critical is it if the temperature strays either side of the normal? Look at a typical heater stat which is used in most aquaria to heat and stabilise the temperature at the setting required. You will see that the range is from 20°C to 32°C. These are the outside limits of safety, above and below these temperatures your fish could be in real trouble. The higher the temperature, the lower the oxygen content of the water. At too high temperatures fish, when they are not gasping at the surface, will be flitting around in a listless manner. They will lose their appetite and uneaten food will not even faster in the intense heat and your fish will certainly be in deep trouble. If the thermostat is not working properly you could have frozen or cooked fish and this is why it is very important to test out this equipment before using it in a tank with fish in it.

When transporting fish it is important not to leave them in the car on a hot day. It's surprising how the heat can build up in a closed car. I have found that more fish are lost through overheating than being chilled. We all seem to be aware of the dangers of cold to tropical fish but less aware of overheating problems. Someone I knew was so worried about transporting fish during the winter that she put a hot water bottle wrapped up in a blanket in her fish box to keep them warm. The bottle burst and the scalding hot water killed the fish.

Fishkeepers worry when a power cut turns off electrical equipment. As long as the power cut does not last more than four hours the fish will not suffer, as water cools down very slowly and a gradual drop of a few degrees will cause your fish no harm. Obviously with marines the filtration and aeration being down for this long can cause serious problems, but freshwater fish seem to cope well.

Some species are harder than others and temperature fluctuations of a few degrees, as long as it is gradual, does not seem to worry them. In many natural habitats fish experience this night and day variation in temperature, small pools, in particular, are subject to wider variations. There are, however, some warmth loving species that will not tolerate lower temperatures but general community fish are quite hardy and adaptable. Under normal circumstances it is best to stay within the normal range for tropical community fish which is 22-26°C.

Pat's tip

It's advisable to have a spare heaterstat in your cupboard in case the tank heater malfunctions.



Starting out with fishkeeping

Naturally... AQUARIAN

Lost for Words



Blue gouramis are typical anabantoids

Anal fin This is on the underside of the fish just behind the vent or anal opening. Like the dorsal fin it acts as a stabiliser. Usually rather small but can be very large in some species. In some livebearing fish the male's anal fin extends into a long, rod like structure and is used for mating.

Anabantoids These are a group of fish originating from poorly aerated water and have an additional breathing structure called the

labyrinth which enables them to take in air from the water's surface. If unable to reach the surface they will die. The Gouramis featured in this issue are Anabantoids.

Caudal fin The caudal or tail fin is used for fast propulsion through the water, used together with the pectoral fins it assists the fish in leaping out of the water. Some fast moving fish have forked tails and a narrow caudal peduncle. Fish have numerous tail shapes and sizes.

Caudal peduncle This is where the tail joins the body. Fish with large tails need a strong caudal peduncle to carry it. Veiltail guppies must have a strong caudal peduncle to swim in a normal manner.

Algae One celled or multicellular plants that lack true stems, roots and leaves but contain chlorophyll (green colouring matter). Kelps, other seaweeds and diatoms are algae. In the aquarium it comes in many forms. Green algae is the easiest to deal with. Ancistras-codfish amongst others are good algae eaters but a little green algae in an aquarium is no bad thing. Brush and beard algae are the most difficult to eradicate.

Gills These play an important part in the respiratory system of fishes. The blood vessels of the gills are very close to the surface and are protected by the gill covers (opercula). Fish breathe by extracting oxygen from the water as it passes over the gills. Oxygen is absorbed and waste gases are passed out through the gills.

Ammonia First by-product of decaying organic material also excreted by the fish's gills. Highly toxic to fish.

The ten golden rules of fishkeeping

Read all about it

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

- Manufacturers often provide free booklets about fish care.
- Inexpensive books provide information on setting up.
- 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 13-21°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 large filtration systems.

THE FISH

4 **Stocking levels:** For *freshwater tropical* we recommend 12cm³ of surface area per 1cm of fish.
Marines: For a fish only setup we recommend 2.5cm of fish for 5l of water and for Reef only setups we recommend 2.5cm of fish per 27l of water.

For your free beginners guide please call: 0845 677 6770 or visit our website: www.aquarian.com

AQUARIAN



Feeds 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**

- Knowledge:** Find out as much as you can about any fish you hope to buy before purchase.
- 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.
- Quarantine:** All new purchases should be quarantined for established tanks for at least two weeks.

THE ROUTINES

1 **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.

2 **Water changes:** *Freshwater tropicals* 10-20% weekly
Marines do 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.

3 **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.

Fishkeeping Answers: Tropical

BROUGHT TO YOU BY
NUTRAFIN & FLUVAL



I have recently set up a 95l tank. It is very densely planted with lots of bogwood to make plenty of caves. I have also hidden a terracotta plant pot with the front cut out as a breeding cave. The temp. is 25°C, nitrate 15, nitrite 0, GH 6, KH 10 and a pH of 6.8. I have two young *Aplatogramma borellii* which I have not yet sexed, although I think they may both be males. I would like to breed them once I have got one of each sex! I would like to add some other Dwarf cichlids to this set-up. What other ones could I keep? I would like to have breeding pairs. Would two pairs be about right for this tank? Can you give me any tips on breeding these fish? Also, I am aware that Plecs, Catfishes, Corys and Loaches are a no-no for keeping with egg-layers if you want to breed them but is there an exception to this rule that I could keep?

Katie Lindridge via e-mail



Yes, you can keep Catfishes and I would suggest six or more Corydoras, any type of Corydoras will do. Your water parameters look good, but your flowerpot is not the best thing if its very big? You should use a rather small flowerpot placed upside down if the hole in the bottom is too small, make it just big enough so the fish can get in and out. With a small opening, the fish feel more secure and it's easier to defend against intruders. If you just bought two fish, which are not big enough to sex, I would suggest you buy at least a couple more of the fish. This way they can choose a partner themselves when the time comes. I would also suggest you raise the temperature one or two degrees up. You may have another pair of Dwarf cichlids in the tank, but put the flowerpots far from each other. If the flowerpots/caves are placed too near each other they feel the other fish are trespassing. This way you will avoid fights among the fish. To try to spawn the fish, keep good water quality (by changing at least 1/3 each week), give them a good variation of food, frozen, live food, and a good quality flake food and of course you have to be patient.

Alf Stalsberg

Star Letter ★

BREEDING BORELLIS



Star Letter Prize from Hagen

NUTRAFIN
AQUATIC PRODUCTS



This month the winner of our star letter wins a Nutrafin Master Test Kit from Rolf C. Hagen worth RRP £59.99

The kit comes in a handy plastic case and comprises Ammonia, Nitrite, Nitrate, pH Low range, pH High range, Carbonate & General Hardness, Iron, Phosphate, and Calcium test kits. Each one comes with its own instruction book which explains why you need to test for each substance and what the results mean.

When breeding fish it is often necessary to adjust either the pH and/or the hardness. With this

Nutrafin Master Test Kit these parameters are easy to monitor and adjust so the optimum conditions are created for the fish you are trying to encourage to spawn.

NUTRAFIN
AQUATIC PRODUCTS

& FLUVAL

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Having problems? Then let our panel of experts solve them for you. *Fishkeeping 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.

CAN I USE AN INTEGRAL MULTI-FILTER MADE FROM AQUARIUM GLASS?



The following is my current set-up - Aquarium - 180 x 60 x 60cm. Occupants - shoals (20 to 30 fish): of small Rasboras, small Tetras, mixed

Corydoras, plus a few extras (Aнцистру and Otocinclus).

Planting - heavy. (large bogwood with Java Fern, giant Vallis, various bulbs, various Echinodorus).

I have seen integral multi-section filters, made from aquarium glass, silicone into smaller freshwater aquaria. They seem to benefit from easy access/maintenance, high overall filter volume, and low cost. The first section/box has low level intakes (with safety grills) from the aquarium, a heater occupies this narrow box - water exits at the top to reach the central section.

The large central section/box has a bottom layer of 'lava rock' type biological medium, filter sponges above, and polisher layers at the top. Water exits at the bottom to reach the final section. The final (corner) section/box has more of the lava rock medium, plus a 'powerhead' splitter pump to draw water from the unit as a whole, back to the main aquarium area - water exits at the top, via a spray type bar.

Would two units of this kind be a suitable option



for my set-up? If they would, could you tell me the approximate size for each of the three sections, and what size for the powerheads?

Mike Lavender by e-mail

Integral aquarium filters made from glass as you describe show how well a filter is working (and trapping solid debris). They are a miniature version of a multi-chambered filter that are used in the larger koi set-ups. In these set-ups, each chamber has the benefit of being drained independently at the pull of a gate-valve. This is not the case with an integral multi-chamber aquarium filter made from glass. They may look interesting (and fun to build) but they need to be removed completely to purge the dirty chambers. An internal filter also takes up valuable aquarium space.

Regarding the size that you may require, I would use the volume that a suitable external power filter would take up as a guide, using different but complementary media to perform mechanical then biological functions - as found in an external filter. Use an adjustable power head as you may have to fine tune the flow rate through a new and untested filter.

Ben Helm

Fishkeeping Answers Expert Panel

Alf Stalsberg - Cichlids

Fete Liptrot - General questions on tropical fish and cichlids.

Andrew Caine - General questions on Marines.

Ben Helm - General questions on Coldwater plus equipment and technical advice.

Lance Jepson - Health

Tony Sault - Discus

Derek Armitage - Anabantids

Derek Lambert - Livebearers,

Rainbows & Breeding fish.

Ian Fuller - Catfish

Andy Gabbott - Killifish

Stephen Smith - Goldfish

Bernice Brewster - Koi and Ponds



What is the effect of acidic water on black header tanks ?



In the April edition of Today's Fishkeeper you wrote that water stored in black header tanks and pond box-biofilters is not good for acidic

water. I use both of these for my many Discus. My water is very acidic. I would like more information on what effect acid water has on these products as mentioned above. I use them for water storage and filter boxes.

David Lack by e-mail



Acidic water is by its very nature aggressive and corrosive to surfaces that are not inert. Black header tanks, unless marked with 'food grade' markings are likely to impart dissolved compounds that emanate from the plastic (such as plasticisers) - i.e. does the water smell or taste of plastic? If so, then the plastic is leaching compounds into the water. As most tap water is buffered by water companies, leaching and corrosion are less of a problem with these header tanks than if the tanks are used to store acidic water.

Ben Helm



Acidic water prepared for Discus should never be stored in containers made from plastic because the plastic may leach chemicals into the water such as plasticisers.

PHOTO: M.P. & S. REEDMAN

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, TRAG 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@trag.co.uk

www.hagen.com

Fishkeeping Answers: Tropical



FIRST AQUARIUM SET-UP INFORMATION REQUIRED



I am contemplating starting up with tropical fish, I have a 75cm aquarium, with BioLife filter.

Would the following live together peacefully? 20 Cardinal Tetras, 1 pair Siamese fighting fish, 1 pair of *Apistogramma agassizii*, and a few small catfish. I would like the tank heavily planted and with driftwood for hiding places. What would be your advice on starting this project and would there be space for any more fish? If so, what would you recommend? Could you recommend a few good books?

M. Winkley, via e-mail



There is only one obvious fault with what you have planned, and that is the inclusion of the pair of Siamese Fighting Fish. I would not include these in your display, for a number of reasons.

1. They are likely to come off worst in any aggressive encounters with the *Apistogramma*, and may not compete well for food with the other fish.

2. They do not like appreciable flow in my experience, and the BioLife filter is likely to produce far too much water movement.

3. If they do settle in and find somewhere out of the current and where they are ignored by the Dwarf cichlids, the male is likely to harass the female quite badly.

So, I would leave these out of this aquarium, and if your heart is set on Siamese fighters set up another couple of small aquaria run on sponge filtration where the male can build a bubblenest and you can condition the female in isolation and safety.

With the stock you list you will be actually pretty well at the stocking capacity of your aquarium with very little room to spare... so why not reduce the numbers of Cardinal tetras down to about 8 and instead have a few of another species of small Tetra, or a couple of pairs of Pencilfish (one of my all-time favourite groups of fish). Then, along with a small group of *Corydoras* or *Otocinclus* you would have a beautiful and interesting community which would allow for the extra bio-load temporarily should the *Apistogramma* breed (which I'm sure they would!).

I would use a sand substrate (use an inert aquarium

sand, there are various suppliers for this). This will give the Catfish the opportunity to do what they do best, and will make for a suitable substrate for the *Apistogramma* to easily dig out spawning sites under the wood deco. The wood should be obtained from a suitable source (aquatic trader) to ensure that it is safe for aquarium use.

As for plants, I always suggest that Java Fern (*Microsorium*) and Java Moss (*Vesicularia*) are very reliable plants, and you could try a variety of other species to see what thrives. You could try small species of *Echinodorus*, *Cryptocorynes*, or *Lilaeopsis*, but to really succeed with plants it may be necessary (but certainly not always!) to acquire the specialised systems designed for their optimal growth.

I'm not sure what your water conditions are in your area, but I have a suspicion it may be hard and possibly alkaline. If so you will need to take steps to provide more suitable water for the long-term maintenance of these fish, possibly collecting some rainwater (depends how clean the air is where you are), purchasing an RO or water purifier (quite expensive and maybe not practical if you only have the one aquarium), or purchasing a few gallons of purified water periodically from a retailer and using this to dilute your tap water for water changes. Water changes should be weekly, and at least 25% each week. This should ensure that the level of dissolved wastes is maintained at an acceptably low level.

A few good books

A book I have been quite impressed with recently as a guide for the beginning aquarist is *The Simple Guide to Freshwater Aquariums* by David Boruchewitz (TFH publication). Another excellent book would be any of the *Baensch Atlas* series, they have a wealth of information on a huge range of aquarium fish.

The best piece of advice I can give you is to see if there is an aquatic society near you. There you would find a resource of knowledge, advice and experience that would be impossible to put a value on. Good luck with your new tank.
Pete Lightfoot

Can I feed maggots to my fish?



I am new to fishkeeping and hope to set up a 120cm tropical freshwater system. Is it safe to feed aquarium fish with maggots from an angling shop? I have read many books and magazines, but none seem to mention maggots, and yet these are easily available.

Alan Jefferson via e-mail



Personally I do not recommend the use of maggots as food for aquarium fish. This is for various reasons. They are raised in fairly unsavoury conditions (to say the least!), and so may introduce a high level of unwanted and potentially problematic bacteria into the very small water body represented by your aquarium. You could find that the high bacterial load in your aquarium could create a health risk to yourself during aquarium maintenance should you accidentally ingest some (while starting a siphon to do a water change etc.).

Maggots have surprisingly tough skins, and many fish are simply

Commercial fish foods are safe and nutritionally balanced foods. Why take the risk feeding something that could be damaging to the health of the fish or yourself and may offer little in the way of usable nutrition?



unable to chew them sufficiently to be able to digest them. At best this would mean that the maggot passes through the alimentary canal and out of the anus pretty much as it went in, which then creates extra loading on the filtration system. At worst this could cause a blockage leading to the death of the fish. With all the wonderful range of suitable foods available to the aquarist, at what I feel are fairly reasonable prices, I see no reason to try to economise in this way by feeding something that could be damaging to the health of the fish or yourself and may offer little in the way of usable nutrition.

Pete Lightfoot

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Fishkeeping Answers: Marine

Star Letter



I have picked up your magazine for the first time and am

extremely grateful & also concerned. It would appear that I have been mis-advised regarding my set-ups. I have 2 tanks both 120l capacity. I am trying to keep Lionfish, (a Volitans who I picked up when he was 2.5cm in length and seems to be very healthy and eats well out of my hand. He is now about 7.5cm in length.

I recently expanded and now have the Volitans in my latest tank, and a Radiata (Whitefin) and Fuzzy dwarf in my original tank. I put my new fish into the original tank because, before reading your magazine, I thought the water conditions were good.

The Volitans seems happy and is still very responsive to me and feeds well. The new tank is a 120 litre Rio with internal filter (usual filter material for internal) and a single wooden air block. I was advised this tank would be OK for the Volitans and eventually a Snowflake eel. I am not one hundred per cent happy with the clarity of water in the new tank, this also only has one white strip light and I am unsure if it is the light that is having the effect on how clear the water appears to be.

The two new Lions are my main concern. The Whitefin seems quite happy and fed well initially but does not seem to be particularly responsive to food over the last couple of days. The Fuzzy dwarf has not eaten for two weeks (since I collected them from the shop). I know this is not unusual but the fish showed good interest in food at first and even seems to, on occasion, nudge the food then loses complete interest. The fish is obviously thin. I'm most concerned about this fish.

The aquarium is a 120 litre custom made tank. It has an external filter (Interpet prime 10 plus) and also a single wooden air block. The water quality is crystal clear. Lighting is by 2 white strips and one blue. I change my water (using tap water again on advise) once a week approx 15% -20%. My ammonia levels are never much above 0, my nitrite levels never go above 0.1 ppm, nitrates never seem to go above 10 ppm and my pH is consistently around 8 - 8.5. I change the carbon once every 2 weeks (and the fine filter media if dirty).

I am very concerned about the health of my fish which all have names and are more like members of the family!).

Tim Windsor, Via e-mail.



I am very sorry Tim, but due to bad advise you are in a bit of trouble, however, it is nothing that cannot be rectified if you are up to it. Firstly, you should close down your tanks and get rid of the Rio, it is not a marine aquarium. Pass all of your livestock to a local dealer who will look after them whilst you provide a proper home for your aquatic mates. The way things are they will all slowly go off their food as your water quality drops - which it will do over time. Please buy a beginners' book and start again. Your aquariums are far too small to house Volitans and a Snowflake eel. Do not be disheartened, we all fall on our face sometimes. I do a lot!

Andrew Caine

HELP! MARINE FISH NEED URGENT ATTENTION AND I AM UNSURE WHAT THE CAUSE IS!



Lionfish are full of character but need the right conditions to thrive.

 **AQUA MEDIC**

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Nitrate problem



I am having problems with high nitrates. I have checked my source water and found the following readings ammonia is 0.1, nitrites 0, nitrates 25. I don't have live rock in the tank. The only additions to the tank have been Red sea salt which boasts no nitrates and several pieces of Ocean Rock (from a reputable dealer). I have checked my tank water and have the following readings:- ammonia 0.1 or less, nitrite 0, nitrate 75. The external filter and media are second hand but were all cleaned with just my source water. I have been told that putting some chicken in the tank will help mature the filter. Do I need it? Should it be cooked?

Martin Timmis Via e-mail



Nitrate filters are one way to reduce a nitrate problem.



Your nitrates are down to a high ammonia surge as the tank matures, the only way to get this level down without harming your maturing aquarium is to either, invest in a nitrate filter, or perform 10% water changes each day for up to two weeks, using RO water of course. This will work. Do not put chicken in the filter as this method will cause a repeat high ammonia spike resulting in more nitrates in the water.

Andrew Caine

NEW MARINE SET-UP



I wonder if you can give me some advice on creating a Marine set-up. I've been keeping tropical fish for a while now and am interested in keeping marine fish. I'm looking at having a corner shaped tank, live rock, mainly fish set-up, but am keen to have some corals and maybe some invertebrates, Hermit crabs etc. I basically need advice on what equipment, price, value etc. to go for as it can seem a bit daunting unless you get the right advice. I was also hoping you could help me with regards to whether there is any sort of battery back-up you can buy to protect your fish in the event of a power cut. I have been told tropical fish can survive up to around 9-10 hours, marines for 3 hours max. If so where could I obtain one of these & for what price?

Darren Park Via e-mail

good at a reasonable price. If you want more specialist lighting then buy Aqua-Medic and UFO High. On the optional extras I would have to list, ozonisers, chillers, UV steriliser, computer control, nitrate filters, calcium reactors and Kalkwasser reactors.

You can easily get lost with all this equipment, so don't think of it as a whole, extras are just that. Learn about them when you have had your fingers wet, and NEVER forget this - if you know more about the equipment than the animals you keep, then you are doing it the wrong way round, you may have the best set of drums but that doesn't mean you will play in the band! As to power cuts, the only reliable tool you can use is that of a generator, this will not only power your aquarium but also your house, worth every penny.

Andrew Caine

Holiday sighting

Which fish live in the sea around the Greek island of Kos?



PHOTO: TIM MARRAS



While on holiday in Kos, sitting by the seashore I saw some fish called Silver bream. Could you tell me more about them? I also saw some other marine fish picking away at the stones. What other marine fish could I have seen around Kos?

Alan Stewart



By far the best thing about holidays is playing in the sea.

and of course being with my wife. The Silver bream, the two species of bream that they could be are *Diplodus annularis* the Ringed bream or *D. sargus* White bream, both inhabiting close inshore waters, I might be wrong but I think the fish you observed were Mullet species of which there are many in the Mediterranean Sea, and many shoals have become accustomed to tourists throwing bread so will swim right up to the shore line. There are also many species of Gobies, Blennies, Rockling and possibly a Wrasse or two, which you may have observed. Glad you had a good time.

Andrew Caine



I agree with you when you first take the plunge it can seem a bit daunting. Remember when you first learnt to drive a car, you had to think about using the mirror and indicators, even gears, after two months these were second nature. Well beginning in marines is just like that. You are at the bottom of a learning curve, what you think is difficult now but will soon be an old friend. When buying equipment always try to stretch yourself for the better the equipment as the easier it will be.

So, what do you need for your aquarium? Two external filters, one for biological and one for chemical filtration. These need good media in them - not sponges. Eheim or Interpet have some good models. A power protein skimmer is needed. Aqua-Medic, Deltac or Red Sea have excellent models. Heaters with independent control, Algarde make one or, for greater accuracy, choose Aqua-Medic. Power heads for water movement in the aquarium with a surge control if possible. MaxiJet. Aquaclear power heads with Algarde or Aqua-medic surges. Lighting should be via tubes or metal halides, tubes by Arcadia, or Coralle. If you can get Halides do so, the Arcadia series 3 are very

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Fishkeeping Answers: Coldwater



UNEXPLAINED FANCY GOLDFISH DEATHS

Q Could you help on the following matter: I have kept fancy coldwater fish for the past 4 years and recently I have encountered 2 fatalities which I cannot explain. My tank is a decent size with a good filtration system and the water quality is good. The first case was a Celestial who became listless and had no apparent signs of illness with the exception of a dark belly. The fish kept to the bottom of the tank for several days and then floated on it's side at the top gasping for breath. It did not have the energy to swim or eat. I removed the fish and put it in a small tank using the water from the large tank. I treated it with the blue dye medication but eventually it died. I have never had a fish that took so long to die. A few days later a Bubble-eye followed with the exception of not having a dark belly. This fish did not last as long. All the other fish seemed quite happy and healthy. I now have a Pom-pom which has become listless and is in the corner of the tank. I am scared that he will be another fatality. Have you any ideas?
Karen, Via e-mail

A Fancy goldfish are probably the most common fish that experience "unexplained deaths." As you know, they are bred for their external features and the many generations of selection and inbreeding are likely to result in fish experiencing physiological weaknesses or liabilities that may cause complications throughout their life. Swimbladder and imbalance problems are a good example. Unfortunately, once Fancy goldfish do take a mysterious turn for the worse, very rarely do they recover. As you mention that all of your other fish are fine, you can be sure that a poor environment has not led to their condition. If you want to be completely sure that the water is OK, then I suggest you test for ammonia or nitrite and that the pH is slightly above 7.0.

Ben Helm

Celestial goldfish, in common with many other man-made fish can be prone to sudden death without any apparent reason.

Why shouldn't you feed pond fish in winter?

Q In all books and magazines, it says not to feed pond fish in winter, because of the low metabolism of the fish. I am confused why this should be when anglers throw all sorts of bait in when winter fishing.
John Bell, Via e-mail

A There are a number of reasons why it is usually recommended that pond fish should not be fed in winter, or fed only sparingly. Important among these is that the temperature of a small body of water can fluctuate greatly over the course of 24 hours. Thus

the fish may appear hungry, but if a cold front then moves in, the fish, if they have been fed, will have undigested food in their alimentary canal for some considerable time (the digestive enzymes of pond fish are less active as the temperature decreases). This can cause severe internal problems at a time when the immune system is depressed anyway. Larger bodies of water (rivers, lakes, canals etc.) are far more stable temperature-wise, and so the fish are less likely to encounter a sharp drop in temperature, and are thus much less likely to end up with undigested food in their gut.

Once through your pond fish the food may be excreted in a poorly digested form, which will place extra demands on the biological filter at the time of year when it is least able to cope. This would matter little in a natural body of water where the dilution factor would be far greater.

Another important factor with pond fish it can be assumed that during the warmer months of the year they are fed pretty well on demand with high quality food. Wild fish will need to spend much more time feeding to obtain the same amount of nutrition, on a daily basis and throughout the year. Because of this pond fish should be able to build

up what sufficient reserves of fat deposits to last them quite comfortably for the worst of the winter, and if there is an unseasonally warm spell they should be able to gather enough natural food from a mature pond to suffice.

The other reason is that it is possible that if pond fish are used to being fed from the surface, then they could react to the presence of the pond owner as if hungry, when in fact it is purely a habitual response. This could give the false impression that they require feeding. So there are lots of different reasons why you should not feed your pond fish in winter.

Pete Liptrot

Top of the Pops the Gouramis

Our new series features all the most popular aquarium fish in the trade and some of their lesser known cousins who are the "Wannabes" of the fish world

PHOTOS: MAX GIBBS

Sparkling Gouramis



A group of Sparkling gouramis. Only the wild form of this fish is available and most of these are wild caught rather than commercially bred.

OUR VERDICT

An excellent choice, if you can get them. Definitely a "Wannabe" but unlikely to make it to "Top of the pops" because of its small size and delicate coloration.

Name	Sparkling or Dwarf croaking gourami
Scientific name	<i>Trichopsis pumila</i>
Aquarium type	45 x 30 x 30cm
Distribution	Thailand, Sumatra and Vietnam.
Diet	All foods including commercial flake and granular foods.

Companion species Other small peaceful community fish.

Pink Kissing Gourami



The Pink kissing gourami. There is a wild green form and also a marbled version available.

OUR VERDICT

Definitely a "Top of the pops" which shouldn't be! This fish grows far too large for the average community tank.

Name	Kissing gourami
Scientific name	<i>Helostoma temminckii</i>
Aquarium type	180 x 45 x 60cm
Distribution	Thailand and Java
Diet	All foods including commercial flake and granular.

Companion species Other large community fish.

Golden Gourami



Golden gouramis are a colour form of the Three-spot gourami. There are blue, opaline and many other colours available as well.

OUR VERDICT

A good Gourami for a mixed community tank of medium sized fish. Well deserving its "Top of the pops" status.

Name	Golden gourami
Scientific name	<i>Trichogaster trichopterus</i>
Aquarium type	90 x 30 x 30cm
Distribution	Southeast Asia
Diet	All foods.

Companion species Other medium sized lively species. Males will fight with both its own kind and other male Gouramis, so only keep one in an aquarium.

Dwarf Gourami



This picture of a splendid male Neon Dwarf gourami shows why this species is really top of the pops in the Gourami world.

OUR VERDICT

Well deserving of being "top of the Pops" and a highly intelligent star too. No sign of this fish's career ever waning.

Name	Dwarf gourami
Scientific name	<i>Colisa latia</i>
Aquarium type	60 x 30 x 30cm
Distribution	Borneo and India
Diet	Flake, granular, frozen and live foods. Easy to feed
Companion species	Other small to medium sized fish. Males will become territorial when spawning but otherwise make good community fish full of character.

Honey Gourami



OUR VERDICT

A "Wannabe" which really deserves to make it to "top of the pops" but its lack of colour when being offered for sale will probably stop it ever achieving a top spot.

A pair (male below) of Honey gouramis. In the shops they usually just show a black stripe from the nose to their tails.

Name	Honey gourami
Scientific name	<i>Colisa chuna</i>
Aquarium type	60 x 30 x 30cm
Distribution	Assam, India, & Bangladesh.
Diet	All commercial foods, plus any live foods they can get hold of.
Companion species	Other small peaceful fish. Tetras and Rasboras go particularly well with them.

Pearl Gourami



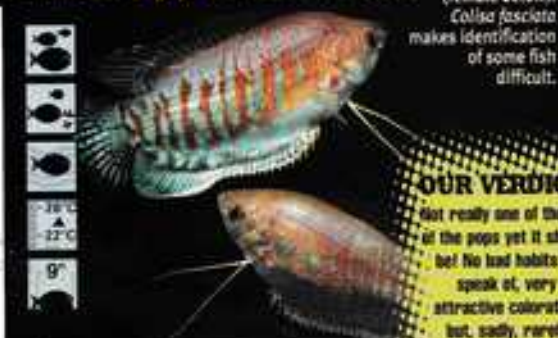
A very beautiful pair of Pearl gouramis.

OUR VERDICT

A very good "top of the pops" which has been a highly popular fish since it was first introduced in 1933.

Name	Pearl or Leeri gourami
Scientific name	<i>Trichogaster leeri</i>
Aquarium type	90 x 30 x 30cm
Distribution	Malaysia, Borneo & Sumatra
Diet	All foods.
Companion species	Other medium sized community fish.

Thick-lipped Gourami



A pair of Thick lipped gouramis (female below). *Colisa fasciata* makes identification of some fish difficult.

OUR VERDICT

Not really one of the top of the pops yet it should be! No bad habits to speak of, very attractive coloration but, sadly, rarely stocked because of all the colour morphs of the top two species.

Name	Thick-lipped gourami
Scientific name	<i>Colisa fasciata</i>
Aquarium type	100 x 30 x 30cm
Distribution	Burma and northern India
Diet	Not fussy. Flake, small pellet, frozen and live foods.
Companion species	Well suited to a medium sized community aquarium with other peaceful fish. Males are territorial when breeding but otherwise are not aggressive towards other fish.



Sea view

Andrew Caine explains the importance of the Boundary Layer in the Aquarium

I HAVE GOT ZERO NITRATES AND ZERO phosphates so why have I got an algal problem? If you scan over the net or I think it's called surfing with you computer people, the one problem that comes over the most is algae. I have read heart and wallet breaking tales of huge efforts and expense on high priced kits to alleviate such problems, sometimes to no avail. The water quality is great, the fish and corals are thriving, everything you have been told indicates you should have no algae, you are not overfeeding, in fact, you are doing everything right, BUT still the algae grows so our assumption is we have a great aquarium but we also have algae.

Two problems

My friends we have two problems here. Firstly, we are testing the aquarium water which is great but the fact is we are testing the wrong water. Confused! I will reveal all in a minute. The other problem is our love for corals and fish, and these together are the root of the algae problem.

Testing the wrong water, what other water can we test? Andy Caine has finally lost the plot I hear you all scream, but hold on, let's see what a boundary layer is.

In every aquatic habitat we have surfaces that water passes over, rocks, sand, corals all are surfaces. There is a microscopic layer of water that touches the surface, the friction created by the liquid passing over the solid surface causes the water to slow down. The thickness of this layer is less than 1mm, and above this friction is lost and water passes freely. So, if water has a velocity of say 30cm per second, the layer of water over the surface could be less than 3 cm per second. This thin layer is called the boundary layer and it's very important. Without this, many larvae that are settling out of the plankton would be battered against the rocks. This layer slows down the descent and allows the larvae to take hold and forward the species.

Why then is this important in the aquarium. Well beasts that live within our

Beautiful corals and fish - but where are the cleaners?



homes do not have table manners, they chew with their mouths open, and also fight for food. This results in lots of fine particles falling to the rocks. You cannot see them, but they are always there. The food is now trapped within the boundary layer, it rots down and releases phosphates, nitrates and other nasties. This is food for your algae, the algae grows, and takes up the nutrients from the boundary layer as it is being produced. However, it does not make it into your water so your tests show zero.

Don't forget the cleaners

Now we come to our other problem, our love for corals and fish. When making purchases for our aquatic habitat we all like the letter W. We pass Shrimps and Dwarf hermits by

because they are just little crustaceans - hey, I could buy a great coral as I already have a pair of shrimps. BIG mistake. Two Shrimps and six Dwarf hermits in a metre long tank will do very little. You have to make cleaners work for a living, the tank mentioned should house at least 6 Shrimps and 30 Dwarf hermits. A couple of Shrimps will find enough food to keep them happy, add more and now they will have to search out food. This is what we want for now they really are cleaners. If you make them work for a living, what do they clean? Yes, you guessed it, the particles of food lying in the boundary layer thus removing the algal food source and removing the algae.

Years ago, I went out and spent £150.00 on Shrimps and Hermits for my aquarium, my wife didn't speak to me for two weeks and it cost me another £150.00 to get into her good books, but I never had an algal problem!

Feed your fish and not your algae **ROWA phos**

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An invertebrate for you

Sea
view

Red starfish (*Fromia indica*)

Doesn't it fill you, the customer, with confidence, when you are in an aquatic shop and you spy a lovely Red starfish. Sadly most seem to have split legs with all the innards falling out. These splendid animals are clinging onto the glass, but falling apart before your very eyes. You then progress to another shop and again there are Red stars, all in great condition. You happily purchase one. In the morning there it is in your aquarium falling apart before your very eyes. Such magnificent animals doomed simply because they have not been treated correctly.

What exactly do these beasts require? They can live for quite a long time, in some cases years, in the correct aquarium. Firstly the aquarium MUST be at least 450 litres in capacity, at least two years old with a large amount of liverock. It must not have many grazers, for this beast needs a special diet. Our little baby has a great craving for sponges, they are not scavengers, as frequently described in books, this my friends is a biological

fact. There have been reports that Red stars have taken bits of meaty food offered, however, I personally have never seen this. So your aquarium MUST be able to supply this natural food source or it will slowly starve to death over quite a long time period.

OK, so we have a great aquarium ready to take such a beast, let's return to our case of animals falling to bits, what is happening here? All starfish and their relatives 'the echinoderms' suffer greatly if not introduced very carefully to their new home. Take time to equalise the temperature then, over two hours minimum, drip your water via air line, and I mean drip, until you have doubled the water in the bag. Then and only then release the beast. Always have the animal bagged up underwater and release it underwater, no aerial exposure please. The tube feet are very delicate, also the papulae, (little sacs that stick out of the body and allow the animal to breathe). Damage occurs with osmotic shock (salt concentration differences) and the lack of a supporting medium (water) around them. This causes bacterial infection which in turn ruptures open the

doomed animal.

Handle with care, plenty of natural food, and this animal will live for years.

PROFILE

Phylum
Echinodermata

Name
Fromia indica

Location
Indo-Pacific

Feeding
Natural food found growing in the aquarium, Sponges

Size
Up to 9cm

Water flow
None required

Lighting
None required

Difficulty
Easy, if handled correctly

tropical marine coldwater & ponds plants regulars

A fish for you

Sea
view
**Silk shot goby,
Chinese zebra goby
(*Ptereleotris zebra*)**

Oh how a common name is misleading, I am afraid this beast is not a Goby, or shall we say a true Goby, for this one has a swim bladder (most true gobies do not), and it does not belong to the family Gobiidae. So, beware, all is not in a common name. Help! Here we have a fish that is not a Goby, so what can we call it? However, as far as the hobbyist is concerned it is a Goby and will remain so like countless others, and that's good enough for me.

So what exactly is this beast like? Let me introduce this hardy animal that will thrive in a peaceful reef aquarium. When in good condition, the striking coloration and banding make this fish truly a sight to behold, and, what could be even better, it should cost less than £20.00. Feed slowly sinking, small particulate food, vitamin enhanced, and live Brine

shrimp. They like to stay within their cave and dart out to pick off a piece and dart home again.

Our friends have a shy disposition, so don't expect to see them all the time. You will get the best from them by having small tank mates that are well behaved at feeding times. They are easily spooked which sadly has led to many deaths. Our beast is fast, like a bullet, so it can jump, and it will jump. Not only will it jump but it somehow always finds the smallest hole in your coverglass and the first you know about it is when you find a dried up husk.

When young, the Zebres can be kept together in small groups, however, as sexual maturity approaches fighting will break out. A pair will lay claim to a cave, then the male will dive down under and touch the female. Then they swim together and the female deposits eggs in the cave. Sadly, there are no reports of successful captive breeding.

The ideal aquarium for this beast is a well established reef with plenty of holes for it, good open space for feeding, high

water quality, good mates and a very, very tightly fitting cover glass. When in striking condition these fish are worth every effort.

PROFILE

Family
Microdesmidae

Name
Ptereleotris zebra

Location
Indo Pacific, Red Sea

Feeding
Small meaty foods

Reef compatibility
Great reef fish

Size
10 cm

Difficulty
Medium



Argentine pearlfish (*Cynolebias nigripinnis*) are a typical annual species.

Killis in the community

PHOTOS: MAX GIBBS

Killifish are usually kept in tanks by themselves, however, they can also be combined in a community aquarium if you pick the correct tank mates for them. **Andy Oughton** has all the details

THE MOST POPULAR CHOICE FOR newcomers to the hobby of fishkeeping is, without doubt, the tropical community tank. Once you have gained a little experience, however, it is perfectly natural to want to branch out into something a little different - and Killifish admirably fit this bill. Unfortunately, they have a reputation of aggressive behaviour, especially when breeding. So what do you do if you only have room in your house for one aquarium, you still want to keep community fish and you also want a Killi or two as well? The good news is, provided you choose and mix them with care, you can keep the two together.

Unique life patterns

Killis are unique when it comes to life patterns, and anyone considering keeping them should be familiar with the most important differences. Annual species, such as those belonging to the genera *Cynolebias* and *Pterolebias*, live in waters that dry up at certain times of the year. This compresses their life cycle into less than a year and they

rarely live longer than nine months. These species lay their eggs on the bottom and because of this are known as bottom spawners. When the water eventually evaporates, the substrate keeps the eggs relatively moist and this gives them a chance to develop by the time the rains return. When these bodies of water fill up again, the eggs are ready to hatch. By the time the young are four to six weeks old they are ready to reproduce, and by three to five months they are fully grown. When the waters dry up again all the adults die, but the cycle repeats and the survival of the species is assured.

Semi-annual species, such as *Paraphysemon* and *Aphyosemon walkeri*, live in waters that do not dry up regularly and may carry water all year round. These species are also known as bottom spawners and their eggs develop either in the water or, during dry periods, in the damp ground. Depending on how often the water dries up, these semi-annual species can live as long as several years.

Species, such as *Epiplatys* and small species of the genera *Aphyosemon* and *Raflesia*, live in bodies of water that carry water all year round. They deposit their eggs on aquatic plants and because of this are known as plant spawners. Although their eggs develop in the water, they can withstand short periods of drought. This type of fish, which includes the majority of all Killifish, disproves the belief that Killifish are short-lived, as given optimum conditions they can live for up to five years.

How to choose

So which Killifish are suitable for community tanks? The first thing to decide is whether the community in question consists of



Aphyosemon walkeri are a beautiful semi-annual species of Killifish.

several species of Killifish or the combination of Killifish and some other suitable species.

To decide which type of tank to set up, you must study and compare the characteristics and needs of the various species, making sure to pay special attention to the following:

- The size of the fish.
- Their behaviour towards members of their own and other species.
- The conditions of their natural habitat.
- The geographical origin of individual species. →

Setting up the tank

The majority of Killifish species are small to medium sized, although some of them can be very temperamental especially at breeding time. In their natural habitat many Killifish live in soft water and, in the aquarium a water with a medium degree of hardness (between 9 and 12° dH, is ideal).

Most species will also enjoy a planted aquarium and look good in "natural" surroundings, although they tend to prefer a darkish substrate. In fact, if seen against a light background they seem pale and are easily frightened. It is also important that the bottom material contains no calcium, as this will harden the water unnecessarily.

Although Killifish are not large they will still need a decent sized tank. To be honest, no community tank intended to include Killifish should be under 300 x 400 x 400mm. They should also be wider than they are high, as Killifish live primarily in shallow water in the wild.

If real plants are to be included, it is important that you do not use an undergravel filtration system as the continuous flow of water past the plants' roots can inhibit growth. Instead I would go for a couple of internal power filters or, if budget and space allows, an external power filter.

Good background plants for this type of set-up include Java fern (*Microsorium pteropus*), Java moss (*Vesicularia dubyana*), large *Cryptocorynes* and Water pennywort (*Hydrocotyle leucocephala*). For the foreground use *Echinodorus latifolius*. The plants should be set up to create a large central swimming area, which could also include pieces of bogwood to add extra points of interest and hiding places for the more timid inhabitants.



Epiplatys chaperi are a species of Killifish which may live several years in captivity.

The ideal community

So which community fish and Killis will mix well together? If you consider that the best pH range for killifish is between 6 and 7.5, any other fish you intend to stock with them should be tolerant of similar conditions. The slightly acidic nature of the water certainly favours Anabantoids, and some species such as the Blue or Three spot gourami, *Trichogaster trichopterus*, is particularly well suited. Another gourami to consider is the Pearl gourami, *Trichogaster leeri*. Some of the small Characins make excellent tankmates for Killis, as do Corydorids, other species of Catfish and some types of Dwarf cichlid.

If you choose the right kind of aquarium, set it up properly and think carefully about the various inhabitants, you will provide your Killifish with an environment in which they can feel happy and secure, in reward, they should give you pleasure for a very long time. ■

WHO GETS ALONG WITH WHOM?

Killifish can be combined with other kinds of compatible fish and the following can be used as a guide to enable you to plan your Killis community tank.



Armoured catfishes

Species: *Corydoras barbatus*, *C. erhardtii* and *C. paleatus*

Companion fish
Lamp-eyes and small *Rivulus*



Lamp-eyes, such as this *Aplocheilichthys macrophthalmus*, look particularly good on a darker background where the shining blue eye really glows out at you.

Aspidoras and *Corydoras* species from warm areas

Species: *Aspidoras pauciradiatus*, *Corydoras aeneus*, *C. jullii*, *C. rabauti* and *C. sterbai*

Companion fish
All Killis measuring up to 10cm, especially all large *Rivulus* and *Paraphyosemion* species. Can also be combined with *Nothobranchius*



Nothobranchius rabauti come in several different colour forms. This is the one found in aquarium shops.

Various catfish

Species: Bristlenose catfish, Whiptails, Plecs, Mailed catfish and *Otocinclus*

Companion fish
Medium to large species of Killis. *Otocinclus* can also be combined with smaller Killis, such as *Diapetron* and Rocket panchax



Rocket Panchax are pretty surface dwelling Killifish which fit in well with bottom dwelling catfish.



The bottom on the leeward side of the Monkey Bay coral reef was covered with rubble and a wide variety of *Muriceum* corals (*Fungia* spp.). An aquarist's paradise!

of postcards, T-shirts, wooden figures, exchange bureau, restaurants and all the commercial tourist **** (sorry) imaginable... After travelling all over the world, I have yet to see such a beautiful island so terribly spoiled!

Monkey bay

However, there are still beautiful beaches several places along the island's edges and narrow coves penetrate the island and form beautiful lagoons. On the northern tip of Phi Phi Don lies a Holiday Inn, which is a very good place to stay. Situated directly on the beach the resort offers SCUBA diving and has a house reef for practising skin diving. The resort is relaxed and situated well away from the Ton Sai over-commercialised "paradise". Local long boats with experienced crew are available for hire. These take you to remote and completely unspoiled beaches, such as Monkey Bay a beautiful beach with the most diverse coral reef just off shore. Stay there for a complete day, bring drinks and bananas and you will have monkey visitors coming down from the steep jungle surrounding the beach and steal your food!

Reef Sites

Alf Nilsen visits the Phi Phi Islands of Southern Thailand



HAVE YOU SEEN THE MOVIE "THE BEACH" starring Leonardo de Caprio? Well, if you are in southern Thailand, you are nearly on "the beach". Phi Phi Islands are situated about 45 kilometres south east of Phuket town, and consists of the two islands Phi Phi Don and Phi Phi Le. While Phi Phi Le is a world national heritage site and completely unspoiled, Phi Phi Don is a tourist magnet, which unfortunately is severely spoiled! The island of Phi Phi Don must be among the most beautiful islands in the world. A narrow ridge of sand covered with coconut palms connects two hilly islets. This sand bank faces "Ao Ton Sai" (meaning Ton Sai Bay) to the south and "Ao Lo Dalam" to the north. But what has happened...? In the middle of all this is a street! Yes, correct! A street full



In Monkey Bay we found these *Acropora* corals in the branching *Solenastrea*. They are made by *Pocillopora* sp. On the edges of the channels grow small *Hydnophora* that are only known from this reef. This habitat along the edges of the Phi Phi Islands.

Beautiful Giant clams were found at Maya Bay reef.

FAMOUS CONNECTION

The Beach which starred Leonardo di Caprio was recorded on the eastern side of Phi Phi Don, in a small bay called "Maya Bay", or locally known as "An Wang Lang". Although many palm trees were brought to the beach and planted there just for the shooting of the film, the beach is truly magnificent and so is the coral reef found off the beach - although you need SCUBA equipment to explore it as it lies at 5-10 metres depth. The site did, however, have a remarkable growth of corals including large populations of Giant clams with the most beautiful colours - However, loads of tourists come here daily and it is almost impossible to experience the true beauty and silence of the place.



Swallow nests and paintings

Phi Phi Le is an international heritage site. The island has steep cliffs dropping into the deep, iridescent green water. The main attraction is the "Viking Cave" on the eastern side of the island. Here there are ancient wall paintings picturing Chinese ships, which were (wrongly) believed to be "Viking Ships" - hence the name of the cave. The cave is huge and reaches 500 metres into darkness above the cave floor.

Inside it - as well as in many other small and large caves and overhanging cliffs in southern Thailand - are large man-made bamboo structures used for climbing. And what do the natives climb for? The answer is "swallow nests". Swallow nests are gastronomic delicacies and have been an important export article for centuries. Swallows glue their nests to the vertical rock formations and hatch their eggs high up in the dark caves. To reach these the natives perform hazardous climbs to collect this valuable treasure. The Viking cave and its nest collectors are the main reason for preserving Phi Phi Le as an international heritage site and the spot is "a must" on your southern Thailand trip.

Garden of Eden

During the last two decades I have been very fortunate to have the opportunity to travel world wide to remote and exotic places, to see natural wonders, coral reefs



WARNING!

Watch out for long-spined sea urchins (*Diadema* spp.) when skin and SCUBA diving in Thailand. They are numerous, especially at inshore habitats.

and rare animals and to meet with amazing people. What then is the most impressive location I have visited? With no doubt: "Pang Nga National Park". The park is located north east of Phuket and is a group of islands situated between the main land and the large island Sam Chai Thale. Ferryboats leaving from northern Phuket approach the site, and organised tours are definitely the best way to explore this remarkable park.

When you approach the site, it does not look very special. You spot what seems to be a group of steep rocky islands, which are

Native people climb bamboo scaffolds in order to reach the swallow nests high above the bottom of the huge cave.



commonly seen in this part of the world. The ferry boats leave at certain times of the day, a schedule that is not at all casual. "Tide" is the key word - our daytrip to Pang Nga is going to follow the tides.

We approach the islands; the ferry-boat slows down and stops. The crew gets busy launching several small canoes and we are ordered into the small vessels; two guests and a kayaker in each canoe. The canoe is made from rubber and we sit barely a foot above the water. The kayaker smiles and chats away in his native language to his friend in the neighbouring canoe. "What happens now?", we wonder!

Canoe journey

The bunch of yellow canoes head for the vertical rock wall... and there, at the very waterline, a tiny, tiny hole opens up. Black and dark! The skipper keeps on smiling and orders us to lie back - flat on the bottom of

KRABI

To the north of Phi Phi Islands and about 60 kilometres north-east of Phuket lies Krabi, a magnificent, impressive rock and mountain formation of the same type as found in Khao Sok National Park. Although the town of Krabi is accessible by car, the shoreline and its fantastic landscape are only accessible by boat. Drive to Krabi town, hire a long boat or hire a speed boat for a full day tour from Phuket or spend some days at a resort in Krabi - whatever you choose, don't miss this spot! The flora and fauna on land is wonderful and diverse and there are many interesting places just off shore to skin- and SCUBA dive. Long boats will transport you where you want to go to explore the marine life. Be aware of the many long-spined Sea urchins (*Diadema* sp.) that occupy the substratum in many places - their spines are sharp and poisonous.

A lot of Christmas Tree Worms (*Spirobranchus* sp.) were found on the reefs off Krabi. These tiny worms are overgrown by the corals and in this way the coral colony protects them.



tropical marine coldwater & ponds plants regulars

"Way in!"



The quiet lagoon inside the islands is a Garden of Eden and a world-class nature site and an indescribable experience!



the canoe. My camera and flash-light go on top of my belly! It gets dark, very dark! We enter the opening and are handed a torch. The skipper hands us a torch. The small beam of light reveals that the roof of the tunnel, which we are now approaching is not more than 30 cm above the canoe and at its lowest perhaps not more than a couple of inches above our nose-tips - that is when we are lying flat down on our backs in the canoes! The tunnel is 80 metres long and it is now low tide! What happens when the tide rises? Where is the tunnel then?

The canoe kayaker smiles and chats away - apparently used to this rather bizarre activity... The canoe scrolls its way through the tunnel. Columns of rock formations hang down in the middle of the narrow passage and the canoe must manoeuvre around them. It is incredibly narrow! Switch off the torch and it is dark as hell! Point the beam to the roof, and there in narrow cathedrals opening up are thousands of bats hanging from the roof during daytime.

At night they leave for fruit hunting! This is no place for people with claustrophobia - definitely not! We hit the roof - it is too low! The local guy at the back of the canoe smiles and opens a small wave letting a little of the air out of the canoe. We are lowered a bit and barely slip under the

When the tide rises, our way back is closed for six hours!

downward facing rock formation.

Now a light in front - sunlight! We are through and we think "finally out on the other side of the island, we made it!" But not so... what lies in front of us is a shallow lagoon in the middle of the island! Inside the very island, only accessible through

underwater tunnels, which are only exposed above sea level during low tide. When the tide rises, our way back is closed for six hours!

The lagoon is the most fantastic place one can ever imagine! The cliffs rise steeply more than 100 metres above us and are covered with untouched vegetation of all kinds. Mangrove trees grow in the lagoon. It is completely still - no wind at all, and the only sounds are that of the jungle. We are encouraged not to talk. There are flowers, fiddler crabs, butterflies, monkeys, and best of all... no one can touch anything! It is truly a Garden of Eden!

On a day trip you visit three different lagoons, all different and all magical and spectacular with their unique entrance. Pang Nga is another must! Southern Thailand is remarkable! If you want to dive and see as many corals as possible, this is not the place to travel. If you want to see corals in combination with a wide variety of other wildlife, experience culture and taste good and exotic food - pick Thailand! 🇹🇭

ABOUT FOUR YEARS have now elapsed since the first large-scale mortalities associated with a new highly contagious carp and Koi disease were observed in several Israeli fish farms located along the country's coastline region. Between early May, 1998, and the beginning of 2000, three further outbreaks were recorded, with several others being subsequently reported up to 2001.

All outbreaks followed the same pattern, and resulted in massive mortalities. Disturbingly, affected fish that were subjected to detailed examination using electron microscopy were found to contain herpes-like viral particles within their cells. This particularly virulent disease was therefore labelled Koi Herpes Virus (KHV) disease, particularly, as only Carp and Koi appeared to be affected. All other fish - including closely related cyprinids like Goldfish (*Carassius*



Culture ponds at Gan Snuul and Ma'aga Zvi.

KHV: NOT A HERPES VIRUS!

John Dawes investigates Koi "Herpes" Virus and publishes full details about this disease and the on-going scientific research surrounding it



auratus) - remained asymptomatic, in other words, they did not exhibit any sign of disease. Subsequent experience and analyses have both confirmed that this is, indeed, the case; KHV only affects the species *Cyprinus carpio*.

Rapid Spread

Within a remarkably short time after the first outbreak, exports of Israeli-bred Koi dropped dramatically and reports started appearing of the disease occurring in numerous countries. Most of these accounts came from Europe where the disease rapidly became widely distributed. There are also, however, reports of viral Koi diseases with very similar (or virtually identical)

developmental characteristics and results from many other areas, including the USA, South Africa, Japan and Korea.

In fact, some of these reports, particularly from Japan, predate even the first reports of the Israeli outbreaks by several years. Yoshimizu and Kimura, for example, reported an epithelial tumour in carp (*Herpesvirus cyprini*) as long ago as 1989 (see References). Then, between 1990 and 1993, Sano et al reported results of various laboratory tests, including some in which Carp were intentionally infected with Cyprinid Herpes Virus, causing 65.7% mortality.

In some instances, the reported disease is referred to as Cyprinid Herpes Virus (CHV) disease and

the virus responsible as *Herpesvirus cyprini*. While there does not appear to be definitive proof that every single such reported disease is one and the same, a study of symptoms, viral characteristics, development (aetiology) of the diseases and resultant mortalities all exhibit strong similarities, suggesting that the disease in question may, indeed, be the same in all, or a majority, of instances.

As mentioned above, the initial 1998 Israeli outbreak was followed by three others within 18 months; each occurred in a different kibbutz. In all, the period covered by these and subsequent "eruptions" has spanned about four years. Yet, each of these outbreaks

has been contained and overcome within a period of 12-18 months. Therefore, while the disease has been present within Israel for about four years, this generalisation hides the very important fact that 'clean' Koi from each affected kibbutz have generally been available 12-18 months after completion of the eradication programmes that have been implemented in all such cases.

Interestingly, while KHV disease is almost universally regarded as an 'Israeli' disease, within Israel itself, it is widely believed that the virus was imported into Israel from western Europe. Whether this is, or is not, the case, the big 'unknown' is where, when, or how the virus itself actually originated. ➔



Herpes...or Not?

From the earliest days of the crisis, the virus linked with the disease has been accepted as being a herpes virus. Certainly, transmission electron micrographs have tended to lend weight to this belief, since the particles exhibit the characteristic herpes virus shape when viewed in cross section at high magnification.

However, recent research (a paper is currently in press) carried out by Professor Moshe Kotler and colleagues at The Hebrew University - Hadassah Medical School in Jerusalem and the team led by Dr. Izhak Bejerano at the Israeli Central Fish Health Laboratory at Nir David, indicates that the virus may not be a herpes virus at all, but a "double-stranded DNA virus with icosahedron morphology" that makes it resemble a herpes virus. (An icosahedron is a solid body with twenty plane faces, only a few of which can be seen when a cross section is taken for transmission electron microscopic examination).

If this is, indeed, the case, it may help explain some of the results of the various tests, experiments and field trials that have been carried out over the past few years. It may also mean that the periods of latency (dormancy) that are characteristic of herpes viruses - such as those that cause cold sores in humans - may not apply to the Koi virus. This, in turn, could have significant implications for the rapid restoration of confidence in Koi supplies from Israel. Logically, if the causative agent is not a herpes virus, the disease will require renaming, since the KHV 'label' will no longer apply.



Red patches and ulceration are clear on this affected carp.

The Symptoms

Irrespective of the identity or origin of the virus, the disease exhibits a distinct development pattern. Symptoms, for example, only become apparent within a relatively narrow temperature 'window' between 17-25°C (although some deaths can still occur at slightly higher temperatures). KHV disease is therefore primarily only evident during spring and autumn.

When it strikes, it first of all undergoes a short period of incubation, with the first mortalities occurring after about seven days. However, within two to four more days, mortalities rise sharply to 80-100%.

Affected fish exhibit morbidity (sluggish behaviour), usually followed by death. In the interim



Large white patch on the gill of a badly affected carp.

period, white patches appear on the gills. These are produced by dead gill tissue and excessive mucus production and may be accompanied by bleeding. White or pale patches may also appear on the body, accompanied by ulceration. Affected fish may, in



Koi pond with affected fish exhibiting lethargy, despite the vigorous aeration.

addition, exhibit sunken eyes and erratic swimming behaviour consisting of spurts of intense activity interspersed with the aforementioned morbidity.

Histologically i.e. under the microscope, gill and other tissues may show heavy bacterial and parasitic infections, which are likely to be secondary, i.e. they are likely to have occurred as a result of the fishes' weakened state, but will not have caused it. The primary causative agent, as mentioned earlier, is the virus. The viral particles are not, however, detectable under normal light microscope examination, though the nuclear hypertrophy (excessive growth of cell nuclei) that results from the infection certainly is. Viral

particles, owing to their very small size, can only be detected with any clarity under the high magnification provided by electron microscopes.

The Survivor

Although, in many cases, mortality can be as high as 100%, some fish can and do survive. Sometimes, the survival rate can exceed 20%. These fish then become resistant to subsequent exposure to the virus, remaining healthy despite attempts to re-infect them. Referred to, during the trials that have been carried out, as 'Naturally Immune Fish' (NIF's), these survivors will not succumb to the disease, even if exposure is carried out during the optimal



A selection of Ma'agan Michael Koi set aside for hand-picking.

spring and autumn temperature 'windows' referred to earlier, when the virus is at its most virulent.

The logical possibility that arises, of course, is that, while now being resistant to the disease, these survivors of an earlier infection could still be carriers.

Experiments to test this hypothesis (and others) have therefore been carried out by the Israeli Ministry of Agriculture team at both the Nir David Laboratories and the Dor Aquaculture Research Station. Several particularly interesting experiments carried out by S. Timman and A. Benet Perleberg produced quite remarkable results.

In order to test the survivors' resistance, their immunity system was suppressed through

intraperitoneal injection with cortisol (hydrocortisone 21-hemisuccinate). One day later, these fish were exposed to the disease for a period of five days by being introduced into tanks containing infected carp.

After the exposure period, they were monitored for 30 days, during which none of the immunosuppressed survivors, either developed symptoms of the disease, or died. In sharp contrast, naive carp that were exposed to the infection for the same five-day period, exhibited mortalities in excess of 80% between Day 7 and Day 15.

In another experiment NIF's which had experienced two seasonal temperature 'windows'

were tested for their ability to infect naive fish. In order to do this, lots of 100 such fish were collected from three farms and kept in total isolation from each other. Naive fish were then exposed to these resistant fish (within the temperature 'window') but none developed the disease. However, naive fish exposed to infected fish from the Dor station showed the typical development and mortalities associated with the disease.

In yet another experiment, three lots of presumed resistant fish were exposed to infected fish from the Dor station. Two exhibited total resistance to the disease. The third, however, showed typical mortalities. When the reason for this was investigated, it was discovered that these fish had not been through the resistance-stimulating procedures that the others had experienced. Instead, they had come from a pond in which 'wild laying' had taken place.

new microscopic and other analyses have been carried out on all these fish. Again, two important factors have, so far, emerged:

a) NIF's do not appear to carry antibodies against the disease; and

b) NIF's do not appear to harbour any viral particles.

When I discussed this matter with Dr. Bejerano, he was (quite rightly) at great pains to emphasise that the results that his team have so far obtained do not constitute scientific proof in the strict sense of the word, and further tests are being carried out. However, as he also pointed out, the results are hugely encouraging. ■

The NIF Protocol

In conjunction with the Ministry team, Koi and 'food' carp farmers have now established a seven-step protocol designed at creating NIF's, which - in view of the above-quoted results - can be considered safe and 'clean' and can therefore be regarded as being of suitable quality for sale.

1. Fish are spawned and hatched in March.
2. They are allowed to grow (unsorted) until July.
3. Sorting into the different quality categories is carried out in July.
4. At this point, the sorted fish are exposed to the virus for four days through the introduction of sick fish.*
5. These 'exposed' fish are given two-three months' recovery time.
6. They are then allowed to experience the optimal infection 'window' that occurs as temperatures drop in the autumn (beginning around October).
7. They are subsequently tested for immunity (usually around January).**

NOTES:

*Back-up cultures of sick fish have, to date, been maintained in isolation at the Ministry of Agriculture's facilities. This has been intentionally done to keep the virus infection 'fire' going and as a ready supply of infected fish for the trials. Now, however, the virus can be maintained in-vitro at the laboratory, this reduces the need for this back-up.

**The apparently antibody-free and viral-free fish referred to in the previous section come from these 'naturally-immune' stocks.

The two main conclusions derived from these tests are that:

- a)** NIF's do not infect naive fish, i.e. fish which have never been exposed to the virus before, irrespective of whether these are newly-hatched fry, or fish at any other stage of maturity; and
- b)** NIF's do not appear to be carriers.

In order to investigate this further,

Open invitation

There is also a standing 'open invitation' for anyone associated with the industry to visit Israel and see the situation for himself at first hand. Particularly welcome are visits from those who intend to write or present papers on Israeli Koi and the disease, as well as from those whose role it is to advise both the industry and the final consumer.

ACKNOWLEDGEMENTS

I would like to extend my sincere thanks to the following for co-ordinating my itinerary of visits and discussions, for their willingness to 'subject' themselves to my numerous questions and for allowing me everything I asked to see and examine: Ofer Carmel and Chaim Keller (Agricola Agricultural Export Co. Ltd.), Mordi Haimi (Gan Shimon), Eytan Hazan (Maragan Ziv), Uza

Ulinder (Maagan Michael), Dr. Itzhak Bejerano (Director, Central Fish Health Laboratory, Ministry of Agriculture, Fisheries and Aquaculture Dept., Nir David).

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Today's
Guide to...

POND PUMPS

Ben Helm guides us through buying a pond pump

REGARDED AS THE heart of the pond, the pump (like the heart) must be the most reliable part of a garden pond. We expect a pump to work 24 hours a day and every day of the year in temperatures ranging from near-freezing to perhaps over 25°C, with both the life of our pond and its appearance depending on a reliable pond pump. Because of its partnership with a pond filter, once installed, a pond's health relies totally on a pump, and over recent years, pump performance and reliability have improved dramatically in order to meet our increasing demands.

Why have a pump?

A pump is not essential for keeping a pond clear and stocked with fish but by adding a pump that circulates water through a filter, you are able to keep more fish in your pond and guarantee clear water (when using a UVG).

Which pump?

It can be very daunting when choosing a pump when you are presented with a vast array of different pump makes and models, each with their own features and performance claims. On the positive side, by virtue of the choice available, it makes it far more likely that you will find the pump that is particularly right for your pond.

What to look for when choosing a pond pump

Before you can choose the pump that is most suited to your pond, you need to know your pond's volume (in both gallons and litres)



and your anticipated stocking levels (light, standard or heavy)

You also need to measure any additional 'work' that your pump will have to do, such as pumping up a waterfall (measure the vertical distance (or head) from the pond's surface to the top of the waterfall) or a fountain or ornament. Any additional 'head' required of a pump will reduce its overall turnover.

1. Pump Flow Rate

A useful guide when choosing a pump is to find one that circulates the volume of your pond at least

once every 2 hours.

Most pumps are sold with very flattering specifications, perhaps stating that a particular model will pump 1000 litres per hour. This is probably measured at the pond surface without any restrictive pipework or fittings attached. As soon as a pump has to move water vertically, the turnover of that pump is reduced. The greater the head, the lower the turnover. If a pond has a volume of 500 litres, it requires a turnover of 250 litres per hour. If that same pond has a waterfall that is 1 metre

which pumps are expected to perform. Let's face it, we want to install a pump and forget about it. In response to our reluctance to get our hands wet for the sake of pump maintenance, pump manufacturers have re-engineered their models to handle solids. This means that rather than clogging up with debris as they may have done before, they simply pass this debris through to the filter. Before buying, check that your pump will handle solids.

b. Pump protection

Many submersible pumps are fitted with additional safety features. Float switches are a safety back-up



The Fish Mate 3000 pump has significantly lower running costs than many models on the market.



high, then a suitable pump would be one that provides a turnover of 250 litres per hour (minimum) at 1 metre of head, which will mean choosing a more powerful and more expensive pump than at first expected.

2. Other performance factors

a. Solids Handling. Garden ponds present some of the most demanding environments in

which prevents pumps from burning out should they run dry. Should the water level within a pond drop, then the change in angle of the float switch will cause the pump to switch off. An additional safety feature found in many pumps is a thermal cut-out which also switches the pump off should it over heat. This will also protect the pump should it ever run dry.

c. Variable hose fittings You may be buying a pump to replace or upgrade your existing

model. If so, it may be worth checking that the new pump is supplied with a stepped hose-tail on the outlet. This will allow it to fit a range of hose sizes, and hopefully yours that is buried beneath your rockery and waterfall.

3. Guarantee

As we have demanded more from a pond pump, they have become more rugged and reliable. Consequently, most pumps are now sold with a free extended warranty of 3 years, with some models this year carrying even a 5 year guarantee! This is a measure of how reliable

(and competitive) pond pumps have become. With standard care and the use of correct pipe work so as not to produce high back pressures, then such guarantees can easily be exceeded. Pumps are likely to be more temperamental if they are switched on and off rather than used continuously and problems can also occur with pumps becoming blocked with debris or blanketweed, choking the impeller and leading to a burnout.

Most pumps are fitted with foam or perforated plastic pre-filters to prevent impellers from becoming blocked, but these can reduce pump performance even when

only partially blocked. Self-cleaning pre-filters are available as a remedy for this common blocking problem and as mentioned earlier, pumps that will handle solids up to 10mm are now available on the market.

In summary, there has arguably never been a better time to buy a pump. There is a huge range to choose from, most of which offer us the latest engineering and efficiency, giving us complete peace of mind. Simply take your pond's measurements to an aquatic store and by checking for the factors above, you are sure to leave with the best pump for your pond. ■

What volume is required for a waterfall to look realistic?

For a waterfall to look realistic, with the full channel width covered in flowing water, sufficient water must be delivered by the pump to the top. A useful rule of thumb is that an average running tap represents approx 910W per hour. A flow of 2275l per hour is usually required for a waterfall 1.5m wide. If a pump is not able to deliver this flow, then a waterfall will be a trickle rather than a cascading flow. So returning to the example above, if the waterfall is 1.5m wide, then the pump must be able to deliver 2275lph at 1m head for the waterfall to look realistic.



A waterfall adds real life to a pond, but the water flow must be great enough for it to look realistic.

Running costs - The Hidden Extras

As a pump is likely to be used continuously, the running cost is a significant consideration when pricing up a pump for a particular pond. Power consumption is measured in Watts with the greater the figure relating to a power-hungry pump. The wattage does not necessarily relate to the overall performance of the pump as many efficiencies in design and construction enable low wattage pumps to outperform pumps with larger motors. For example, when comparing 2 pumps each rated at 2800 lph, one may be a 76W model while the other one may be a 40W model. Which would you choose? The difference in running costs over the years could amount to the price of a new pump. When the running costs are forecasted across the 3 years of guaranteed life of a pump, you are able to get a true picture of the real cost of that pump. Remember when comparing pumps to make sure you are comparing like with like. In our example the Blagdon Amphibious P3000 will pump water to a greater head than some of the other pumps shown. So it may be more expensive to run but it will be better suited for some purposes.

Model	RSP	Guarantee (Years)	Litres/hour (approx)	Watt	Hours running in 3 years (3x8 months)	KWh	3 year running cost (£p/KWh)	Total 3 year cost
Blagdon Amphibious P3000	£130.22	3	2800	76	17640	1340.6	£20.44	£210.66
Hazlock Cyprio Cascade 4000	£155.99	3	2800	40	17640	705.6	£42.33	£202.32
Dase Nautilus 3000	£135.99	3	2800	40	17640	705.6	£42.33	£178.32
Tetra GP 3000	£110.84	3	3000	42	17640	740.68	£44.45	£155.29
Fish Mate 3000	£109.05	3	3000	28	17640	493.92	£29.63	£139.58

A comparison of 5 different pumps, each producing similar flow rates at zero head. Assuming the pumps run from March to October (8 months) for the duration of their 3 year guarantee, the running costs are a significant factor when comparing pumps of similar performance. In extreme cases, the running costs may amount to the price of a new pump.

Waterworld Aquatics

Today's Fishkeeper dips its toes into Scottish waters with a visit to Waterworld Aquatics in Glasgow

WE STOPPED IN at this shop unannounced (which we always like to do) and found one of the owners on holiday. The other partner, Brian, however, more than made up for William being on holiday. He proved to be a lively, entertaining character with a huge knowledge of fish and fish keeping. Brian started in the business 7 years ago but has been keeping fish for over 30 years now. One of his first recollections in the hobby was of wrapping tanks up with towels to keep the heat in during the first miners' strike (circa 1973). Since then he has kept all types of fish and continues to do so at home, despite working with fish all day long in the shop. His personal favourites are the Rift lake cichlids, but during the summer his Koi take up more of his time. Marines come in a close third. As with many fishkeepers when asked, "Which is your favourite group of fish?" Brian found it very difficult to answer because he finds them all fascinating.

Brian's business partner, William, is also nuts about fish. He started in the trade 15 years ago and has been a fishkeeper for about 23 years. His son, Bob, also works in the shop full time.

As with many small shops this venue wasn't the tidiest in the world but all the tanks looked well



Brian proved to be a lively, entertaining character with a huge knowledge of fish.



Shop details: Waterworld Aquatics, 232 Paisley Rd West, Glasgow, G51 Tel: 0141 427 9552.

Shop opening hours: 11am - 6.00pm. Sat & Sun 11am - 5pm.

Proprietor: Brian Drain & William Fraser

Staff: Bob Fraser

Number of tanks: 80 tropical & marine, 20 Rift lake.

Number of Vats: 3 x 750 litre ponds

Specialities: Rift lake cichlids, Marines and Koi (in summer)

Brands stocked: All major brands

Which groups of fish do you sell?: Freshwater, Marines, Coldwater & Koi

maintained and the fish healthy. We arrived not long before they were due to take delivery of some more Discus from Steve Purnard so the Discus stocks were a little low. The Rifts looked in top top condition with plenty of tank raised as well as wild caught fish for sale. ■

Our verdict

A bit of a tardier! Don't forget to check out the basement for all those mouth watering Malawi and Tanganyikan cichlids.

Brian's verdict on the manufacturers

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

Keet Marine & Red Sea

Which company gives your customers the best service?
Interpet



A few of the Rift tanks tucked away downstairs.



Marines are one of this shop's specialities.

Red Comet Platy

Xiphophorus sp. hybrid



Copy for Today's Diary Dates

Copy for Today's Diary Dates should be sent to Today's Fishkeeper, Windingside Court, 1 Forum Place, Hatfield, Hertfordshire, AL10 0BN Telephone 01673 885352, fax 01707 469333 or e-mail denk@timg.co.uk copy deadline 6 weeks before publication date.

Today's Diary Dates

June's show, auction and club meeting dates

Sat 1st		
Sun 2nd	Caer Ulla Open Show. Contact 0191 5237464	West Yorkshire Marine Aquarist Group meeting. Contact 01924 420101
Mon 3rd	Kirkcaldy A.S. meeting. Contact 01738 634689	Clacton Fish Keeping Club meeting. Contact 01255 428665
	Solway A.S. meeting. Contact 01387 730606	Tongham Aquarists Society meeting. Contact 01232 25686
	St Helens A.S. meeting. Contact 0151 42604213	Pertsmouth A.S. meeting. Contact Gill Ulling 9, Inverness Rd., Gosport, Hants.
	Ayrshire Fishkeepers Association meeting. Contact 01204 605272	Perth A.S. meeting. Contact 01738 642704
	Reigate & Redhill A.S. Contact 01293 781212	Bracknell A.S. meeting. Contact 01344 485287
Tues 4th	Parkley & District A.S. Contact helburns@btinternet.co.uk	Workington A.S. meeting. Contact 01900 67953
	Dunstable & D.A.S. meeting. Contact 01582 707280	
	Greenock D.A.S. meeting. Contact 01475 704219	July 2002 TODAY'S FISHKEEPER on sale
	York & Dist. A.S. meeting. Contact 01904 414272	Bristol Tropical Fish Club meeting. Contact 0117 973 2145
	The Irish Tropical Fish Society meeting. Contact 01456836	Faircity A.S. meeting. Contact 01738 634291
	Hallow A.S. meeting. Contact 0151 2898191	Sandgrounders A.S. meeting. Contact 01704 541177
	Northern Goldfish and Pondkeepers meeting. Contact 0181 9697567	Corydon A.S. meeting. Contact 0208 664 0984
	North Bucks A.S. meeting. Contact 01608 327333	
	Oldham A.S. meeting. Contact 0161 281 3275	
	Preston A.S. meeting. Contact 01772 32116	
	Lang Toun Aquarists and Pondkeepers Group meeting. Contact 01592 595825	
Wed 5th	Corby & D.A.S. meeting. Contact 01536761736	
	Oasis Fish Club (Sunderland) meeting. Contact 0191 3843433	
	Hounslow club meeting. Contact 01784 259230	
	Perth A.S. meeting. Contact 01738 631704	
	Clacton Fish Keeping Club meeting. Contact 01255 428665	
	Portsmouth A.S. meeting. Contact 01673 885352	
	Bracknell A.S. meeting. Contact 01344 485287	
Thurs 6th	Faircity A.S. meeting. Contact 01738 634291	
	Sandgrounders A.S. meeting. Contact 01704 541177	
Fri 7th	Northwest Cichlid Group meeting. Contact 019422 707 593	
Sat 8th		
Sun 9th	Yorkshire Cichlid Group Summer Auction. Contact 01924 367086	
Mon 10th	Kirkcaldy A.S. meeting. Contact 01738 634689	
	Bristol Aquarist Society (Goldfish) meeting.	
Tues 11th		
Wed 12th		
Thurs 13th		
Fri 14th		
Sat 15th		
Sun 16th		
Mon 17th		
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Tues 30th		

Convention chaos

THE BENNETT BUILDING at Leicester University was the up graded venue for this years British Cichlid Association Convention. This was a 240 seat, tiered lecture theatre with full audio visual equipment for the speakers. Sadly some of it was not exactly new! Right from the outset Dr. Peter Henderson had problems with slides jamming. Despite these problems he managed to open a window on the ecology of the Amazon basin which left most of the audience absolutely enthralled.

The next speaker was supposed to be Toby Veal. Toby was due to fly in from the shores of Lake Tanganyika. Much to everyone's disappointment he couldn't make this convention so last year's other speaker Dr George Turner stepped in to fill the gap. Hopefully next year's convention will run a little more smoothly but at least the auction had some worthwhile fish in it.

Dr Peter Henderson talking with one of the audience after his lecture.



FESTIVAL OF FISH KEEPING AND WATER GARDENING WEEKEND — OCTOBER 12TH & 13TH

This year's Festival is shaping up to be the best ever! *AB Aquamedic* have agreed to sponsor the marine seminars this year. Apart from two beginners' courses, one to be held each day. Today's columnist, Alf Nilsen, will also be giving a presentation at this event. Alf is an internationally renowned marine expert who gives a wonderful presentation, no matter how much or little you know yourself. Certainly not one to miss.

Viviparous - the British based livebearer organisation will also be holding their convention in conjunction with the Bracklesham Bay weekend. Harro Hieronimus, an expert on livebearing fish, will be attending this event and lecturing on Goodeids. Other specialist societies so far involved with this event are the Goldfish Society of Great Britain, "Jinchi Kai" Rancho society, South Hants and Worthing Koi societies, and the Southern Catfish Society.



How to book for the marine beginners seminars

If you are interested in attending one of the beginners seminars please phone 01673 885352. They are free to day visitors and weekend guests but places are strictly limited and will be allocated on a first come first served basis.

How to book for the weekend

Full board weekend packages for the Festival are available priced at £78. To book contact Grace Nethersell, 8 Acacia Avenue, Brentford, Middlesex, TW8 8NR. Tel/Fax 020 8847 3586.

AZOO arrive in the UK

AZOO is a well known name in other parts of the world but now this innovative company are venturing into the UK market for the first time. With a huge range of products to choose from we have selected just one of the most interesting ones to give you a preview of what will be available in the coming months.



IN SEPTEMBER LAST year John Dawes highlighted the fact that dual-purpose aquaria were very much in evidence at Aquarama. In his section entitled "Aquarium Ideas" he wrote :-

In this section, I would like to comment on aquarium 'ideas', rather than the actual physical components of aquaria, because it is the original ways in which these systems are being used that I found particularly interesting at Aquarama '01.

This year, more than at any other time in the past, there were many dual-purpose aquaria on display. These are aquaria that not only provide the normal underwater arrangement, but also facilities for above-water plant displays. A wide variety of such aquaria/plantaria were on show - all of them

absolutely stunning in their effect, as one of the accompanying pictures demonstrates.

Another range of these dual-purpose aquaria was fitted with an Ultrasonic Mist Maker (manufactured by Guangdong Risheng Group Co. Ltd. of China). The overall effect is quite spectacular and is a reflection of a definite trend that began influencing the design of aquaria a few years ago. More and more manufacturers are attempting to exploit the decorative properties of aquaria and are designing tanks to appeal to an ever-wider range of potential customers, not just fishkeepers. This modern approach should help open up sections of an untapped market which, I feel, has long been in great need of attention.

We are pleased to report that John's words were rather prophetic! Only 9 months later the first of these dual-aquaria are to go



on sale in the UK. AZOO describe them as "Garden Aquariums" and have a whole range of sizes to suit every home. These are made in Acrylic and will scratch if roughly treated but any scratches can easily be removed and the tank weighs only half that of traditional glass tanks.

This new generation of "garden aquariums" comes complete with light and filter and can be used for either tropical or coldwater fish. Currently only the smaller models are available and are expected to retail at under £200. The full range should be available by the end of the year.

Innovative in style, they certainly look nothing like anything else on the market at present. Look out for this whole



new generation of fish keeping at your local aquarium shop, and if they don't stock them in the next few months ask why not!



Starve them out!

Aeromonas is a big problem in all forms of aquaculture be it in a goldfish pond, Koi pond or a commercial fish farm. An American aquaculture company has been solving the same problem in commercial fish farms for years and has now launched a similar product for Koi and Pondkeepers in the UK.

THE NEW PRODUCT is called Genesyz™, and it contains no chemicals, no medications and no antibiotics of any kind. It is an organic preparation of non-pathogenic bacteria, enzymes and micro-nutrients and it works on the established principle of competitive exclusion. Pathogenic bacteria in general and the dreaded Aeromonas and Pseudomonas strains of pathogenic bacteria in particular, consume a specific type of food. By adding a competing non-pathogenic bacteria, in this case Genesyz™, into an aquatic environment infected with pathogenic bacteria the Genesyz™ aggressively competes with the Aeromonas and other pathogens for the available food and because the introduced Genesyz™ is present in bigger numbers it consumes all the available food and the Aeromonas and other pathogens quite simply starve to death.

These bacteria only feed on the food source of pathogenic bacteria. The vital nitrifying bacteria, in your filtration systems for example, which feed on a different nutrition source than the pathogens, remain completely unaffected.

This process is totally demonstrable simply by measuring the bacteria counts before and after. This has been done by independent laboratories throughout the USA and more recently in the UK so real performance data is available and in all cases the results are the same. This method works and can be proved to work.



Book of Coral Propagation

BOOK OF CORAL PROPAGATION

Volume One, Volume 1.0

Reef Gardening for Aquarists



A Concise Guide to the Successful Care and Culture of Coral Reef Invertebrates

by Anthony Calfo



...of coral propagation... fully and fast... of reef propagation... fully and fast... of reef propagation... fully and fast...

...of coral propagation... fully and fast... of reef propagation... fully and fast...

...of coral propagation... fully and fast... of reef propagation... fully and fast...



Regional Reef Price: \$24.95

International Price: \$34.95

THIS BOOK IS certainly no pretty picture book. It does have some photographs in it but they are not the reason you would buy the book. Instead this is an in depth guide to the successful care and culture of Coral reef invertebrates. Over the last 10 years its author, Anthony Calfo, has worked as a wholesaler, distributor, retail store owner, aquatic consultant and most notably as a coral farmer. He began culturing and propagating corals in the early 1990s and let his passion for the coral realm lead him to build a greenhouse for the commercial inland production of reef coral.

This book uses personal knowledge and experience of the subject. It is written in a comfortable easy style with moments of humour, pieces of instruction and passages of sheer wonder blending together to create a book which is a riveting read for anyone even vaguely interested in marine aquaria. Don't think that this book is only of use to those people who want to propagate corals. There is a wealth of information here for every mariner.

The book is being self published and lacks some of the polish of some books in the sector, however, it is also a living book with regular updates planned. The first two years of these come free via e-mail when you register on-line.

CONTACT DETAILS

The book of Coral propagation by Anthony Calfo is distributed in the U.K. By Midland Reefs. Tel: 01543 684821
e-mail: midlandreefs@inverts.demon.co.uk

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.

Star Letter

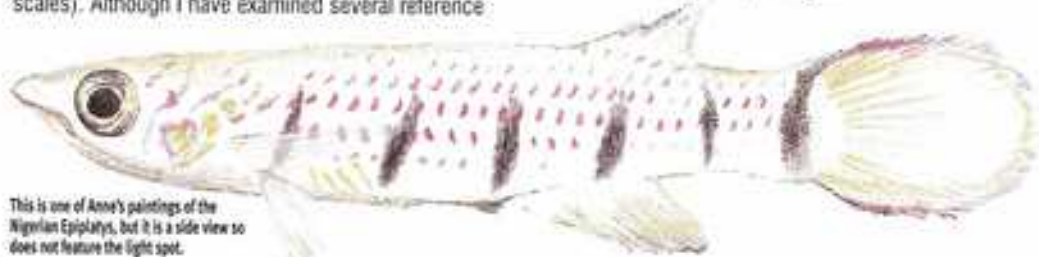


LIGHT SPOTS IN NIGERIA

I was intrigued by your Goa trip in the March issue of *Today's Fishkeeper*. In particular of your mention of the Panchax with the light spot on its head. We had *Epiplatys sexfasciatus* in Nigeria also with a light spot about the size of a pinhead (not, I think, a patch of scales). Although I have examined several reference

books relative to West African fish, I have never seen any reference to the light spot before. The Nigerian *Epiplatys*, with light spot, could be found in a variety of waters; even brackish in Ikoyi Park, Lagos.

Grant Weir, Algarve, Portugal.



This is one of Anne's paintings of the Nigerian *Epiplatys*, but it is a side view so does not feature the light spot.

Fish spotting in Kos

Last year we went to Kos for a week's holiday. It was absolutely brilliant. The thing that fascinated me and my girlfriend (both fishkeepers) was that we could go to the bar/restaurant by the sea and the number of fish swimming about just below you at your table was unbelievable. There were tiny fry near the shore, you could run a net through the water and catch loads. The further you went out the bigger they got. They were called Silver bream. The owners of this particular bar/restaurant were English. All they seemed to do was throw bits of bread into the water and the fish would go crazy! They would also put bread on the end of a fishing rod line and cast away. Out there in the pub/restaurants they had quite a few fish tanks with goldfish and tropicals mixed in.

Allan Stewart, Ross-shire

GM Horror

I first read about these GM zebras several months ago in John Dawes' column 'Close Encounters' but thought they would never come into this country or be bred in large numbers. I read your editorial in the May issue of *Today's Fishkeeper* and was appalled that these fish could be bred on a large scale for distribution into the trade. The Zebra danio is a beautiful fish, so why do this kind of monkeying about? Hybridisation has given us many beautiful species. Plotos and Swordtails have been crossed to provide us with some beautiful fish. These, however, all belong to the genus *Xiphophorus* and have been bred in the normal manner just living together in the same tank.

These GM zebras are the result



of tinkering across alien groups and I for one don't hold with it. This, quite simply put, is a way some people think they can make a lot of money. Well, I hope we fishkeepers stick together in this and refuse to buy fish produced in this way. I'm off now to my local aquarium shop to get them to join the campaign.

Anne Forster, Birmingham

Ed. Note: The May magazine was hardly out there when people started to call me. A top aquarium shop, Clearwater Aquatics of Leicester (Tel: 0116274 3426) are the first shop to join in our campaign. They were closely followed by Spire Aquatics of Chesterfield (Tel: 01246 278957) who had been shown the May editorial by one of their customers.

www.tetra-fish.co.uk

New releases



The hobby is moving at a tremendous pace these days and new fish are being discovered and imported all the time. **Oliver Lucanus**, is right at the centre of all the new introductions and discoveries. This month he has a new Danio, Barb, Anabantoid and Cichlid you are unlikely to find in any of the books. **PHOTOS: OLIVER LUCANUS**



This Fighter was named for the "pi" shaped marking on its chin.



The new Fighter will eat all foods but the Bloodfinns are taken ravenously.

Pi fighter (*Betta pi*)

This is an interesting Betta from the *Betta wasei* group. The distinguishing mark of this species is the "pi" shaped marking on the chin. Adult males (just over 12.5cm) are patterned in contrasting yellow and chocolate brown stripes over the head and front of the body. This larger Betta from northern Thailand is not aggressive and several males may be kept together in a heavily planted aquarium of 135 litres or more.



New Danios are being discovered all the time - expect to see at least 10 more soon.

Kyathit Danio (*Danio kyathit*)

With extensive research in Myanmar and Northern Thailand more and more Danio species are being discovered and described. *Danio kyathit* is one of the prettiest small (5cm) Danios to be exported. Males differ from the females with more red orange fins and a more speckled rather than striped pattern. Keeping and breeding this new Danio is as easy as the common Zebra danio (*Danio rerio*). Look for at least 10 other new species of Danio to be introduced soon.



Black-spotted silver barb (*Barbus camphacanthus*)

Widespread throughout much of west and central Africa *Barbus camphacanthus* is one of the smaller Barbs from the region and makes an ideal dither fish for shy Dwarf cichlids like *Chromidotilapia* and *Pericocchromis*. At a maximum size of just over 15cm it is small enough to fit mid sized community tanks. The hardier plants are not touched by this Barb but it may nibble on fresh shoots of stemmed plants. It is a typical open spawner scattering eggs into clumps of fine leaved plants.

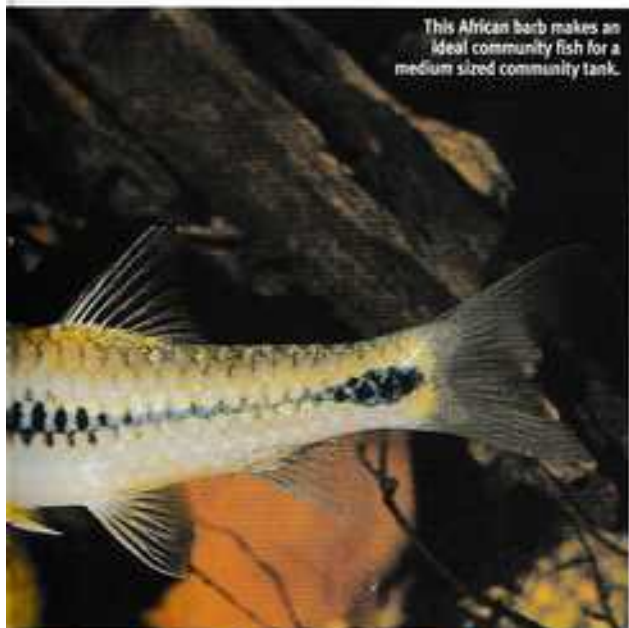




Difficult to breed initially, once the Simballe hemichromis did spawn they looked after their eggs and fry just like their close relative the jewel cichlid.

Gold jewel (*Hemichromis sp.*)

There are two new *Hemichromis* species from Guinea found in the Kalente River system near the Liberian border. The first from the small river of Limbun is already established among West African cichlid enthusiasts, known as the Red-fin jewel or Limbun jewel. The second from Simballe has proven to be a much more difficult fish to breed, considering that this is, after all, just a *Hemichromis*. The fairly large Gold jewel can grow to just over 15cm in length. Males develop a pronounced nuchal hump and are larger than the females. While water conditions are of lesser importance getting the Gold jewel to breed is not easy. After a massive water change this pair finally deposited 200 eggs on a piece of driftwood and set to guarding their eggs and young in typical jewel cichlid fashion.



This African barb makes an ideal community fish for a medium sized community tank.

tropical marine coldwater & ponds plants regulars

INSPIRATIONAL IDEAS IN THE JUNE ISSUE OF

WATER Gardener

WATER GARDENER



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Just add water

**Win £1000
complete
aquarium
set-up**

More aquarists than ever before are buying a complete system rather than trying to put together separate pieces of equipment to set up their own aquarium. In this series we look at a selection of these tanks and give them away to lucky readers. However, not only will you win the Duplarium set-up complete with plants from Tropica, but you will actually have it installed in your home by Today's team of aquarists!



WHAT THE BASIC SET-UP INCLUDES

Aquarium 100 x 50 x 50cm
(10mm glass thickness)

Volume: 250 l

Lighting: 2 x compact
fluorescent tubes

Filtration: 3l prefilter
9l trickle filter

Pump: Max flow 1,150l

Total size: 170 x 120 x 50cm

Cabinets and stand



DUPLA ARE LAUNCHING a new range of unique modern aquariums over the coming months. The first of these is ideally suited to the office environment and fits perfectly on the end of a set of filing cabinets or other office furniture. The tank is 100 x 50 x 50cm and unlike most aquaria currently sold, is left open to the room allowing plants to grow right out of the water. Above the aquarium is suspended a light unit

housing two powerful fluorescent lights to maximise plant growth both above and below the water's surface.

As you would expect with a Dupla product, the aquarium, cabinet and all the equipment supplied is built to the highest standards. Filtration is provided by a 3l prefilter and a hefty 9l trickle filter. This maintains the water quality to an excellent standard. All the equipment is tucked away out

of sight in the cabinet which enhances the professional look of the whole unit.

This new dimension to fish keeping is all the rage in Asia and looks set to become just as popular here as well. Today's Fishkeeper has one of these new Dupla tanks to give away complete with a range of beautiful plants from Tropica and other products from the Dupla range. All told the package is worth an estimated £1000.



This open aquarium is in the traditional rectangular style. Some of the new range will break completely new territory.

WANT TO WIN THIS COMPLETE SET-UP?

Write to:- Today's Fishkeeper, Just add water feature, TRMG Magazines Ltd., Winchester Court, 1 Forum Place, Hatfield, Herts. Include your name, address, telephone number and why you would like to have this complete set-up installed in your home or office. Remember you can get your fellow workers involved with this competition as well - after all, this aquarium could be a permanent part of their working environment!

TROPICA PLANTS

Tropica are based in Denmark and are one of Europe's foremost aquatic plant growers. Their range of plants includes many varieties which have been discovered or created by Tropica and are unique to this company. For further details and your local stockist contact Tropica Aquarium Plants, Box 3, 8530 Hjortshøj, Denmark. Tel +45 86 22 05 66 Fax +45 86 22 84 66 e-mail : tropica@tropica.dk Website :- <http://www.tropica.dk>



This view over an open aquaria shows just how attractive this type of tank can be.



Lighting for this aquarium is supplied by Dupla electra II which contains 2 compact fluorescent tubes.

DUPLA

Dupla are a German based company which produce high quality products specifically designed to help you grow aquatic plants and produce a beautiful living picture in your home. For further details contact Dupla UK, Ltd., Unit 25A, Francis Street, Leicester, LE2 2BE. Tel 0116 270 6010 Fax 0116 270 2913 e-mail info@aquaticproducts.co.uk Website :- <http://www.aquaticproducts.co.uk>

Tate's GALLERY

John Tate has more plants to add to his collection



Fish weed

Fish weed (*Zagorospion major*) originates from South Africa and is recognised as one of the most popular of all the oxygenating plants. It is often readily available from most aquatic retailers under its more familiar name of *Elodea crispata*.

Its rich green leaves are semi-transparent,

and are arranged as opposing pairs in tight spirals, curling back on pale central stems at one to two centimetre intervals, bunching together at the stem tips. Each stem branches to give a bushy appearance, whilst lower down aerial roots search for the substrate, more for anchorage than for nutrient up take, as most of its food is absorbed through the fine leaves.

Sold in bunches

It's mainly sold in bunches as a series of stem cuttings secured by lead ribbon. Many people buy it in this form and simply drop it in the pond, but this method is more likely to fail than if you were to buy it potted or pot it yourself.

1. Remove the lead ribbon and separate the stems.



Fish weed can take over a pond if allowed to grow unchecked.

Environmental concerns

In recent years there have been considerable concerns from environmentalists about the possibility of non-native plants contaminating our Waterways, and choking out our native plants. We should take this risk, although I believe it to be slight, seriously, and as enthusiasts dispose of any plant material we remove in a responsible manner. Leave the removed plant near to the pond's edge so that any life caught up has a chance to return to the pond, let it dry thoroughly until dead. Then it can either be composted, burnt, or put out for collection.

The beautiful Orchid like flowers of Water hyacinth make it well worth growing in a garden pond.



tropical marine coldwater & ponds plants regulars

2. Strip the leaves off the lower five centimetres of each stem.

3. Prepare an appropriate pot with some aquatic soil pushed down firmly.

4. Using a pen or nail, dib a series of holes into the soil at regular intervals approximately 6cm deep.

5. Place each stems into a hole and firm in well, once the pot is planted top off round the stems with washed gravel and place into the pond no deeper than 45-60cm.

Elodea and other Oxygenators are very beneficial to the pond and the life the pond supports, but too much could cause water chemistry problems putting the pond life at risk. It is, therefore, important that any oxygenating plant be kept in check once well established. The total amount of oxygenating plant material in the pond should never spread over more than 1/3 of the pond's area.

A beautiful floating plant for the summer

Water Hyacinth (*Eichhornia crassipes*) is an amazingly adaptive plant suitable for both the aquarium, and the garden pond during the summer season. It's a floating plant from the Pontederiaceae family, and is found throughout the tropical parts of America, and is also proving to be a bit of a nuisance in some of the Rift Valley Lakes in Africa. In this country however, our winters are too cold for it to survive throughout the year and it's best to treat it as an annual. Thus their availability is generally restricted to late spring/summer unless you source it for the aquarium.

What does it look like?

They have dark green, rounded/heart shaped, waxy leaves, with thickened leaf stalks forming spongy balls at their bases. Each ball contains a fibrous tissue that traps air keeping the plant buoyant, below which shoot the bright purple/blue feathery roots.

To keep them inside you really need a large open topped aquarium with plenty of lighting, but in the garden pond they will happily spread over the water surface, providing shade for the fish, mopping up nutrients that might benefit algae, and providing niche habitats for the pond's smaller creatures. However, many people are rightly attracted simply by the beautiful blue/mauve Orchid like flowers that, given warm weather and water, will bloom in trios proud of the leafy carpet supported on strong spikes.

Although unlikely to survive our winters, elsewhere in the world *E. crassipes* has choked waterways and caused havoc, herbicides having to be sprayed to control them. For this reason, any plants you remove when thinning out should be disposed of in a responsible manner.

If you have a heated greenhouse you could try to keep some plants over winter, to be put out again once the frosts have gone and the warmer weather has set in. ■



The Slender tetra (*Aquarionectes tenuis*) is a very fast moving fish with a streamlined shape and large pectoral fins. These make great community fish and only grow to 6 cm.

MOST FISHES ARE CAPABLE OF SWIMMING at considerable speed, sometimes over quite short distances sometimes much longer depending upon species, environment and habit. But this seemingly obvious statement can easily disguise or obscure just how fast certain varieties are capable of moving.

For instance it may come as a surprise to learn that one of the fastest recorded fish is capable of travelling through the water at a speed greater than the world's swiftest animal can attain on land. An impressive achievement, especially when you consider the far greater density of the water medium!

The creature in question is the beautifully hydrodynamic marine Sailfish that has been known to accelerate to a breathtaking 110 k.p.h. A speed in excess of the fastest animal on Earth - the Cheetah, at the peak of its run. Other Billfishes, with their characteristic elongated upper jaw bone formed into a sharp spike, like the Swordfish, together with the closely related Tuna, are among the very fastest aquatic animals.

Hydrofoil swimming

Such incredible speeds are possible for two main reasons. Firstly there is the overall uninterrupted smooth body line that achieves almost perfect streamlining.

Fliers and floaters

PHOTOS:
MAX GIBBS

Roy Osmint looks at Hydrofoil swimming and buoyancy

Secondly the fish makes maximum use of a technique known as hydrofoil swimming.

The fundamental principles behind the hydrofoil are fairly straightforward and are successfully employed in both ship and aircraft design (in the latter it is of course known as an aerofoil). The objective is to generate lift and thrust whilst at the same time creating a minimum of drag. Though effective hydrofoils in man-made applications

are relatively new, certain large fast-swimming fish species have been using the system to propel themselves for millions of years.

The basic principles of a hydrofoil are perhaps best described by considering a flat plate of asymmetrical design travelling forward through water and tilted upwards at an angle to its direction of motion. The extent of this angle is crucial and is known as "the angle of attack".

The amount of force that the water exerts on the top of the plate produces a factor called "drag", which acts in the reverse direction to that of motion. A third component "lift" acts at an angle of 90° to the direction of travel.

The optimum "angle of attack" is approximately 20°, when it provides its best lift value for a given speed. Above this angle the phenomenon known as stalling can occur, resulting in sudden loss of lift (a potentially

Sailfish have been known to accelerate to a breathtaking 110 k.p.h.

disastrous situation in aviation terms). The lift value becomes nil when the "angle of attack" is zero, as it also does when it reaches 90°.

Many fast swimming fish unwittingly adopt these principles to help propel themselves by effectively using their tails as hydrofoils. With the tail beating from side to side they progress through the water in a sinuous path. At the same time continuously adjusting the "angle of attack" so that with every stroke the effects of lift and drag create forward movement.



Take a close look at how your Goldfish move in the pond. You may be surprised just how powerful and precise they are in their movements.

As the fish's tail beats to the left the result is a forward movement to the right, likewise, when the tail moves to the right the result is forward to the left. The overall consequence of these actions is that the left and right inclinations cancel themselves out leaving only forward thrust.

Take a close look at your fish

The manner by which fishes propel and manoeuvre themselves with such power and precision within so diverse a range of habitats and environments, thus overcoming the numerous physical challenges presented by a totally aquatic

existence is, to me at least, one of the great wonders of the natural world.

Next time you are proudly admiring the colourful inhabitants of your aquarium or pond, try taking a closer, more sharply-focused look at their movements!

Notice the variation of technique between species and the differing results produced. Observe and compare the degree of body undulation that is being used to aid propulsion. Marvel at the exquisite delicacy of the various fin movements and appreciate how both individually and collectively they are subtly used to "fine tune" every action.

This is a "moving experience"! You might even find yourself seeing your fishes in a whole new light! ■

Another basic problem presented by an underwater existence is that, broadly speaking, water is less dense than most of the elements from which animals are made. In theory the consequence of this is that unless a fish is constantly on the move it will simply sink to the bottom.

Ancient cartilaginous fish, for example Sharks, present an excellent illustration of this. Although their bodies incorporate relatively high quantities of various low-density compounds such as lipids and oils, they still remain overall negatively buoyant. Generally, in order to prevent sinking they must keep swimming upwards or utilise their lateral fins (i.e. pectorals) as hydrofoils.



Sharks in order to prevent themselves sinking to the bottom must keep swimming upwards or utilise their lateral fins (i.e. pectorals) as hydrofoils.

Dwellers. Located within the body cavity the swimbladder is inflated with gas. This is constantly adjusted to suit the fish's depth by increasing or decreasing its volume as the fish ascends or descends in the water, automatically compensating for changes in pressure.

In the more highly developed modern fishes the swimbladder is of a closed design (unconnected with the gut). This is inflated with oxygen and carbon dioxide via an extremely sophisticated gaseous exchange mechanism directly to and from the blood supply. Rendering the fish, from this point of view, independent of the surface.

The swimbladder of the more ancestral modern fishes is inflated from atmospheric air at the water surface. In this case the anterior end of the bladder is connected to the gut via a short canal just behind the head. Air is taken in through the mouth and passed down the passage to the swimbladder. It in most cases exits the system via the same route.

BUOYANCY

More advanced bony fish (Teleosts) have evolved a remarkably ingenious way to overcome the effects of buoyancy differentials enabling them to always render themselves the same weight as the water in which they are suspended. This state of weightlessness produces neutral buoyancy and without physical exertion they will neither float nor sink. The organ that makes this possible is the swimbladder!

The actual bladder varies in size and shape dependent upon species and habit, indeed, in a few varieties it is absent completely. These would normally be constant movers (as with Sharks) or bottom

Today's Surgery

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Today's vet,
Lance Jepson, deals
with Dropsy (Ascites
and Oedema)



What causes the disease?

THERE- IN LIES THE NUB OF THE PROBLEM. Dropsy is not a disease in its own right, but a serious symptom or sign that can come about from a variety of different diseases and disorders. Dropsy is more correctly termed ascites where there is a build up of fluid inside the body cavities of the fish, or oedema when fluid collects within tissues. It is most commonly seen in freshwater fish.

When this fluid accumulates in the main body cavity (known as the coelom) what we see is a swelling or ballooning out of the body. This fluid, which is under some pressure caused by the limitations of the space

within the coelom, compresses the internal organs and blood vessels and so can affect the normal functioning of these organs. Fluid also infiltrates into the microscopic spaces of the tissues around the scales, causing an obvious protrusion of the scales to give the characteristic "pine-cone" appearance associated with dropsy. In the head, accumulations of this fluid in the eye sockets will cause the eyes to bulge outwards so that the fish exhibits an exophthalmia.

Why do we get these accumulations of fluid?

To answer this question we need to take a step further back and look at some of the problems encountered by a fish living in freshwater.

1. The fluids inside a fish (such as blood and lymph) are relatively more concentrated than the surrounding water because they have a wide variety of substances dissolved in them. Examples of these would be blood proteins, hormones and salts.
2. Fish skin and gill tissue is freely permeable to the tiny water molecules, which can slip through the microscopic gaps between cells. Larger molecules such as proteins cannot do this. Because the skin acts as a barrier to only some molecules, we can think of it as a partially permeable barrier.
3. Water molecules are constantly moving across this partially permeable barrier into

the fish in an effort to dilute its more concentrated internal fluids. This is known as osmosis, and the partially permeable barrier can be referred to as an osmotic barrier.

4. It is vitally important that many of the substances found in the blood and other body fluids have their concentrations controlled within very tight limits. The fish must therefore actively take account of the constant diluting effect of osmosis by excreting excess water (or salts if the concentration is too high), out of its system to keep the status quo. This regulation of osmosis is called, not surprisingly, osmoregulation.

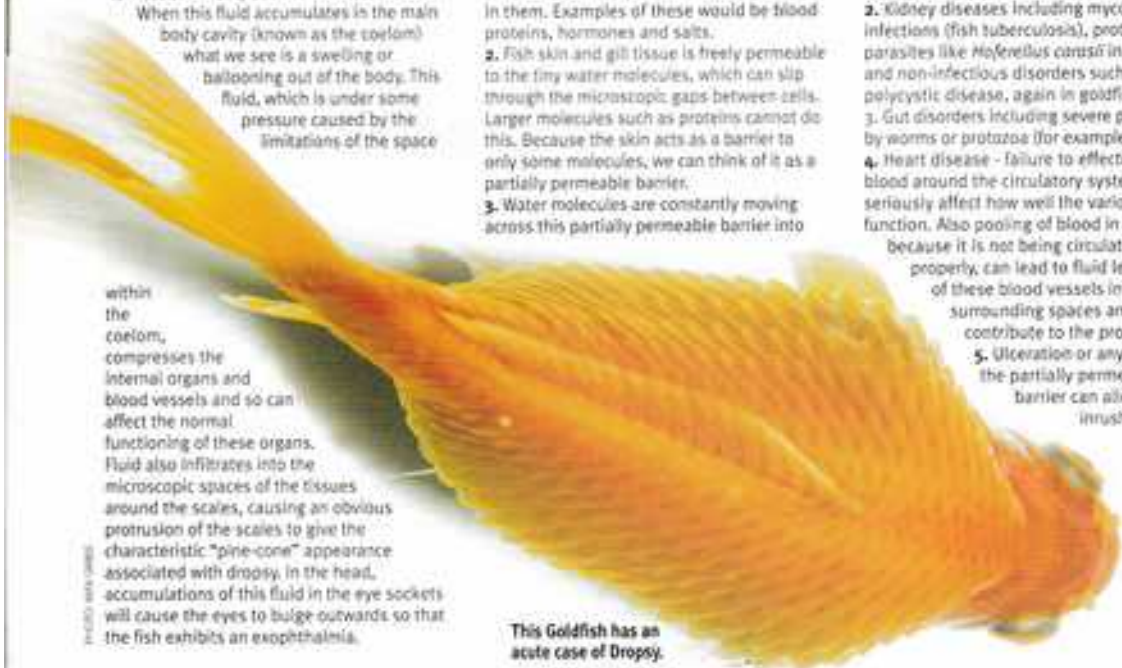
5. The main organs involved with osmoregulation are the gills, the kidneys (freshwater fish produce large volumes of dilute urine) and to a lesser extent, the intestines.

Dropsy is usually a multi-factorial condition. Fish that show classic signs of dropsy often have disease processes going on in several different organs at once.

Predisposing Factors

Any disease process that interferes with osmoregulation in freshwater fish can result in an overall accumulation of fluid in the fish which in turn will show as the signs of dropsy. Examples of these would be:

1. Gill diseases such as ectoparasites like *Dactylogyrus*. Bacterial gill disease and fungal infections can all contribute to disturbing normal osmoregulation.
2. Kidney diseases including mycobacterial infections (fish tuberculosis), protozoal parasites like *Myxobolus corynei* in goldfish, and non-infectious disorders such as polycystic disease, again in goldfish.
3. Gut disorders including severe parasitism by worms or protozoa (for example coccidia).
4. Heart disease - failure to effectively pump blood around the circulatory system can seriously affect how well the various organs function. Also pooling of blood in veins because it is not being circulated properly, can lead to fluid leaking out of these blood vessels into surrounding spaces and so contribute to the problem.
5. Ulceration or any breach in the partially permeable barrier can allow a major inrush of water



This Goldfish has an acute case of Dropsy.

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DISEASE FLOW CHART: DROPSY (ASCITES AND OEDEMA)



DIAGNOSIS

Species susceptibility. Any freshwater species.
Recognisable signs of disease. Swollen body cavity accompanied by classic "pine-cone" outline. Other signs such as ulceration, haemorrhage, loss of balance due to compression of the swim bladder, heavy breathing and so on should be noted. Remember "dropsy" is only a sign and consideration must be given as to what the underlying problem is. Dropsy is not a diagnosis in its own right.

to swamp the fishes' normal osmoregulatory balance. This can have other serious consequences by allowing the loss of proteins and salts from the body as they can bypass the osmotic barrier.

6. Liver disease. One of the many jobs of the liver is to manufacture proteins that are required in the blood stream. These proteins are large molecules and their presence bumps up the overall concentration of the blood and so they have an effect on osmosis. If the liver is not functioning properly then

these proteins may not be produced in sufficient quantity. This means that there is less difference between the concentration of the blood inside the blood vessel and the fluid in the surrounding tissues than there ought to be. This results in water molecules leaving the blood and accumulating in the surrounding tissues and spaces.

7. Nutrition. Low protein diets may have an effect on blood protein production by the liver; a vitamin E deficiency may predispose to heart disease and so on. ■

CAN MARINE FISH SUFFER FROM DROPSY?

Not surprisingly true dropsy is rare in marine fish. The same underlying disease processes still occur but the high concentration of marine water prevents the build up of fluid seen in freshwater species.

TREATMENT

- 1 Attempt to identify underlying problems and treat for them.
- 2 Because the accumulation of fluid within the fish is due to osmosis, reducing the difference in concentration between the fluids inside the fish and the water around it may help to redress the balance. This can be done by adding pure salt or sea salt to increase the water's concentration. A 0.3% salt solution is ideal - this equates to 30g (around two tablespoons) of salt added to every 20 litres of aquarium water, or 3.0kg per 1000 litres of pond water.
- 3 Drawing off fluid from the coelom by syringe and needle is sometimes of benefit. However, there are dangers in the risk of damaging the internal organs with the needle if one is unfamiliar with the internal anatomy of that fish species, and one may be removing so much fluid along with other vital dissolved substances that the fish may die of shock following such an invasive procedure.
- 4 By the time a fish is showing obvious signs of dropsy it is a very sick individual indeed, with the odds of its recovery heavily stacked against it. It may also be acting as a reservoir of infection for your other fish. If you cannot hospitalise in a separate aquarium or vat for treatment, I would strongly urge you to consider euthanasia of the fish on humane grounds.

DISEASE LOOKALIKES

Internal tumours are the most likely problem to cause confusion. The body outline of such fish is often not symmetrical and usually the scales do not protrude. Other internal abnormalities such as polycystic kidneys in goldfish can cause swelling of the body cavity, but again without scale protrusion.

Spring Viraemia of Carp is sometimes called Infectious Dropsy because of the characteristic swelling of the abdomen. Other signs include haemorrhages in the skin, mucoid faecal casts or strings hanging from an often protruding vent.

At first glance one could be forgiven for confusing Pearl-scale Goldfish, with their globular bodies and raised scales, with a severe case of dropsy!

The single most important factor in maintaining the health of aquarium fish is the quality of the water in which they live. Aquarium Pharmaceuticals offers a full range of products for maintaining a healthy aquarium including water conditioners, test kits, filtration products, cleaning products and more. Look for Doc Wellfish on quality products from Aquarium Pharmaceuticals.



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Ponderings

In **Dave Bevan's** regular column on ponds and pondlife he shows you how to plant a water lily and has a fascinating fact which could save your pond from leaking

Planting a water lily

Whether it has been grown from a section of rhizome, purchased from the local garden centre or has simply started to outgrow its existing container it makes good sense to ensure that a waterlily stands the best chance when it is placed in the pond.



STEP 1. Select a good strong plant with several developing leaves. Trim off any dead or dying leaves and flower buds.



STEP 2. Take a new planting basket and line it with hessian - note an old hessian sack which has been rinsed in water will allow you to line several baskets for a few pence each.

STEP 3. Half fill the basket with aquatic soil or compost and position the plant in the centre of the basket.

STEP 4. Add more aquatic compost and firm down round the plant.



STEP 3. Carefully remove the lily from its pot. If the roots have grown through the bottom of the pot then cut them off or tease them out but try to keep the root ball intact.



STEP 4. Add about twenty millimetres of pea shingle so that it completely covers the compost. This will help to keep the soil in the basket.



STEP 5. Lower the container slowly into the water, watching the air come out of the container, and make sure it comes to rest on the bottom of the pond at a depth suitable for the variety of lily. If you want to place the lily in the centre of the pond then use a ladder to bridge the pond and gently lower the basket on a piece of rope.

FASCINATING Fact

Wandering through some marshy ground the chances are that you will see some reeds waving gently in the breeze. They grow quickly and look great — just the thing for the back corner of the pond. Fine if you have an unlined natural pond or even a concrete pond but watch out if you have a rubber liner. As they grow reeds send out runners, which have very sharp points and are quite capable of puncturing a pond liner.

Buying Goldfish

New season stocks have arrived so a visit to the local aquatic centre is on the cards. Whether it is a few replacement fish or a complete restocking, avoid the temptation to overstock or restock with too many fish, too quickly, as it usually leads to poor water quality.

What should we look for in a healthy fish?

- 1 A healthy fish has quick movements, is lively and constantly on the move. Avoid any fish which lies on the bottom of the tank.
- 2 Check out the eyes, they should be clear and bright avoid a fish with cloudy eyes.
- 3 Look for bright crisp colours. Any fish with a dull appearance may have produced additional skin mucus in response to disease or stress.
- 4 Check the fish for injury. A missing scale or torn fin is not a problem in a healthy fish.
- 5 Check for signs of disease and reject any fish with fungal growth, on blood streaks on fins or body. Be wary of accepting apparently healthy fish from a vat containing diseased fish or from adjacent vats if they use the same water system.
- 6 Look for good solid well-proportioned fish consistent with the type you are purchasing. Avoid any fish with a disproportionately large head and small body.
- 7 Avoid any fish carrying parasites like fish leaches.

STERLET FACTFILE

Species: Sterlet (*Acipenser ruthenus*)

Other names: Sturgeon

Other forms: Stellate or Star sturgeon (*Acipenser stellatus*)

Size: Sterlet up to 1.2 metres. Star sturgeon up to 1.5 metres

Weight: Up to 50 pounds

Availability: Both species available through aquatic outlets as small 15 – 20cm long fish. These tend to be expensive.

Habitat: Slow moving water often with poor visibility.

Identification: A long streamlined fish with a pointed snout and large body

plates called scutes instead of scales. Dorsal fin towards the tail end of fish.

Habits: A fish of big rivers with a specially adapted mouth for bottom feeding, where it hovers above the silt from the bottom extracting the crustaceans and larvae. Possesses long barbels with which it can smell the presence of potential prey.

Pondfish value: Can grow to a very large size but is not really suitable for the small general purpose pond where it may not be able to compete with other fish for food. Possible candidate for the clean fish type pond but will not be able to compete for floating food.



Blanketweed can soon cause pond pump problems if it gets in the impeller housing.

Pond problem

On the whole garden pond pumps, whether submersible or surface mounted, are fairly reliable, often continuing to work under adverse conditions.

Most pumps have an impeller, which spins, inside a chamber, sucking water in through the inlet hose and forcing it out of the outlet. A partial blockage of either the impeller or chamber or indeed the hoses will result in a reduction in flow rate even though the pump is still turning.

Pumps often block early in the season, particularly if the blanketweed has grown quickly in early spring, so if the flow from the pump has slowed down or stopped completely it's probably the pump that has blocked.

Many pumps have an integral filter in the form of a wrap round mesh basket or a foam pad so always check this first before looking further. Once the filter has been removed, it is usually possible to split the pump impeller housing by undoing a couple of screws to reveal the problem — a tangle of blanketweed and plant material. Whilst the impeller is exposed check that it is securely fixed to the pump motor shaft.

After reassembly, reposition a submersible pump in the pond, ensuring that the inlet is well away from plant material or sludge on the bottom of the pond. →

COLDWATER: PONDS

Charles Thomas[®] Lotus flower. These are very beautiful deep water aquatic plants.



Plant lore

Deep water aquatics are also often called surface plants. This is because their roots are firmly fixed in the soil on the bottom of the pond but their leaves are invariably on the surface. This group, apart from containing some of the most beautiful flowers, performs two major functions critical to the continued well-being of the pond. The roots remove nutrients from the soil on the pond bottom whilst the leaves, usually large and flat, help to shade the surface areas that the marginals do not reach.

They are a small but varied group and include the early flowering Golden club sending up its yellow spiky inflorescences in early spring. The Water hawthorn flowers right through to autumn producing its large white flowers with their distinct vanilla like scent. Top in the beauty stakes, however, is the Lotus although it is not frost hardy and does best under glass. First place in this group must go to the very varied and prolific group, the water lilies, whose cultivars come in many sizes and colours.



A pair of Great diving beetles feeding on a dead Golden orle

POND PESTS

Pond snails lay lots of eggs and, given free reign, can take over any small pond unless the pH is very low. Snails prefer an alkaline pond with plenty of plant growth. Of course, not all snails are bad news and in moderation, snails have a place in the wildlife pond.

The beautiful chocolate brown Ramshorn snail seems to be self limiting in my pond and rarely can I find more than five or six adults, but the Great pond snail is a different story. Breeding rapidly through the spring, they can be found floating on the surface and feeding on most plants by autumn.

Check the leaves particularly Water lily leaves, and you will see the egg clusters (tiny black dots in a blob of jelly) sticking to the underside of the leaves. Remove the leaf or scrape off the blobs of jelly to reduce numbers.



Great pond snails can become a pest. To keep them in check remove some of their eggs when you find them.

BELOW THE SURFACE

Terror of the pond, the carnivorous Great diving beetle, is over 3cm in length. Capable of strong flight it moves to colonise new ponds and is on the wing this month. Occasionally landing on a patio or path or crashing into a window having mistaken the smooth surface for a pond.

Equally at home in the water it swims quickly using its powerful back legs like oars but it prefers to use stealth and ambush to catch its prey. No small pond creature is safe as it can tackle creatures larger than itself. Surfacing it takes in air which is stored under the wing cases; then it dives to grasp a water plant with its back legs. Here it waits motionless, until a fish or tadpole passes within striking distance when it is grasped by the front legs and drawn into the powerful jaws.

A valuable member of the fauna of the wildlife pond they are less welcome in the fishpond where they will eat small fry although any fish more than about 7cm long is fairly safe.



DISCUS PROBLEM SOLVER

Tony Sault answers your questions on Discus



A beautiful Turquoise discus bred by Klaus Grabowski.

Can I breed my Discus in a community tank?

I am soon to be setting up a 120 x 60 x 60cm fish tank with 3 x Fluval 404 external filters and a surface trickle weir in to a sump tank of 36l. It will also have a UV steriliser and 4 tubes on timers. These will be 2 x Triton 2 x Grolux and a Beauty light. I am intending to use live plant and bogwood decor. I am looking at stocking with 3 pairs of Corydoras to keep the bottom clean and a shoal of Tetras. I would like to keep 6 adult Turquoise or Heckel discus in with the others in the hope of breeding. Would this set-up be adequate to house my intended fish?

D. Lough, Barnstaple, Devon

Your intended set-up sounds excellent for the fish. I have only one misgiving and that is your intention to breed them. I would never say it is impossible to breed Discus in a mixed community set-up, but it is very unlikely as the tank mates of the Discus would have a field day with the eggs and/or small fry. To increase the chances of success, a breeding pair of Discus really need to be alone in a bare tank, but by all means please have a go and keep me informed of your progress.

What should I look for in young Discus?

I would greatly appreciate your advice on what to look for in young Discus, as I intend to buy small fish 5-7cm should I look for colour or size or what?

Jane Edwards, London.

I know the feeling well! It can be a daunting experience looking into a tank of young Discus and hoping that you are going to select good healthy specimens that will grow and live to a ripe old age.

The criteria that I use for young Discus are:

1. Shape. The young fish need to be a good circular shape, never elongated, as this is a sign of inbreeding. There should be no defects such as misshapen fins or tails.
2. Size. In a tank full of young fish always choose the size that are above the average size of the whole shoal, never the small ones. This will ensure that you get the fish that are competing well enough for the available food. Don't be afraid that in selecting the largest that you will end up with all males. I can assure you that they are just as likely to be all females or mixture of each.

3. Colour. In young Discus this is your lowest priority, as a Discus will change colour for the first 18 months of its life and finally, when sexually mature, will put on its finest outfit to attract a mate. I am always suspicious of fully coloured 5cm long fish as this is not what nature intended.

Is it possible to sex Discus at only 7cm long?

I have read your previous articles on sexing Discus but is it possible to select males and females from a shoal of 7cm fish or is it pot luck? Some people tell me that they can sex Discus at this size.

John Halliday, Bolton, Lancs.

In a large enough shoal the law of averages would probably give you about a 50% success rate, I am afraid I need to be a little more accurate than that, and as 7cm fish are not fully developed physically the usual rules that you would apply cannot be used. Having said that, I often tell the story of one of my lady customers who happens to be a professor of Zoology. On one visit she selected a "pair" of 7cm fish from a tank containing a shoal of 20. On a subsequent visit I asked how the fish she had previously selected were doing? Oh they are a pair she remarked! So, in awe of such a noted person, and always willing to learn of new techniques, I asked what criteria she had applied when selecting the fish. Women's intuition she replied! ■

American flagfish

They may not be the best community fish but as **Paul Skinner** has found they make a fascinating breeding project



FACTFILE AMERICAN FLAGFISH

Scientific Name
Jordanella floridae

Family
Cyprinodontidae

Distribution
From Florida southwards into the Yucatan peninsula in Mexico.

Size
Some reports to 5cm

Two males (upper fish) and a female American flagfish. Females have less colour and a black spot in the rear of their dorsal fin.

Aquarium set-up

Tank used	45 x 25 x 25cm
Filtration	Air-powered sponge filter
Substrate	2.5cm layer of silver sand
Decor	Tufa Rock
Plants	Cabomba, Cryptocorynes and Java Moss
Diet	Cabomba, Flake, Algae wafers, Peas, frozen Bloodworm and Brine shrimp
Temperature	18 - 24°C (24 - 27°C for breeding)
pH	7.0 - 7.5
GH	15 - 30 degrees
The fish	5 females 1 Male all just under 2.5cm when purchased

THIS FISH IS SOMEWHAT DIFFERENT TO most of the Killifish that we normally keep in the UK as firstly it originates in the United States rather than Africa, Asia or South America where most of the popular Killifish come from. This means that the fish are adapted to tolerate a lower temperature range than most of the fish that we keep in our tropical aquariums. Their favoured temperature starts at 18°C, which means that they can safely be kept in an unheated tank situated in a warm room.

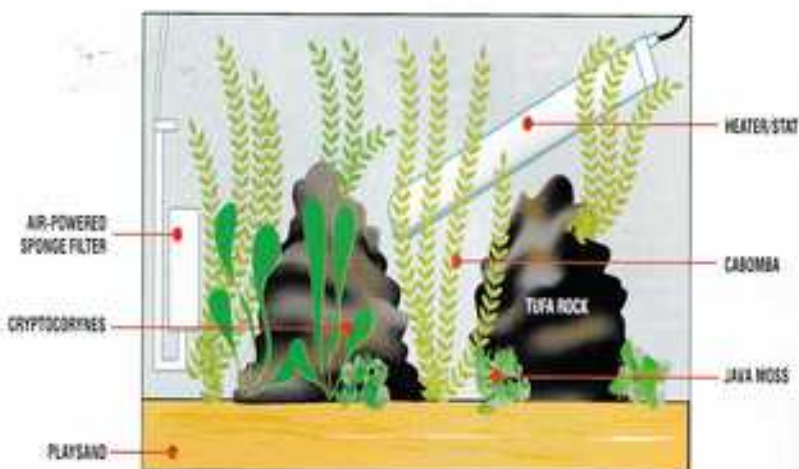
As the specific name suggests *J. floridanus* comes chiefly from Florida in the USA where they are one of the commonest fish. They are found in small, shallow, slowly flowing streams; in standing water and even in irrigation ditches and canals. This water is usually alkaline and brackish.

Difficult and aggressive?

When I first considered keeping these fish, I read that, as they were a member of the Killifish family, they could be demanding to keep and that they should be kept in a species tank as they were likely to damage tank mates. I have found that the males in particular can be very belligerent but with regard to water conditions, I have found them to be most accommodating.

In nature, Flagfish are omnivorous, a large proportion of their diet consisting of vegetable matter. The ones that I kept thrived on a diet of flake, algae wafers, peas, frozen Bloodworm and Brine shrimp. I also found that they were fond of eating soft-leaved plants such as Cabomba, so I added a bundle of these plants every couple of weeks just for the fish to browse on.

Having discovered as much as I could about these fish and having a spare 45 x 25 x 25cm aquarium at hand I decided that it was time to purchase some specimens. After nearly a month of staring at an empty tank (they can be hard to find in the shops) I finally found about 20 young Flags in one aquarium shop. They looked in good condition and were just under 2.5cm long, which was big enough to sex them. The sexes are easy to tell apart as



the females have a dark blotch at the rear of the dorsal fin, which is absent on the male.

I decided to buy five females and a male, with much anticipation after the long wait, I took them home, and introduced them to the tank that had been prepared. The tank water was slightly alkaline (pH 7.2) with 1 teaspoon of marine salt added per 4.55l. It was heated to a temperature of 21°C. The tank had a substrate of silver sand and was heavily planted with Cabomba, Cryptocorynes and Java Moss, as I was aware that the females would need plenty of hiding places, should the male turn nasty.

Careful change over

As these conditions were different to those that they were used to in the shop, I introduced the fish very slowly. Firstly, I turned the tank lights off before floating the bag for 25 minutes. The bag was then opened and I added the same amount of tank water into the bag. After a further 15 minutes, I repeated this procedure before leaving the bag to float for a further 15 minutes before gently letting the fish swim out. Although the natural reaction is to put the tank lights on at this point, I gave the fish a further hour to settle before these were switched on.

The fish settled down well and apart from the occasional skirmish they thrived, doubling their size over the next couple of months. It was towards the end of this period that the males' coloration was transformed. He became a beautiful blue-green colour with horizontal red stripes on the body and fins. At the time of purchase the fish were all very nearly the same colour. A basic olive-green overlain with a checker board pattern of dark stripes and reddish spots. Both sexes have a distinctive black spot on the body, which is larger in the female. The body shape is more like that of a Dwarf Tetra than that of a Killifish. Indeed, I have even seen them listed as such in some shops.

All in all, I found the Flagfish to be a fascinating subject for a species aquarium and one that I can fully recommend if only

for their interesting spawning behaviour. It would be interesting to keep some outdoors and I might well try this next summer. ■

SPAWNING

Once the male coloured up I noticed that both sexes were digging pits in the sand under the Java Moss, in exactly the same fashion as Dwarf cichlids do. I decided to remove all but the largest female and raised the temperature to 25°C in an effort to tempt them to spawn. A couple of days later the male was guarding one of the depressions in the sand and driving the female away from the site, although he would allow her in from time to time to lay more eggs. After three days I decided to take the female out of the tank and to leave the male to continue guarding the nest. After a further week the first fry started to hatch so it was at this point that I removed the male. Over the next two to three days the eggs continued to hatch and eventually there were about 450 youngsters free swimming in the tank. These were fed newly hatched Brine shrimp and powdered fry food from day one. Although they were not the fastest growing fry that I have raised they were sexable after about three months.

With the next spawning, I decided to leave the male in with the hatching fry to see if he would raise them like Dwarf cichlids do. However, he looked after them until they were free swimming but then they disappeared so I can only assume that he had made a meal of them. After this, I always removed the male once the young fish hatched.

Some reports state that they can be bred like other non-annual Killifish using a breeding mop and removing the eggs daily. It is stated that the males will then defend the mop, although I never saw mine displaying this behaviour.

COLDWATER: KOI

PERSONALLY, I AM NOT KEEN ON KOI SHOWS. I prefer to see Koi swimming and feeding both happily contented in the garden pond. Whilst I understand the Shows are a window on the hobby and an opportunity to tempt more people into keeping Koi rather than having a simple garden pond, my concern is always for the welfare of the fish. The summer is an important time of the year for the Koi to feed, grow and spawn. Immediately after spawning, the Koi will begin to produce eggs and sperm, which will mature over the winter months in anticipation of reproducing again in the following year.

Many of the Koi Shows take place through the summer, during the time when the Koi should be feeding actively. In order to reduce the amount of solid waste entering the show vats, the koi are usually

fasted for about a week prior to showing. I should also point out that fasting the Koi has little effect on the amount of ammonia they will produce, in the absence of food, proteins essential for tissue repair are just taken from other body tissues, including muscle. So, even though the Koi are completely starved prior to the show, ammonia production will still continue and foul the water in the show vat. Most certainly, the Koi will be under stress by the time they have been netted, benched, placed in the relevant vat and judged, so, they will be producing more nitrogenous waste, that is ammonia. Those responsible for the water quality monitoring and changing at many shows, know what hard work it is to keep on top of the water conditions, especially when the mature Koi in a number of vats choose to spawn. ■

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A vat full of healthy Koi at a Koi show



Koi world



Bernice Brewster looks at the world of Koi shows

LEGISLATION THAT HITS SALE OF KOI AT SHOWS

Regardless of my personal view of Koi Shows, I was quite surprised to learn this year that many have come under threat from legislation being enforced by local Environmental Health Offices, following guidelines issued by the Chartered Institute of Environmental Health. Under the Pet Animals Act of 1951, anyone owning a pet shop or aquatic retailer is required to have a licence issued by the Local Authority in order to sell animals. Interestingly, the meaning of the term 'animal' under this Act applies only to the vertebrates, or back boned animals but there is a huge market for invertebrates such as spiders, scorpions and giant snails. No animals or pets may be sold in streets or public places, which was extended by the 1983 Amendment Act to include stalls or barrows in a market or public place. One of the factors which has led to the enforcement of these Acts, interestingly involved the sale of fish, in a perspex cube, which were sold from stalls or barrows at some shopping centres. At the time, there was considerable concern for the welfare of these

fish, which no doubt were little more than Christmas novelties and stocking fillers to many of the purchasers.

Many of us involved in the ornamental industry expressed concern over this matter. The end result is the enforcement of this legislation. So, what does it mean for Koi Shows? Well, the Koi Shows can go ahead but as far as I'm aware, none of the dealers will be able to sell Koi, as no Pet Licences will be issued by the Local Authority. The Legislation that is applicable to the sale of fish in perspex cubes, also applies to the sale of Koi from Shows.

As one of many in the Ornamental Industry who was unhappy about the sale of fish in perspex cubes from shopping centres, I am prepared to stand up and be counted and say well done to the Chartered Institute of Environmental Health because at the end of the day, they have acted with the welfare of fish of paramount importance. It's just part of life's rich pattern that the Legislation has also impacted on the Koi Shows, you can't have it all ways!



Today's Guide to...

'C' numbers

Ian Fuller starts to make sense out of the 'C' numbers

ALTOGETHER THERE ARE ONE HUNDRED and fifty four known species of *Corydoras*, with many, many more as yet undescribed species circulating within the hobby. The recognition of these undescribed species and knowing which of them is being discussed is becoming ever more difficult. So how can this problem be overcome?

It was German aquarist Werner Seuss who first introduced the 'C' number idea in his book *'Corydoras. The most popular armoured catfishes of South America'* 1993. He listed five, at that time, unidentified species at the end of his book giving them a 'C' number reference. Whether or not he had intended the idea to be a way of cataloguing all unidentified species I do not know.

Great potential

Seeing the potential in having a system where by undescribed species could be referenced, another eminent German aquarist Hans-Georg Evers continued with the idea by adding another 14 species to the list. With some involvement from two other German aquarists, R. Stawikowski and D. Rösse, Hans-Georg Evers has continued to extend the list; publishing all the relevant details in the German aquatic magazine *Datz*. The list currently stands at C74.

This system is far more reliable than trying to relate to the names that are given to *Corydoras* species by the South American collectors and exporters or even importers. These names only perpetuate the confusion that already exists in the identification of these fish. Whether or not collectors or exporters will adopt the 'C' number coding remains to be seen.

This numbering system has no basis in scientific terms but it certainly makes life a lot easier when talking to other fishkeepers about a particular fish. There's nothing worse than discussing a fish with someone for half an hour, only to find you have been talking about two completely different species. I can think of several long established species that would be better recognised in the hobby if numbers were used instead of misidentified trade names. The recently described

Corydoras portonolensis Knaack, 2001 has been known for several years as 'C5'.

A few drawbacks

So far around 88 of the 74 species of *Corydoras* that have been given a 'C' number, have since been described as new species or have been positively identified. Like many well-intended ideas there are, however, some drawbacks and in this system the danger is to give a reference number to a specimen that has only very slight variations from another. This can be seen in a number of cases in the *Aqualog All Corydoras*. It is not my intention to criticise the work done by others in any way. I

know only too well how difficult this kind of work can be, but more to show how difficult it is to create definable visual borders between species. The main get out here would be to refer to the species as the cl. 'character' of a species, or aff. 'Similar to'. A sample of this would read 'C5?' *Corydoras cf garbei* or 'C5?' *Corydoras sp. aff garbei*.

Pictures may not always be readily available, therefore to give further aid to the fish's recognition I will describe the differences that distinguish it from the type species. With so many 'C' numbers now being recognised as true species I think this would be the best place to begin, so I will start by showing some of these first. ■



'C1' *Corydoras incolicana*
Burgess, 1993

This species has quite a variable colour pattern, which is similar to the variable colour patterns of *Corydoras amandajenei* making it very difficult to differentiate between them.



'C2' *Corydoras parallelus*
Burgess, 1993

The prominent horizontal stripes visually separate it from its near relatives *Corydoras schwartzi* Rösse, 1963 and *Corydoras ornatus* Nijssen & Isbrücker, 1976. The caudal fin in *Corydoras parallelus* shows very little pigment if any at all, the other two species have irregular vertical bars.

'C'4 *Corydoras virginiae*
Burgess, 1993



Visually this species is similar in shape and colour to *Corydoras cripticus* the difference being in the colour pattern. The markings are similar but the black elongated blotch in *Corydoras virginiae* extends down the side of the body and onto the ventral scutes. In *Corydoras cripticus* the blackish body blotch is more or less confined to the upper half of the dorsal scutes. In both species the black pigment in the dorsal fin has pretty much the same dispersion.

'C'5 *Corydoras pantanalensis*
Knaack, 2001



This is a recently described species which at this time is fairly common in the hobby. It has been known for several years and mistakenly identified as *Corydoras bolivianus* Nijssen & Isbrücker, 1983c or *Corydoras latifus* Pearson, 1924. *Corydoras bolivianus* was proved by Isbrücker, 2000 to be a synonym of *Corydoras geryi* Nijssen & Isbrücker, 1983c.

'C'15 *Corydoras lacerdai*
Hieronimus, 1995



This is a small species coming from southern Brazil being similar in appearance to the much larger *Corydoras borbotus* (Quoy & Gaimard, 1824). This fish is also known as "BAIANINHO 1" in the trade.

'C'17 *Corydoras stenocephalus*
Eigenmann & Allen, 1942



This fish has been around in the hobby for a long time. When it first arrived in the late 1970s it was thought to be a colour variation of *Corydoras oratus* Cope 1872.

'C'25 *Corydoras pinheiroi*
Dinkelmeyer, 1995



'C'27 *Corydoras seussi*
Dinkelmeyer, 1995



This species looks like a long snouted *Corydoras gossei* Nijssen, 1972. It also differs in the colour of the pectoral and dorsal spine coloration; *C. seussi* has a pinkish orange colour and *C. gossei* has a yellow orange colour.

Frogs and Friends

Bob and Val Davies suggest a good Toad for a beginner and try to create some sense out of the rules surrounding endangered species imports and sales



ABOVE: European Green toads are an attractive and 'easy' species to care for.
BELOW: Captive-bred Tangerine Honduran milk snake. This would be a good choice for those who want to handle their reptile.

GREEN TOADS (*BUFO VIRIDIS*) ARE A largeish (80cm) toad with a distribution ranging from Central and Eastern Europe into Central and Southern Asia and North Africa. Their coloration is variable - North African forms tend to be brown with dark green markings. In contrast the European forms can be very attractive with bright green markings and sometimes red spots on a pale or almost white background.

Captive Care

A vivarium 90 x 30 x 38cm will house about 4 specimens. A coarse, sandy substrate with a damper area covering 1/3 of the vivarium is needed with shelters in both damp and dry parts. Like many other Toad species *B. viridis* prefers a drier habitat than frogs. A small water dish can be provided. Required temperature range during the day is 21-25°C.



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falling to a minimum of 14°C at night. Photo period should be about 16 hours. Although most Toads are nocturnal *B. viridis* is frequently active during the day, even basking for short periods in strong sunlight. Preferred foods include Crickets, LOCUSTS and Earthworms - the former two will need to be dusted with multivitamin supplement. The Green toad soon associates its owner with food and becomes tame, and will feed from your fingers.

Breeding

An outdoor enclosure or converted greenhouse with a small pool can be used to provide more spacious accommodation for Green toads and they are more likely to breed in this type of set-up than in a vivarium. Males are slightly smaller with loose skin folds on the throat. In addition, during the breeding season, they develop nuptial pads on fingers. Winter conditions vary depending upon the origin of the toads. European forms will need to hibernate in slightly damp moss and leaves and be kept frost free at about 5-7°C for several weeks. For North African forms the temperature can be reduced to about 10-11°C for a similar period.

Increasing the temperature, photo period and spraying will help to trigger breeding. Up to 12,000 eggs have been recorded in one spawning; however, infertile eggs will rot and quickly pollute the water. It is probably better to remove a desired number to a separate container. The young tadpoles



Reptiles can be a lifetime commitment, our Stumptail skink died at the ripe old age of 32 years!

will graze on algae but small amounts of fish flake food can be supplied - again beware of polluting the water. Regular, partial water changes will also be necessary. Depending upon temperature the tadpoles take between 10 and 14 weeks to metamorphose. The young toadlets can be placed in a vivarium similar to that described above.

Your first Reptile

There is a wide choice of reptiles available, many of them captive-bred, for would-be keepers to select. In some instances a number of traders stock mainly captive-bred specimens. So how does one choose your first reptile? Some people have an instinctive fear of snakes and will not want to keep them. Others want a reptile which they can easily handle and this tends to rule out certain lizards such as Anoles which are relatively small and very quick moving. By contrast most snakes are easy to handle. A major consideration affecting choice is the equipment and space needed. In most cases reptiles need to be housed separately except for breeding - doubling the cost. In many cases the vivarium and other equipment will cost more than the animal. A few other basic considerations that need to be borne in mind are the cost of heating and lighting, feeding, replenishment of equipment such as tubes and substrate material and finally that, properly cared for, many reptiles can live for a considerable number of years. ■

REPTILES AND THE LAW

Interest in keeping reptiles has greatly increased during the last 15 years or so and many species have now been bred in captivity over numerous generations. Owing to protective legislation certain species are not now available or their import is controlled mainly by the Convention on International Trade in Endangered Species (CITES) and the Official Journal of the European Community (OJEC). More plentiful species are not subject to these controls but others are categorised according to their degree of endangerment and need appropriate licences.

There seems to be some confusion with would-be keepers over licences, some people thinking that to keep any reptile one needs a licence. Species such as Royal/Ball pythons (*Python regalis*) are listed on Appendix II of CITES and Annex B OJEC. This means that the **IMPORTER** must have applied for the appropriate licence before importing them. However the purchaser does not need a licence to buy them in a shop.

Restrictions concerning tortoises are rather more confusing. Some species such as Horsfields (*Agrionemys horsfieldi*),

Hingebacks (*Kinixys* species) are Appendix II CITES and Annex B OJEC and as in the case of the Royal python the onus is on the importer to get a licence. Again the purchaser does not need a licence. The importation of more familiar Mediterranean tortoises e.g. Spur-thighed (*Testudo graeca*), Hermanns (*T. hermanni*) and the Marginated (*T. marginata*) has been banned in Europe since the late 1960's and they are classed as CITES Appendix I and OJEC Annex A in all European countries. It is therefore an offence to bring them home from holidays in the Mediterranean countries where they occur. The last 20 years has seen captive-breeding of numerous specimens of these three types and they are regularly advertised. Any reptiles and amphibians under CITES Appendix I or OJEC Annex A cannot normally be imported but some captive-bred specimens may be offered for sale under strictly controlled conditions so anyone buying them should be given a licence issued by DEFRA as proof that they are captive-bred. On reaching soem shell length they should have an identifying microchip inserted. Some vendors may leave acquisition of the microchip to the buyer.

NEW SERVICE

Bob and Val Davies have agreed to join Today's Fishkeeper's panel of experts. If you have any questions or need help and advice then they can be contacted at Fishkeeping Answers, Today's Fishkeeper magazine, TRMG Ltd., Winchester Court, 1 Forum Place, Hatfield, Herts. AL10 0RN. Please include a self stamped addressed envelope with your question. Alternatively they can be contacted by e-mail at fishkeepinganswers@trmg.co.uk

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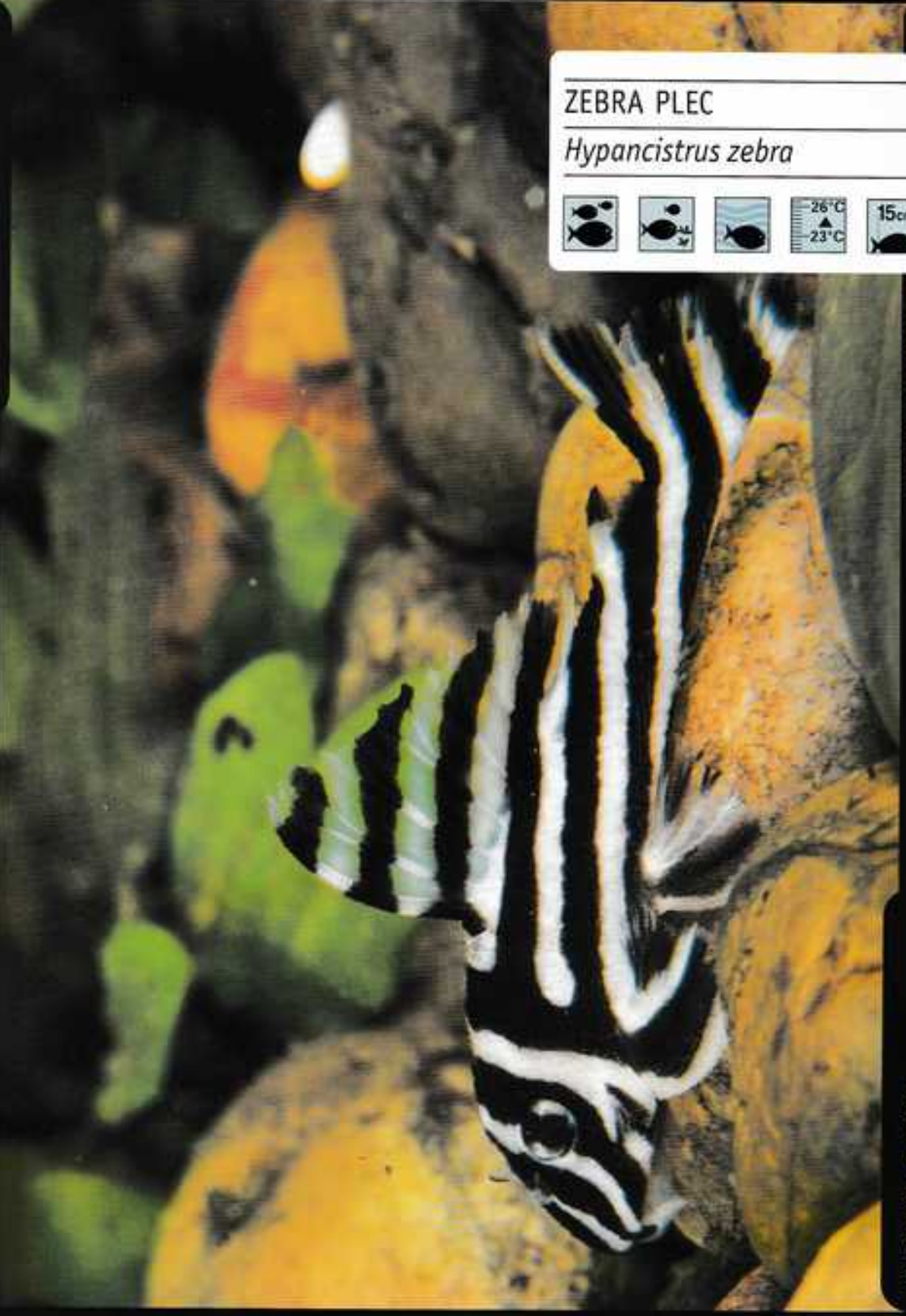
ZEBRA PLEC

Hypancistrus zebra

				
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PHOTO: MAX GIBBS

TODAY'S FISHKEEPER



...End Point

Perrin Keeling from Milton Keynes wrote in and asked **Pete Liptrot** for more information on the Ornate polypterus. He has a 75 x 45 x 37.5cm tank to start off with and then plans to transfer it to a 120 x 45 x 37.5cm tank as it grows. He also wants to know more about the water conditions and filtration needed to keep this fish and how long they live for. Here is Pete's reply.

YOU HAVE PICKED A PRETTY UNUSUAL species, but one that should give you a lot of pleasure. *Polypterus ornatus* comes from West/Central Africa with most of the ones that enter the UK arriving on shipments that originate from Kinshasa.

This fish is a member of an ancient lineage that dates back to the Mesozoic era, when dinosaurs were still the dominant life forms on Earth. This shows that they were built to last! Indeed, they are quite tolerant of water conditions, being able to breathe atmospheric air when the water in the areas they inhabit becomes deoxygenated during the dry season, but this should not be treated as an excuse to neglect good husbandry in captivity. If your specimen is only young, the smaller aquarium should suffice temporarily, but be aware that these fish can grow reasonably quickly when well fed. They can jump, and although they will survive out of water for extended periods of time, it is better not to take the chance, and ensure that there are secure cover glasses and a gap of a few inches between the water surface and the top edge of the aquarium.

Water conditions and filtration

As a guide, aim for a pH around neutral, and a temperature of between 25-27°C. Hardness doesn't really matter, but extremes should be avoided. Personally I would go for a combination of internal and external powered filtration to take care of the wastes produced by the fish. Any equipment inside the aquarium should be securely fixed in place, these are robust fish easily capable of pushing filter intakes around and of damaging loose heaters. Water changes should be carried out on at least a weekly basis, and should be at least 25% a time, more if water testing indicates that this is insufficient.

Aquarium decor

Decor isn't really critical, I would use a sand substrate (use aquarium sand), with branched pieces of bogwood to provide some cover. Plants would tend to be

uprooted, but if they will grow attached to bogwood (*Anubias* and *Bolbitis* would be geographically appropriate, otherwise use Java Fern) they will provide a welcome touch of greenery and also some extra cover for the fish.

This species can be skittish when first obtained, and if startled may panic which could result in physical injury if sharp or rough decor is used. Although they do have a very tough covering of scales (termed 'ganoid'), when damage does occur it can be quite serious and take a long time to heal properly.

Captive breeding

They have been bred, and the sexes can be distinguished by the larger and fleshier anal fin of the male. The fins in general are also somewhat more ornate, but this is really a relative measure, and requires comparison of several individuals. They have quite a long courtship, in which the male will follow the female, rubbing against her until she is receptive, at which point they will embrace, the male wrapping his anal fin around the vent of the female in order to maximise

fertilisation of the eggs as they are produced. I have no information on the potential life span, but to take a guess I wouldn't be surprised to find that 15 years is possible, maybe more. ■

Feeding

Feeding isn't a problem, they will take a wide range of 'meaty' foods, from good quality dry foods intended for larger fish (good for vitamins), through many different frozen foods to self collected foods like Earthworms. They quickly learn where the food comes from, and will let you know when they are hungry (which is most of the time!). They may even become overweight if fed on demand, and it would be a good idea to give them a fast day once a week.

Ornate polypterus make interesting pets which will give their owners a lot of pleasure.

