

# Today's Fishkeeper

MAY 2004 £3.25

PASSIONATE ABOUT FISH

PUMP  
Q&A  
SPECIAL

10 GOLDEN  
RULES FOR  
YOUR FIRST  
TANK

GIVE  
GECKOS  
A GO

THORNY  
CATFISH  
They're worth a look

CREATE A  
COMMUNITY  
with cockatoo dwarf  
cichlids

EYE DISEASE  
CASE STUDY  
with a happy ending

HOW TO  
GROW HEALTHY  
AQUARIUM PLANTS

SPAWNING  
FIGHTING FISH  
CAUGHT ON  
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ACCOMPANYING  
**AQUARIST  
 AND FISHKEEPER**  
 The Magazine for every fishkeeper - since 1974

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Cover picture by Max Gibbs:  
 Golden sunset platy  
*Xiphophorus maculatus* var.

# Welcome!

In any hobbyist magazine there's always a fine line between catering for readers new to a hobby and those who are more experienced. In *Today's Fishkeeper* there has to be a mix of information for beginners seeking basic knowledge and aquarists wanting more advanced articles. It's a balance all of us eds are trying to find, as all spectrums of readers are so important. In this issue there's something for everyone with *Starting Point* and the *Back to Basics* 'to golden rules' through to Erwin Schraml's Thorny catfish and the more unusual new Anabantoids in David Armitage's article.

I was having a conversation with Pat Lambert the other day about fish (as you do) and she raised a point which, although obvious, really got me thinking. We were discussing the difficulty of keeping kol and marine fish as they have such specific requirements, but then she mentioned that tropicals probably needed the most care taken with their environments. Tropicals are always seen as beginners' fish (and indeed they are in the true sense) but, as Pat pointed out, they come from such different environments. Depending on where the fish originates they can have wide variations in pH, water flow, water clarity, temperature, water depth, vegetation etc. They can also come from lakes, rivers or estuaries. Yes, I know marines have variations, too, but not to the same extent. However, although tropicals have more parameters they are more tolerant of different situations, and stability is often the answer. Many fishkeepers, serious about their hobby, try to replicate the right conditions for their fish and this is part of the rewarding challenge. Let me know what you think? I would like to thank all the club secretaries who have been in touch about new diary and show dates. Next time you have a club meeting have a look at the Diary Dates and make sure that all the contact details and dates are correct. If you've got a show coming up let us know about it so we can encourage people to attend - after all they're a great place to meet like-minded people and learn more about fish. Also if you go to a show, let us know who won what and send us a few photos.

See you next month

*Christina*

Christina Guthrie



# MAY

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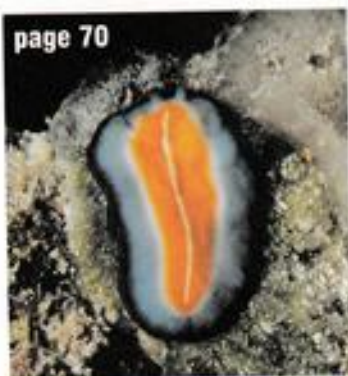
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### KEY TO SYMBOLS:

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

	COMMUNITY		MID WATER
	NON COMMUNITY		BOTTOM
	CARNIVORE		TEMP.
	OMNIVORE		10cm SIZE
	HERBIVORE		NOT SUITABLE FOR KEEPING IN CAPTIVITY
	SURFACE		

# Starting Point...



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

White cloud mountain minnow, *Tanichthys albonubes*, are definitely worth a second look

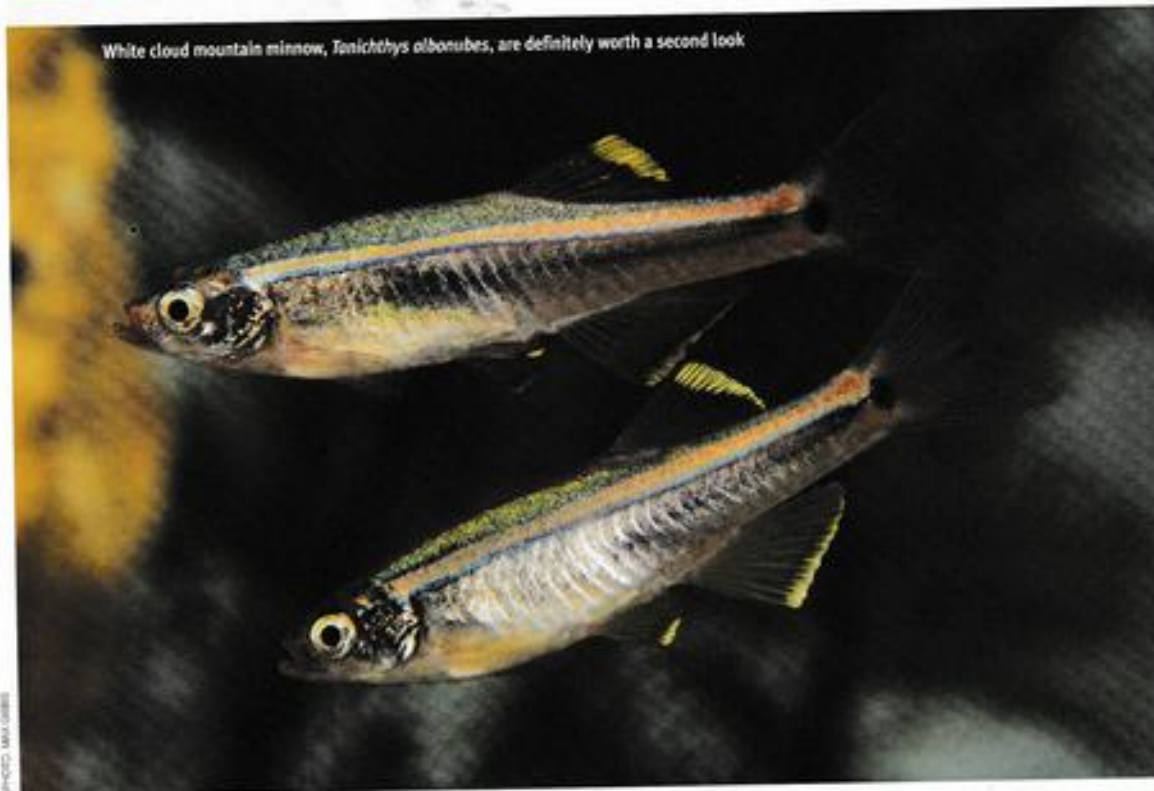


PHOTO: MAL COMBS

People often complain about having to pay a high price for some of the species that they want to purchase. Everybody loves a bargain but I have never been an advocate of selling fish too cheaply as it's the cheap sale of a living creature that leads the buyer into thinking fish are a disposable commodity, and if they die the purchaser can go out and buy some more. I don't think fish are treated with respect by those who think in this way.

**It is very important to follow the manufacturer's instructions when dosing with additives**

Many readers of this magazine, however, do not have this attitude and are much more caring as displayed by the overwhelming response to the 'Torture chambers for fish' campaign a couple of Christmases ago. This really showed what we hobbyists can achieve by working together when these were taken off sale in shopping malls.

White cloud mountain minnows were placed in these 'tanks'. These fish are very small but they come from fast flowing mountain streams where oxygen levels are high and swimming room is expensive, they also love to swim in shoals. Known as

the Poor man's neon tetra (I consider this a misnomer for this lovely little fish), White clouds like cooler conditions and I've kept a group in a large water barrel outside during the summer months which certainly makes their colours shine out.

## A pretty platy for you

There is a very wide range of cultivated platies out there but one of my favourites has been named the Hawaiian platy. The people who create these fish varieties often give them fancy names. Hawaiian males reach 4.5cm in length with females being a little larger. Hawaiians have a very

distinctive colour pattern. The underlying body and fin coloration is yellow at the front becoming red towards the rear. With maturity comes the black pigmentation over much of the body from behind the eye to just above the caudal peduncle and the tail should be bright red in good specimens, the other fins remain yellow. Females have the same colour pattern but tend to be more robust bodies. When you breed them some babies have much blacker bodies than the rest, these develop into clear finned black varieties not Hawaiians. Some will have no black pigment but the ones with scattered speckles are the ones you want. We once culled all the rest and kept

## WATER CONDITIONS

When recommending fish for freshwater aquaria I am a strong advocate for beginners keeping fish that enjoy the water conditions that are found in their own area's water supply. This makes maintaining pH values and degrees of hardness and softness easier to control. Additives are all very well but too little or too much can lead to real problems as these need to be carefully monitored and controlled.

the blacker ones thinking logically these would develop into Hawaiians. Big mistake!

These lovely, peaceful, undemanding fish make a lovely display in a community tank and they don't have an evil bone in their body.

Fishkeepers quite often want to keep soft water fishes in hard water areas and vice versa. It's sometimes a case of the grass is greener on the other side.

However, don't worry, most of the freshwater aquarium fish we keep tolerate a wide range of water hardness levels and prefer pH values from 6.8-7.8 (with a few exceptions of course). Here **STABILITY** is the key word. Any changes in water chemistry should be very gradual. Marines need strict controls on water chemistry as they are less forgiving than most freshwater fishes.

Remember that water passed through a reverse osmosis filter removes all contaminants and some essential minerals will need to be replaced for the fish's well-being. Hard water is usually rich

This female Hawaiian Lyretail platy has some faults and if used for breeding purposes these would have to be addressed. There is a short top lobe to the caudal fin and a slight fault in the body shape along the dorsal surface, but at 2.5cm long it's a good size



One of our own-bred Hawaiian platies



When breeding from Hawaiians of unknown ancestry don't expect them to all turn out to be Hawaiians

in mineral salts and pH is much more stable than in soft water. In the soft water aquarium pH can drop abruptly and really low pH can have a disastrous effect on most freshwater aquarium fish and all marines.

There are pH adjusters available which lower or higher the pH but these do not hold the pH stable as long as buffers. Buffers hold the pH at a certain level and it remains stable for a longer period or until the next water change is carried out.

## SIZE MATTERS

When choosing fish for a tank it's important not only to consider the size the fish grows to but its habits. Large fish that lie around in the tank and rarely move need less space than shoaling fish or fish that are constantly moving around in all areas of the tank. When purchasing cichlids or other territorial species make sure you read up about the extent of their territory because sometimes the territory for one pair of breeding cichlids can extend beyond the confines of the tank!



## LOST FOR WORDS

**Mechanical filtration:** Mechanical filtration only polishes the water and all new filters only do this when they have been running for some time to allow the biological bacteria to kick in. Ceramic rings are often used for this stage in larger filters. The simplest are the small corner filters that contain filter wool and some charcoal but these only polish the water and always remain mechanical filters. Sponge filters however, move on to becoming biological filters and are useful in small breeding tanks.

**Breeding traps:** These are used for livebearer fishes that give birth to fully formed young. These are plastic boxes with escape holes through which the fry can escape from the mother either into a separate compartment or into the tank which contains no other fish. Females can become very stressed in these traps, goodies in particular do not like them. The stressed, confined fish often abort their fry. A small heavily planted tank is best for most fish although some notorious fry hunters could need trapping.

**Compatibility:** You are really in trouble if you don't play close attention to this one. If you keep any community of fishes it is essential that they get along with each other or at least tolerate each other, living happily in their own designated area of the tank. Incompatibility of the species you keep in the community spells trouble for the fish, trouble for you and maybe the end of your fishkeeping days. Even fish that according to the books make good community dwellers may not fit in with YOUR community, so keep a close watch to see that all is well.

**pH shock:** Moving a fish to a new environment in which the pH is somewhat different from its former home can cause this. pH ranges from 0-14 with 7 being neutral. Even a small change above 0.5 can cause great stress and with a sudden change the fish can die.



The length of time a tank is lit would make a difference to the appearance of this Marbled veil tail angelfish, *Pterophyllum scolopendrum*.

Always test the water the fish is coming from and adjust to your conditions slowly to avoid pH shock. Reaction of the fish is fairly swift.

**Photo period:** This is the length of time a tank is lit during a 24 hour period. It is amazing the difference the photo period can make to the appearance of a fish. Joanne Norton experimented with differing photo periods with angel fish, even limiting the photo period to four hours, and found that the length of the photo period.

It is important to closely monitor the pH in the soft water aquarium

## BE WARNED! THIS IS A VERY UNFRIENDLY CREATURE

There are many small and pretty tetras, there are many medium sized peaceful tetras and there are some which it is best to avoid. Growing to an adult size of 15 cm, small Bucktoothed tetras do come in from time to time along with shipments but this is a very unfriendly creature. It will tear at a fish that is too large to fit in its mouth, tearing off scales and chunks of flesh, even gouging out the eyes. Very belligerent with its own kind but this is a very beautiful fish, particularly when young. Adults have a brilliant red margin to the anal fin and ventral fins are brilliant red. The lower surface of the body reflects all the colours of the rainbow. What a beauty; but what a beast – this fish has an extremely nasty nature. Be warned!

Evil bones abound in this tetra



## The 10 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 and 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 and nitrite and almost zero nitrate. Test the pH, pH7 is neutral, above this is more alkaline and below 7 is more acidic. Read up on pH requirements for any fish you intend to purchase.

**2 Temperature norms:**  
Freshwater/tropicals 21-27°C  
Marines 26°C  
Coldwater 13.5-21°C

Some delicate species have very specific requirements, read up on them before you purchase.

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

### THE FISH

**4 Stocking levels:** For freshwater/tropical we recommend 12cm<sup>3</sup> of surface area per 1cm of fish.  
Marines: For a fish only setup we recommend 2.5cm of fish for 9l of water and for Reef only setups we recommend 2.5cm of fish per 27l of water.

For your free beginners guide please call:  
0845 677 6770  
or visit our website:  
[www.aquarian.com](http://www.aquarian.com)



**AQUARIAN**

**Ponds** to a maximum of 250cm of fish per 4500l of water. Measurements should be based on the optimum adult size of the species not the size at the time of purchase. **NEVER OVERSTOCK**

- 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

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





## REVERSE OSMOSIS UNITS DOWN IN PRICE



D-Deltec Reverse Osmosis Unit

D-Deltec continues to drive down the price of high quality reverse osmosis water with their newly upgraded compact R.O. units.

The RUW99 compact unit uses the same quality TFC membrane and membrane holder as the ever-popular RUW50 – 50 US gallons/day model but has a disposable pre-filter and carbon system which makes it more compact; ideal for use in restricted areas such as aquarium cabinets.

The disposable pods will require more regular changing but are available at a lower price.

At only £79.99 the complete unit with sediment filter, carbon filter, membrane, tap connector, pipes and external pressure restrictor is nearly 25% less than the standard £104.99 RUW50 unit.

### 100-gallon membranes

Both the standard and compact R.O. units above are now available with a new 100 US gallon, (82 UK gallon, 375lt), membrane.

Standard format – RUW100 – £124.99

Compact format – RUW99 – £99.99

### Boost that flow

To maximise the flow from your R.O. unit why not fit a D-Deltec booster pump. This pump increases even the lowest water pressure up to 8 Bar which will massively increase the flow rate for most users and at the same time increase the water quality. The pumps have been reduced in price to only £79.99.

## Aquatic shop open day

A new aquatics shop in York is holding an open day on May 22.

Patrick Skelton, of Manta Aquatics, has been keeping tropical freshwater fish for some 27 years now – but marine fish are much newer to him.

He told *TFK*: "I have only kept marines for a year or so, and I am particularly interested in working towards aquaria which mirror the natural biotope as closely as possible."

His fiancée, Jillian, will "hold the fort" as shop manager and she agrees that their aims are the same.

"We love the animals we sell and value our customers – we want both to be happy," she said. "We believe that the best way of achieving this is by a combination of top-quality equipment and encouraging our customers to learn more about the animals they keep – hopefully without being patronising."

Situated on the outskirts of York, the shop is 40 metres square with 28 marine tanks, 28 freshwater tropical, one invertebrate tank and two show tanks. They will also sell dry goods, which will gradually increase with customer demand.

Why not visit them on their open day on Saturday 22nd May, from 9am until 5pm. All visitors will receive a raffle ticket, with a first prize of a £50 voucher to spend in the shop. For details see their classified advertisement on page 79 or visit [www.manta-aquatics.co.uk](http://www.manta-aquatics.co.uk)

If you have a new product coming out or you have some 'fishy' news to share please let us know. Write to What's new, Today's Fishkeeper, 6-7 The Rickyard, Clifton Reynes, Olney, Buckinghamshire, MK46 5LQ or e-mail: [editor@today's-fishkeeper.com](mailto:editor@today's-fishkeeper.com)

## Gourmet discus diet

Now available from Plymouth Discus, the gourmet discus diet hamper pack Discus Delights® is for sale in three sizes: starter pack, maxi pack and breeder pack. It has been produced because of the risk of non gamma-rayed frozen foods and poisoning caused by frozen foods being defrosted in transit and then being refrozen. This can make discus very ill and at worst, cause fatalities.

The hamper includes seven different safe-dried foods which have been carefully selected to form a different food for every day of the week. This gives the 'king of the aquarium' a choice of a highly

nutritious foods that will improve health and colour to keep them in tip top condition. Up until now only limited safe freeze-dried foods and colouring granules have been available. Now the gourmet discus diet hamper Discus Delights® has everything your discus needs all in one hamper. It's an affordable, fun way to feed your fish.

The starter hamper contains seven different 25 gram packets. Only £12.99  
Maxi hamper contains seven different 50 gram packets. Only £22.99.

Breeder hamper contains seven different 100 gram packets. Only £34.99.



# It's all about me!



PHOTO: MIA GIBBS

Cockatoo dwarf cichlid, *Apistogramma cacatuoides*

**Mary Sweeney** says you can keep Cockatoo dwarf cichlids (*Apistogramma cacatuoides*) in the community aquarium, you just have to know how

Dwarf cichlids are true cichlids in every sense but size. These 4in gladiators are not generally thought of as community aquarium residents, but if you remember that they are 'It', with a capital I, you can create a very fine community aquarium around the cichlid ego.

Amazingly – considering that when they are in spawning mode, they are almost as rambunctious as their larger cousins – dwarf cichlids are among the world's most beautiful species of fishes. My own personal good taste with regard to glamorous fishes is tickled by *Apistogramma cacatuoides*. The common names Cockatoo Apisto and Crested Dwarf Cichlid celebrate the extended dorsal finnage and the brilliant colour. Even more interesting than its eye appeal is that it is one of the easier of the tropical fishes to keep well in the aquarium. It doesn't require water chemistry so similar to the water where the original fish was found in nature as to defeat all but the most seasoned aquarist. Many of the less common dwarf cichlids, like the very exciting *Crenicichla*

regani, a South American micropredator, are quite hopeless if they're not kept in precisely correct water chemistry.

## Aquarium husbandry

A 40-litre aquarium is the minimum requirement for a male and two females if it is your desire to keep both males and females in your community tank. There will be little room for other species as this is about the smallest tank in which you can keep both male and female Cockatoos. The larger the aquarium of course, the more of everything that you can accommodate. Not only that, but the more likely you are to see the fishes displaying their normal range of behaviour.

## Hardware

The substrate of the aquarium should be fine gravel and dark coloured as these are fish that tend to stay close to the bottom. The darker coloured substrates usually give them a bit of confidence and thus they show us their best colour. Some professionals

**Tetra**   
The experts at making fishkeeping easy



swear by a substrate of peat moss and aged oak leaves that is siphoned out at every water change.

I cannot emphasise enough the need for furnishings in the Apisto tank. While a planted aquarium is lovely and certainly provides for many of the needs of this fish, we are not all water gardeners. Plastic and silk facsimiles can take the place of live aquarium plants with no complaints from the fishes. These plants will provide substrates for friendly bacteria and tiny aquarium foods just as well as the real ones. They will provide hiding places for fishes needing a little rest, and they will block the view between territories just as will the real live plants. Floating plants like Water Wisteria or a clump of Java Moss are generally pretty easy for the non-gardening aquarist and offer the dual benefit of making the fish feel secure and helping keep the water sweet. These plants are also great for pecking as they are covered with tiny micro-organisms that round out the diet of many small fishes, especially newborn fry.

## Foods

Cockatoo Apistos love live foods like daphnia, brine shrimp and small worms. Quality flake foods and frozen foods are also fine. Use sinking foods as opposed to floating foods for these bottom-hugging fishes. Make sure that the food you feed is small enough that the fish can actually eat it. If the particles are too large, they cannot be eaten and will soon cause water quality issues. It is said that a diet of at least 50 percent live foods will bring out the best colour and spawning vigour. Colour-enhancing flake foods are also beneficial, as these are fish that can really show off some wild colour when they're in top form.

As long as adequate territories are available Cockatoos will be tolerant of other Cockatoos. They are also tolerant of other dwarf cichlids. Larger cichlids like Angelfish are not really a good idea. I would prefer to see the Cockatoo as 'cock of the walk', with the other fishes being more peaceful, or smaller, or less likely to put up much of a fight if they stray into the territory of a courting Cockatoo. As soon as territoriality becomes an issue there will be a need for changes to be made. Sometimes a simple shift of driftwood will solve the problem, but sometimes you will have to remove one of the combatants. For such small fish, they can do a lot of damage to rivals.

## Appearances

These fish are from Peru, but most of the fish found in the hobby are captive-bred. The male is 9cm to the female's 6cm. He is full of colour and flashy finnage where she is muted in colour and has rounded fins. Mature males have a lyrate caudal fin and the dorsal fin of the male has long extensions that are similar to the crest of the avian cockatoo.

In the hobby you will find double red and triple red line-bred fish. The triple red



Red tuxedo platy, *Xiphophorus maculatus var*

## TANKMATES

If you are in the mood for a community aquarium that displays a single male Cockatoo to its best advantage, you can use quite a small tank, even a container not originally intended as a fish tank, such as a large decorative bowl (as long as there is a proper space for a heater and the ability to filter the water discreetly). Just a few gallons can provide a showcase for one stunning male and a few tetras and small catfish. Large Cardinal or Neon Tetras are safe in schools. This is one situation where I would leave out the Corydoras. Cockatoos stay close to the bottom and the cory could innocently stray into a compromising situation if the Cockatoos were in the family way.

But as one of the characteristics of dwarf cichlids is that they can be kept successfully with other species, a larger tank and a bit more furniture will allow you to successfully keep any number of peaceful mid-water and upper-water dwellers to enrich the view. They will also serve as dither fish to keep the dwarf cichlids sweet. Dither fish are fast, usually schooling fishes that encourage cichlids and other highly intelligent but wary fishes to trust the open water enough to come out where we can actually enjoy looking at them. Smaller armoured catfishes like Ancistrus and Peckoltia are fine with dwarf cichlids. Other suitable fishes could include Platies, Mollies, Tetras, Rasboras, and even Rainbowfishes. As long as the other fish are peaceable and suitable to the water in which you are keeping the cichlids, you should not have any troubles with small or equally sized non-cichlid companions.

Red cockatoo cichlid, *Apistogramma cacatuoides* var

morph is red on the dorsal, anal, and tail fins. The double red is red on the dorsal and tail. There are a few triple-red in double-red spawns, and these are usually pulled by the breeder to improve his own lines. These fish carry a lot of colour, much more than the wild fish, but they are not necessarily the best looking fish. There are times when shape is sacrificed to colour, and this is something that the experienced hobbyist will soon recognise.

### Reproductive strategy

Cockatoo dwarf cichlids are what are called harem polygynists – which means that one male will mate with several females. Or one male will mate with one female if that's the only option. In any case, once the female has laid the pink eggs and the male has fertilised them, she has little to no use for his company, and he is usually best removed if the aquarium is on the small side. In large aquaria, each male will claim a large territory within which are the

### WATER CONDITIONS

The water chemistry could be soft and slightly acidic as it would be in nature, but in nature they would be found over mud and decaying leaves and all sorts of yuck. These fish are quite agreeable about being kept in conditions that are a bit more convenient for the aquarist than usual. They are accepting of slightly hard water with neutral pH. They are unreliable spawners in hard water with a higher pH than 7.0 though, if that's your intention. The temperature should remain stable with optimum temperatures between 24–26°C.

Clean water is key. There should be no trace of ammonia or nitrite. Water changes should follow a regular schedule that stays ahead of any deterioration in water quality. This is the single most important issue in keeping a healthy aquarium.

territories of the females. It's a very good show to have one or two males and four or eight females in large aquariums. Distinct territories should be created with driftwood, rockwork, or other visual boundaries. If the fish cannot see beyond the territory it won't go out of its way to look for trouble.

The females need at least one, but preferably two or three caves of coconut

shell (cracked and cleaned of course), halved flowerpots, or other cave-like structures. The females are quite vigorous in their defence of their own caves and the centimetres (perhaps 25 square cm) around them. The males patrol the outer borders of the territory and visit the females when they are invited into the caves. It's highly comical to see the speed with which the male exits the cave once his job is done. He will still guard the entrance to the cave where the mother guards the clutch, but he is

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definitely not welcome again until the fry have grown and left the nest. It's just as well, because while the female is highly protective of the eggs and fry, he will usually just eat the fry, so the females know what's what with the male.

Depending on the temperature, the eggs hatch after two or three days. The larval phase lasts five to seven days. The fry are free-swimming seven to eleven days after spawning. The female cares for the young for about three weeks, during which time they will eat rotifers and plankton from sponge filters and off of aquarium plants. As they grow, they will need larger foods like microworms and brine shrimp followed by finely sifted flake food. This basic information is provided in case of emergency. Breeding fishes is a natural extension of the community aquarium, but is rarely successful in that fiercely competitive environment.

From time to time, you will see a pair of fish that is anxious and quite belligerent. That is just because they are frantically trying to protect those delicious eggs and fry from the rest of the fishes in the aquarium, which brings us back to the concept of one magnificent male cichlid per territory and a bevy of complementary species. In the community aquarium, it's just too-exhausting for the parents to try to protect all those young against the fast and the hungry. ■

Golden cackatoo cichlid, *Apistogramma cacatuoides* var



## 10 Community Cautions

### Big fish will usually eat small fish

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

### Fish require different water temperatures

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

### Fish have varying dietary requirements

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

### Do not mix riverine and still water fish

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



### Fish have different water requirements

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



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### Fill all the levels

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

### Never over stock

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

### Keep your eyes open

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

### Provide sufficient territory

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

### Differing dispositions

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

Create your community with Tetra's Virtual Aquarium at [www.tetra-fish.co.uk](http://www.tetra-fish.co.uk)

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

# Q&A Tropical

A four-eyed fish, (*Anableps anableps*). Make sure you have enough room to keep them



## Enamoured with anableps



I have just seen some four-eyed fish called anableps in a retail outlet. They are about 7cm long and are cute fish. I understand that they grow quite big and need a special kind of set-up just for them. I would really like to buy them as I love the rare and unusual, but want to know a bit more about them first. Can you help?

Sara Jessop, Isle of White



These fascinating livebearing fish are rarely imported as they do need special conditions to thrive. At 7cm long the fish you have seen are very young fish (anableps are born at 5cm long). The problematic period will be during the early days of keeping them as the rigours of transportation may have weakened them.

It really only has two eyes but each eye is divided, the upper part for seeing above the water and the lower part for seeing below. Anableps grow to 20cm long so will require a 120cm tank just for them. I kept mine in a 120cm long tank even when they were quite small. Water depth for these 7cm fish should be no deeper than 12cm as they swim just below the surface of the water, upper eye just above. Water should be moderately hard and slightly salted (towards brackish) with pH 7.8. They like it a little warm at 26-28°C. They need a sloping emergent bank as they like to spend time out of the water and a smooth basking area is greatly appreciated.

They are not fussy feeders, quite messy in fact, taking all foods including flake. Young anableps can climb up the glass sides of the tank so a light fitting lid is required. Adult anableps can run very fast on land as a friend of mine found out when he tried to catch one.

Pat Lambert

## WHAT'S WRONG WITH MY TERRAPIN?



I recently bought a hatchling Yellow bellied slider terrapin which is approximately the size of a 50 pence piece. Within a short while noticed that it was spending long periods of time on the basking spot (even in total darkness). It was also experiencing difficulty submerging itself in the water and it tends to float at the surface, sometimes at an angle.

I consulted a turtle keeping book which suggested a respiratory disorder and treatment with antibiotics. I have observed no sign of mouth breathing and the terrapin is eating quite well. I have increased the water temperature to 30°C as suggested. Could you advise me on what to do now as my local vet is not sure.

Matt, via email



The commonest reason that terrapins have the kind of buoyancy problem that you describe is due to pneumonia. Infected areas of lung become full of inflammatory material and thickened lung tissue. This increases the density of that lung, so what we see is the terrapin swimming with whichever is the densest, heaviest lung downward. The least affected lung (which has more air in it) will point upward. The cause of the infection is usually bacterial, but it can be fungal.

Initially treatment should consist of:

1. Raising the air and water temperature to around 30°C, which you have already done.
2. Keeping him in a minimal amount of water (just enough to submerge himself) – sick terrapins often become weak and drown.
3. Antibiotics – a good one is enrofloxacin at 5mg/kg bodyweight once daily by injection. A good alternative is marbofloxacin at 10-15mg given once daily by injection (although marbofloxacin is not as yet licensed for use in reptiles).
4. X-rays are often very useful in determining the extent of the pneumonia.
5. If the terrapin does not respond to the above then further investigations may be required.

Your vet can contact me for more information via any of the telephone numbers listed on my website [www.vet4dragons.co.uk](http://www.vet4dragons.co.uk)



## Clown loach problem



I have a 630-litre tank housing 10 clown loaches, four congo tetras, four dwarf neon rainbow fish and two large wild Dumerelli Angelfish.

The tank has been established for over two years, pH 7, ammonia and nitrite 0, nitrate max 30/40 GH 3 KH2, water temperature 83°F. The fish are fed a varied diet including tablet, flake and frozen food and an occasional live brineshrimp.

The problem only affects my clown loach. All of them to varying degrees have dark grey/black marks, mainly in the head area with some on flanks. The marks are various sizes/shapes and do not appear raised. They are also clearly visible on the pectoral, pelvic and anal fin. They are not so obvious on the caudal fin but I can see one or two little holes through the caudal. There is a some flicking (50% barbels and 50% gills) and a slight greyish edge to both corners of caudal. Two of the clowns are becoming emaciated. Breathing is normal, colour is ok, they're active and feeding. I am a bit lost as to what I need to treat. Reader via e-mail



My main concern would be a sporozoan infestation, something that clown loaches are particularly prone to. Sporozoa are protozoa and are extremely difficult to control – even prescription-only medications such as metronidazole cannot control this parasite, which seems to enter via the gut and spreads to various parts of the body, the muscles in particular. The main sign that we see is muscle wasting, with eventual loss of appetite and death. The dark patches you describe, if in the muscle, are likely to be areas of increased pigmentation around accumulations of these parasites. Curing at present is not an option – I would consider culling any obviously infected fish, and quarantining any new clown loaches for at least four weeks. Other possibilities could be fish tuberculosis or even worm infestations such as with Capillaria, but as your problem appears to be confined to the clown loaches, I am strongly suspicious of sporozoa. Lance Jepson



I have just acquired an aquarium which I hope to set up for tropical fish, but it has a dull patch on the glass which has been caused by sharp gravel being rubbed onto the glass with magnetic cleaner pad. We can't turn tank around as it is built into a cabinet and has a built-in tank, end filter and skimmers etc.

Is there a way of polishing out this annoying mark or do we just have to put up with it? Ray, via e-mail



Unfortunately, this can be one of the risks of buying a second-hand aquarium. I once bought an old aquarium with a similar mark,

### GLASS MARK

but was able to turn the aquarium around and hide it at the back. As you mention, this is not possible in your case.

The risk of trying to 'polish' the scratch away is to make it worse and I would not recommend that you try. Have you seen how it looks when the aquarium is full of water as the appearance of some scratches improve once the aquarium is full? Perhaps you'll have to put up with it and use the bargain price for which you bought this second hand aquarium as some consolation! Ben Helm

### Today's Answers Expert Panel

**All Stalsberg** Cichlids

**Pete Liptrot** General questions on tropical fish and oddballs

**Andrew Caine** General questions on marines

**Ben Helm** General questions on coldwater plus equipment and technical advice

**Lance Jepson** Health

**Tony Sault** Discus

**David Armitage** Anabantids

**Pat Lambert** Livebearers, Rainbows and breeding fish

**Ian Fuller** Catfish

**Andy Gabbutt** Killifish

**Stephen Smith** Goldfish

**Bernice Brewster** Koi and ponds

**Val Davies** Reptiles and amphibians

### Questions by Post

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

### Internet Service

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

Guppies are prone to certain diseases even though they are quite hardy fish



## What's killing my guppies?



I bought a 2ft tropical set-up about eight months ago and it has been running perfectly. However, about two weeks ago I noticed a problem. The disease is only affecting female livebearers and the symptoms are that the caudal fin looks like it has fin-rot, then the next day, the rear end of the fish up to the pelvic fins starts to discolour and becomes dropsy-like. The next day the fish disappears, I presume they have been eaten. Is it a bad case of fin-rot? Tony, via email



I can't be sure without seeing the fish, but I have two suspects at the top of my list. The first is a bacterial infection with *Flexibacter columnaris*. This infection causes severe fin and tail 'rot' and can easily cause extensive damage and ulceration to the skin – this may appear as whitish patches on the skin before developing into a full-blown ulcer. This infection is so often associated with livebearers that it is often known as

'guppy disease'. Early cases may respond to proprietary medications or hospitalising affected fish in salt water – more advanced cases may need antibiotics but with the speed of the disease this may not be a practical proposition.

Another 'guppy killer' is a protozoan parasite called *Tetrahymina*. This causes extensive damage to the skin and gills to the extent that it may allow secondary infections to establish. One of the many anti-protozoal medications should be effective, although this parasite can burrow deep into the muscles underlying the skin, causing damage and hiding from the medications! Classic signs include pale or raw patches of skin, secondary infections and respiratory signs.

My feeling is that it is probably *Flexibacter* that is your problem. Treat or euthanase at the first sign of trouble – allowing the fish to die and be scavenged is an ideal way of transmitting any infection or causing an environmental build-up of pathogens. Lance Jepson

## CAN I KEEP MARINES IN THIS TANK?



I am looking at setting up a Jewel Trigon 190 tank. The reason that I am looking at one of these is because everything is enclosed. I know it is on the small side but I have limited space. Can you tell me about the filtration system. Is it suitable for marines? If not can you advise me on any extra equipment that I would need. Colin, via email



I can understand why you have been drawn to this aquarium – it's very stylish, compact and ready-to-go. The filtration unit is adequate for keeping marine fish, but may prove a little limited for inverts (as will the two factory-fitted bulbs). You will need to bear in mind that unlike their freshwater counterparts, marine fish do not tolerate changes or fluctuations to their environment and so you should mature your new aquarium steadily by adding single fish at a time, ultimately settling for a far lower stocking level compared to freshwater tropicals. You will find that with the addition of a little live rock from the start your aquarium will benefit the maturing process and will help to introduce those inverts that will live under the supplied lighting. Finally, with regard to your concerns over the filtration and it's suitability for marines, take comfort from all those marine aquaria (especially those in retail outlets) that are just filtered by an undergravel filter and still function very well – maturity and stability are key to success. Ben



# Marvellous fish



Blue flag mudskipper, *Periophthalmus vulgaris*. These fish spend much of their time out of the water

PHOTOS: MAX GIBBS

## Kathy Jinkings continues her look at some amazing adaptations in the world of fish

The temperature at which we keep our fishes is far more critical than if we were keeping, for example, pet mice. This is because fishes are 'cold-blooded', that is, cannot warm themselves up and have a body temperature governed by the surrounding waters. The Antarctic silverfish, *Pleurogramma antarcticum*, indeed, is extremely cold-blooded. Contrary to popular rumours about fish thawing out of frozen ponds, no fish can actually survive being frozen solid. The silverfish, like other notothenoids, the group to which it belongs, can survive in water as cold as  $-6^{\circ}\text{C}$ , so long as there is not free ice in the water. It does this by a remarkable adaptation – its blood contains glycopeptide antifreeze compounds, which keep it alive when other fish would have become fish-flavour lollies. The kidneys of a normal fish would remove these molecules, so the notothenoids have kidneys that lack glomeruli – the little structures that remove small molecules from the blood.

### Breathing air

When the fish that eventually became the amphibians left the water (some of which

turned their backs on it completely over millions of years to become reptiles), plenty of fish found air-breathing, to a greater or lesser extent, to be a useful feature while staying in the water. The mudskipper is a great example of this. These endearing little fish spend a great deal of their time out of

water, bouncing around on mudflats. They do this by remaining in a moist environment, where their gills can still function and their moist skins can also serve as a 'lung'. Other fishes have reused existing organs to enable them to get that extra little bit of oxygen when the waters are oxygen depleted.

### TEMPERATURE CONTROL

Some fishes are not content with adaptations to enable them to survive the cold, but have actually taken the first steps towards self-heating. When muscles contract this generates heat, which is why we shiver when it is cold. Some sharks, notably the lamnid sharks and some threshers, are able to save up the heat generated when they contract their muscles, and use this to keep their stomach and muscle temperature between  $7-10^{\circ}\text{C}$  above the water temperature. When the body gets cold, its functions are impaired.

Fishes like the marlin, which swim long distances and hunt in colder waters, have developed a unique method of keeping their eyes and brains warm enough to function properly even when the water is cold. One of their eye muscles lacks the parts that make the muscle contract, and instead use the muscle to generate heat by recycling calcium. This is not real heat regulation though, as they cannot preserve a constant temperature, simply keep themselves a bit warmer. Some tuna also simply manage to heat themselves up, but the bluefin tuna, which travels great distances through waters ranging between  $7-30^{\circ}\text{C}$ , manages to keep its muscle temperature between  $28-33^{\circ}\text{C}$  regardless. As cold blood leaves the gills, it passes through blood vessels where it passes closely, and in the opposite direction to, heated blood returning from the swimming muscles, thus maintaining a comparatively stable body temperature.

The African lungfish, *Protopterus annectens*, can hibernate for up to four years



Loaches are one of a number of fish that are able to absorb atmospheric oxygen through the intestine. Anabantids, such as the popular aquarium gouramis and bettas have developed a labyrinth organ, situated above the gills and occupying most of the gill chamber. This organ enables them to breathe air, but there is a price to pay. Since the gills have been reduced to make room for it, air-breathing is no longer optional, and if they cannot reach the surface to breathe they will drown.

### Lungfishes

The lungfishes show many characteristics similar to the amphibians – indeed, early on they were classed as amphibians because the juveniles have external gills, and they also possess true lungs. As the fish matures, gill function is reduced and the external gills disappear, rather like newt tadpoles or salamanders. Not only do they possess lungs, but they also have an answer to one of the major problems of leaving the water – not just being able to breathe air, but being able to

avoid drying out. This is still a problem for many frogs and amphibians today, but the lungfish is able to survive when all the water is gone and only dry, cracked mud remains. While the mud is still soft, but disaster is looming, the lungfish digs up to a foot deep in the mud, and curls up there with its head pointing upwards. It then secretes mucous which fills its burrow around it. As the mud dries out, so does the mucous, forming a closely fitting chamber with little fluid loss. The lungfish then becomes dormant, just as many animals hibernate, with reduced heart rate. For up to four years it breathes air exclusively, waiting for the water to return.

This doesn't, however, constitute an active life on land. The mudskipper at least gets about a bit, in spite of having to keep its gills moist (although this has never seemed to hold back the common woodlouse, which most people would be surprised to know still has gills). The mottled Loricariid catfishes are not only able to breathe air through their intestines, but the armour plating that protects them from predators also protects them from drying out, and although not usually known as a "walking" fish there are many records of them leaving drying pools to cross overland. A number of other fishes also do this, from the climbing perch of Asia and its African counterpart, to the "walking" Clarias catfish and even the eel. A lack of water in the way is no reason for many fishes not to go somewhere!

### Making electricity

So far all the remarkable adaptations we have looked at are similar to features adopted by many "higher" animals. But the fish have a few tricks all of their own, possible only because of the watery environment they live in. With few exceptions, electricity does not travel through air. Land-living animals would find the ability to generate fairly useless. However,

The Electric catfish, *Mastomus electricus*, can produce approximately 300 volts of electricity





The Peter's elephantnose fish isn't a very sociable creature

in their watery, electricity-conducting world, many fish have evolved the ability to generate an electric current, which can be used for a variety of purposes. The electric catfish, *Malapterurus electricus*, is able to produce around 300 volts of electricity, which it uses to stun fish for supper and for defence. The electricity is produced from an organ derived from the pectoral fins, which almost surrounds the entire body. After producing a discharge, the catfish needs some time to 'recharge its batteries'. Compared to the electric eel, *Electrophorus electricus*, this is a strictly amateur effort. A discharge of 500 volts was recorded from a 2m electric eel. Since the maximum discharge increases with size, and electric eels grow up to 2.5m long, this makes them not to be messed with, and they are treated with respect by the natives of South America.

Electricity has other purposes than just providing massive electric shocks. The mormyrid Elephantnoses of Africa, and their equivalent in South America, the gymnotids, live in dark murky waters where they can't see very well. They produce weak pulses of electricity which enable them to navigate and, possibly, communicate. The aquarium fish Peter's elephantnose, *Gnathonemus petersii*, is a territorial mormyrid that is aggressive towards others of its species, and this behaviour has been demonstrated to involve the production of weak electric discharges. *Gymnotus coropio*, the banded knife-fish from Central and South America, is also an aggressive fish, but has been shown to be able to distinguish between 'friendly' neighbours from nearby territories and

'threatening' strangers which are not familiar. It does this based on electric discharge alone.

### Detecting vibrations

Although we, and other land animals, perceive some waves as 'sound', fish can not only hear sounds but also can detect other vibrations and pressure waves in the water. To do this they have a lateral line system – a long groove or line of special cells designed to detect even the smallest vibration in the water. This helps them detect vibrations originating from predators, prey, or other members of a school, and also reflected from obstacles to help them to navigate. Indeed, some fishes, like the blind cavefish, *Asynoxis mexicanus*, are completely sightless (the

cavefish starts out with eyes, but as they mature they are overgrown by skin). Nonetheless, anyone who has kept some of these in a tank will know that they are not in the least inconvenienced by the lack of eyes, and they are remarkably adept at not bumping into things.

Although we aquarists are familiar with a wide range of fish shapes, certainly not just the 'oval and triangle' theme, not to mention a staggering array of colours and patterns, sometimes we forget that fish are as biologically complex, diverse, marvellous inside as any other type of living thing. Fish are one of the most successful and earliest forms of complex life, and continue so to this day. Rather than having just been bit part players in the ascent of man, the fish are still starring in their own, ongoing story. ■

Blind cave fish, *Asynoxis mexicanus*



# What's it worth?

The true value of your aquarium lies in having healthy livestock in a thriving environment. **Andrew Caine** has some good advice

By following some simple rules you can achieve your dream marine aquarium



PHOTO: MAX GIBBS

Make a list of your hardware and livestock then add it all up and see just how much your aquarium is worth. Of course this isn't the true worth of your aquarium because aquatic goods are like brand new cars... as soon as you get them off the forecourt you've lost a great deal of cash. So what exactly is the true worth of your marine aquarium and how can you improve it?

You need three things in this hobby to improve the true value of your aquarium and these are knowledge, guidance and a good retailer. All three elements act in a synergistic manner and together they mean you can keep the healthiest livestock in the best environment possible. There's nothing better than having friends round for dinner and realising that at the end of the evening they are so in awe of your aquatic wonder, that there's hardly been any conversation!

## Knowledge

Wow, what a one to start with! I am the first to admit that I have only taken a sip from the holy grail of marine aquatic knowledge. But I do know that to get the best out of the

hobby you have to have an understanding of the true complexities and understand how one action can cause so reactions within a closed system. This knowledge is gained quite simply through experience, study and trust. You must also remember that if one action works for one aquarium then it could be disastrous for another. Why? No two aquariums are alike in size, stock and chemical interactions both physical and biological.

I have heard the following many times: "I have been to so many shops, on the internet and at clubs trying to get advice and all the information is different. My head is going to explode, and I thought fish keeping was meant to be relaxing!" Quite simply the person is suffering from an acute case of information overload. So to avoid this you have to follow three simple rules and then it will start to fall into place. Remember that you must learn to crawl before you can walk.

## Rule one:

This is the most simple rule and one that is

the biggest cause of disasters in our hobby because people feel stupid. Basically, there are no stupid questions in this hobby, and anyone who laughs at a question should remember that they were once learners. Nobody knows it all, so if you run into one of these people avoid them at all costs.

## Rule two:

Take things one step at a time. Don't go too fast and remember when you first learnt to drive. When you got into a car you had to think about indicating and looking into the mirror, but soon these aspects became second nature – it's the same with your fish hobby.

## Rule three:

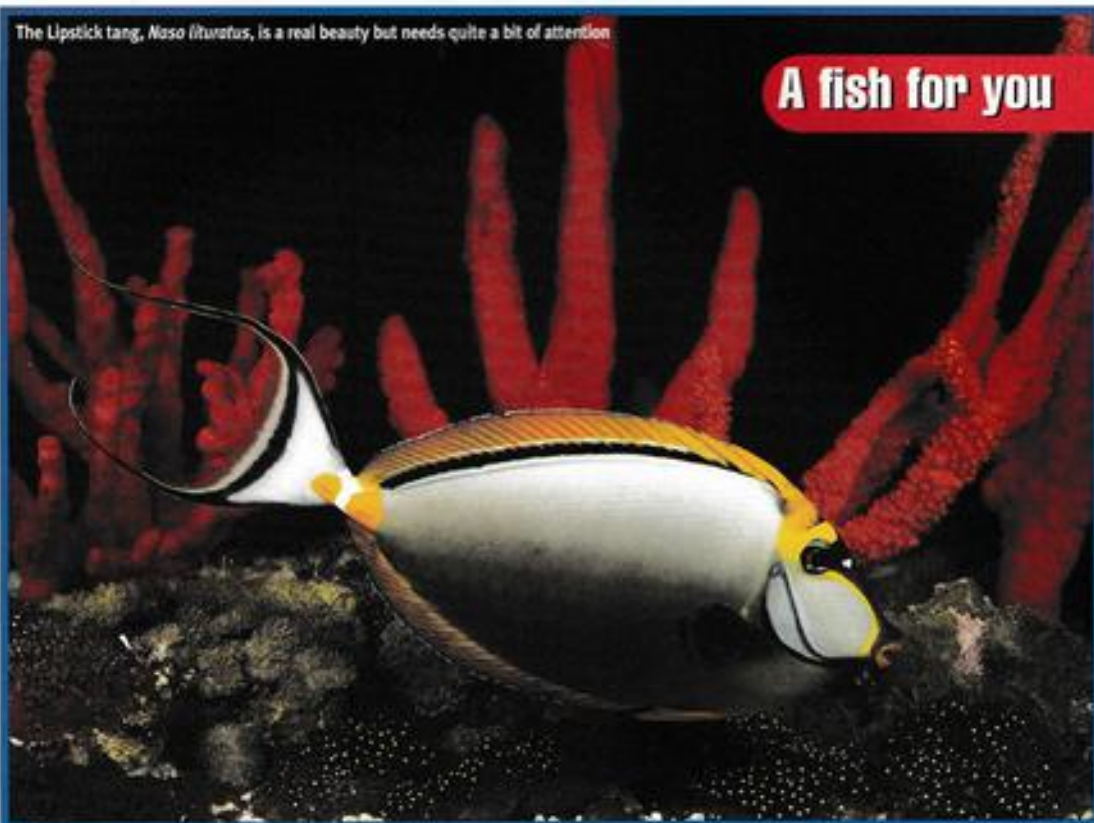
Probably the most important of them all, find a good retailer. No, not one, but three and stick to them – you need good strong advice. Remember that all philosophies are different and you must experience these differences to allow you to broaden your knowledge.

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The Lipstick tang, *Naso lituratus*, is a real beauty but needs quite a bit of attention

## A fish for you



### LIPSTICK TANG NASO LITURATUS

The Lipstick tang quite simply wears its heart on its sleeve or should I say its coloration. This full-bodied muscular fish with intense colours is truly a sight to behold. So how do you keep such a wondrous vision in good order and make it a talking point to be proud of?

In the wild it is most commonly found singularly or in pairs and the latter is the most common. You would need a very large aquarium to house a pair. Remember that this beast will grow to 46cm long so you will need a big home for it with lots of swimming space and plenty of hiding places. Don't even think of buying one in an aquarium of less than 500 litres. How many times have I heard "I'll pass it on when it gets too large?" Have you ever tried to catch a 25cm fish in a reef aquarium?

#### Little and often

This fish heeds plenty of food due to its poor digestive system. A wide variety of

fare should also be presented – seaweed three times a day with a good selection of vitamin-enriched frozen morsels such as brine and mysis shrimp, chopped mussel and cockle, cyclops with other varied sized particles. Feed as many times a day as you can in small amounts and your rewards will far exceed your labour, as the beast's body thickens and coloration intensifies.

Remember this fish wears its heart on its sleeve so any form of aggression by tank mates will be met with one of two responses. The once bold beauty will simply wither away as it cowers under the rocks only to succumb to starvation and stress, or the aggressor will soon realise its mistake as the razor sharp spine at the caudal peduncle (base of the tail) rips into its body causing often fatal wounds.

Quite simply a stunner but not for the faint-hearted.

### PROFILE

**Family:**  
Acanthuridae

**Name:**  
*Naso lituratus*

**Location:**  
Indo Pacific

**Feeding:**  
Seaweed and meaty, vitamin-enriched foods

**Size:**  
46cm

**Reef compatibility:**  
Great fish

**Difficulty:**  
Medium

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## An invertebrate for you



A small Anemone mushroom coral, *Heliofungia actiniformis*

PHOTO: ALF JACOB NILSEN WWW.BIOPHOTO.NET

## ANEMONE MUSHROOM CORAL *HELIOFUNGIA ACTINIFORMIS*

I have often heard the phrase, "How much is that anemone?" and what an easy mistake it is to make if you're a beginner to the hobby. This coral does indeed resemble such animals and, like anemones, it requires specific conditions in which to thrive. Give them such conditions and you will be rewarded with an amazing animal giving you years of pleasure.

The coloration displayed by this animal is quite remarkable, ranging from fawn to multicoloured wonders with bases ranging from metallic green to vivid reds and purples, to top this majestic beauty it has large tentacles with bulbous tips in contrasting reds, purples and greens. Quite frankly it is hard to match a healthy fully-inflated specimen displaying its coloration swaying in the currents.

### Requirements

This coral is quite a delicate baby so we have to be aware of a few requirements, the first is positioning. They should be placed in low to medium flow on a coral

sand or gravel base. When introducing after acclimatisation, lower the animal into position at an angle so no air gets trapped under the calcareous base.

Our beast requires feeding, as with all corals light is not enough. Twice a week place a nice meaty vitamin-enriched piece of Lance fish onto the central mouth. The coral is a slow feeder and it will take a few minutes for it to engulf the food so, if you have shrimps (and you should) feed them first to avoid you having to fend them off with algal scrapers as the coral engulfs the food.

I did mention that it is a common mistake for this coral to be mistaken for an anemone, and it should NOT be considered as a surrogate mother. Our baby has a delicate skin and it will soon rip if forced against the hard calcareous plate by fish swimming in it. This can then lead to loss of internal fluids and bacterial infection causing the demise of a wondrous coral. If you have clowns try to make sure they are already in their natural environment of a host anemone.

## PROFILE

**Phylum:** Cnidaria

**Name:**  
Anemone mushroom coral  
*Heliofungia actiniformis*

**Location:**  
Central Indo Pacific

**Feeding:**  
Large meaty foods twice a week

**Size:**  
Commonly a diameter of  
between 6-12cm

**Water flow:**  
Moderate is best

**Lighting:**  
Low to medium

**Difficulty:**  
Easy if all its requirements are catered  
for, as always very good water quality.  
Not really for the beginner.

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*Parosphærickthys lineatus*

# New Anabantoids on the block



When **David Armitage** visited Aquaculture Technologies he came across some interesting Anabantoids

*Betta sp. Kapsuas*

It was not long ago that my contact in Singapore and occasional contributor to this magazine, Heek Hui Tan mentioned a new wholesaler, Patrick Yap, of Aquaculture Technologies, with an amazing stock of SE Asian species, especially labyrinth fish. Nevertheless, when I visited I was still taken aback by the quantity and quality of his fish and the fact that many of the species he had were undescribed or were of a species that I'd never before seen in the flesh.

Patrick is an enthusiastic young man who has been out with his collectors to many of the sites which provide his fish, so he is aware of the conditions of the natural habitats. Many of his tanks are adjusted to pH 4.5, to take into account the special requirements of the peat swamp species. The fish are treated with antibiotic and quarantined so they are in best condition when they arrive in their export destinations in Germany, Japan or USA. While we were there, I noticed rows of bags on the floor labelled with the familiar initials, 'BAS' and was informed that this was the first shipment destined for 'British Aquatic

Superstores' where many of these species are now available.

### Borneo Green Pikehead

It's only recently been generally accepted that pikeheads are anabantoids, related in particular to the Chocolate gouramis. Amongst other characters, the eggs of *Ctenops*, *Sphaericthys*, *Luciocephalus* and *Parasphaericthys* have a system of equidistant ridges that end in an anticlockwise spiral (near the micropyle) which may be for sperm guidance. *Luciocephalus* and *Sphaericthys* have pear-shaped eggs, while those of most anabantoids are spherical, which shows the close relationship of these two species. This has justified the grouping of these species together in a new sub-family, the *Luciocephalinae*, along with *Trichogaster* and *Colisa*.

Unfortunately, Pikeheads are generally as difficult to keep as Chocolate gouramis and this is compounded by their need for live food – small fish or shrimps. They are true predators which have extendible mouths with which they envelope their prey. Soft acid water of good quality is de-rigueur and even then they fall foul of many diseases. Initial information is that these fish are likely to mouthbrood eggs for 14-21 days.

### Burmese Chocolate gourami

*Parasphaericthys lineatus* (see pic above left) is a new labyrinth fish from southern Burma (Myanmar). Specimens were collected for the trade by the Thai collector, K. Kubota, from swampy areas close to Yangon (Rangoon), 35km down the road to Patheln. No data on water conditions or co-habiting species are available.



Aquaculture Technologists, left to right, Pat Yap, Allan Brown and Heek Hei Tan

*P. lineatus* differs from *P. ocellatus*, in that it is a lot smaller (19mm vs 32mm), has a line along the body instead of a large central eye spot and has less anal fin spines (8-10 vs 11-16). *P. ocellatus* (see Today's Fishkeeper July 2000) has been known for some time to come from northern Myanmar (Lake Indawgyi, streams close to Myitkina and one specimen from the market at Mandalay) but *P. lineatus* comes from much further south.

Unusually for a relative of the Chocolate gouramis, they seem to do fine in tap water. During courtship, males have a dark head, pelvic and anal fins with the rest of the body dark orange, while females have a triangular white mark from the back of the dorsal fin to the base of the pelvic. They have a minimal spawning embrace like that of Chocolate gouramis or Pikeheads, at the bottom of the tank and don't turn over. Eggs are heavier than water and were picked up by both sexes and placed in a rudimentary

bubble nest under a stone. Spawning was observed in early evening (5 and 6pm) in October and November.

### Mouthbrooding Bettas

*Betta enisae* (below) is a beautiful example of the pugnax species group with a broad blue and black-edged margin to the caudal and anal fins which easily distinguishes it from its nearest relation, *Betta schalleri* from Bangka. It was collected in forest streams in the Danau Sentarum Wildlife reserve of the Kapauas basin, Kalimantan where it occurs with *Betta dimidiata* among leaf litter close to the bank.

Like many mouthbrooding bettas, they circle near the base of the aquarium and the female spits the eggs toward the male until he grabs them out of the water. Successful incubation in the male's mouth, takes 10-14 days and when the fry are released they take brine shrimp immediately.



*Betta enisae*





Parosphromenus ornatacauda

The second species is, so far, undescribed and has been imported as a 'contaminant', often labelled as *B. dimidiata*. The male however looks like the aforementioned *B. enisae*, in that it possess the anal but not the caudal band. While the female shares some of the body marbling of a female Rivulus, as does *B. dimidiata*, these fish soon outgrow *B. dimidiata* and it then becomes clear that they are one of the *B. pugnax* species complex.

Both of these species share the predilection of many mouthbrooders of being extremely good jumpers so the aquarium needs to be tightly covered! Their water needs to be soft and neutral but their natural habitat is likely to be pH 4-5.

### Liquorice gouramis

The two species mentioned here comprise probably the largest and the smallest *Parosphromenus* known to date as well as being arguably the most beautiful. *P. ornatacauda* (see image above) is a dwarf of a dwarf genus, achieving about 1.5cm. It is characterised by the red flash in the tail (hence its name 'ornate tailed') and the lower half of the male's body is usually black when he is in spawning phase. *P. 'Manis Mata'* on the other hand is a giant of the genus and can be up to 3cm. It is equally attractive, showing a complex infusion of red, blue, yellow and green so it is sometimes called the Flower liquorice gourami.

*P. ornatacauda* is found alongside the larger *P. anjunganensis* around Anjungan in the Kapuas basin in Kalimantan, but whereas the larger liquorice gourami is found in the deeper, cooler parts of streams, *P. ornatacauda* occurs in the shallow, warmer parts and in ditches. The pH of this habitat is close to 4, so a starting pH of no higher than 5 and a temperature of 24°C is recommended for these species.



Macropodus erythropterus

### Paradise fish

A new species of paradise fish *Macropodus erythropterus* (red wing) comes from Vietnam. It differs from the other species by its combination of forked caudal, missing opercular spot, red spots on the dorsal and caudal membranes (which give the specific name) and iridescent blue-green body with 10-12 faint dark bars.

It was found in small hill streams in the coastal rivers Quang Tri, Can Lo and Giang which enter the sea near the cities of Dong Ha and Dong Hoi. It lives along the shores of these streams among the overhanging shrubs and submerged roots. This contrasts with the habitat of *M. opercularis* which is often found in irrigation channels in rice fields.

This fish seems to do well in half tap, half rain water at 25°C and breeds in the normal paradise fish way, producing hundreds of fry that grow quickly and are not too difficult to raise. ■

### REFERENCES

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- Freyhof, J. & Hender, F. (2002). Review of the paradise fishes of the genus *Macropodus* in Vietnam, with a description of two new species from Vietnam and southern China (Perciformes: Osphronemidae). *Ichthyol. Explor. Freshwaters* 13: 147-167.

# Our readers write

Dick Mills is 'in the chair' for your opinions

Following last month's especially sad column – many thanks for your contributions, even if we didn't find space for all the very many tributes to Derek – it's as they say "Business as usual under new management" this time.

I thought I would raise one or two topical (I hope) matters on which you may have some personal points of view. Bear in mind, this is the place where you can air your views and it's entirely dependent on your responses for its continuing popularity.

## Spring into action

Suddenly it's spring and, despite one or two lapses in the weather patterns, Nature seems to be getting into her stride once more. Being of well over a certain age, a full night's sleep is not always a certainty and I was serenaded at some ungodly hour by that well-known frogs chorus. Never mind chickens coming home to roost, the frogs had returned to spawn! It seemed that all



Here are two pond dippers that count revisiting frogs as a blessing

survivors from previous spawnings had returned to their birthplace – fathers, uncles, sons all advertising for love!

ladies – and judging by the amount of frogs spawn in the following days their efforts had been well rewarded.

My query is this – how do you deal with an excess of frog spawn? Do you regard revisiting frogs a blessing (return of the slug eaters?) or a threat to your fish? How many tadpoles do fish have to eat to maintain a healthy balance each year between fish and amphibians?

## Out priced?

How are fish prices in your area? Members of my own society who travel around 'doing the shops' of a weekend have noticed that there is a wide price range for the same species. A quick example is the Denisonii Barb, *Crossocheilus denisonii*, which over a period of months – and over a range of but a few miles – can command a price which doubles from one end to the other. Are you being driven back to 'bread-and-butter' fishes because of financial restrictions?

## ALGAE EATER?

I'd like to thank Ian Fuller, chairman of the Catfish Study Group, for writing in with an observation about an image used in last month's article, 'Calling in the cleaners'. Here's what he says:

*"I am concerned that Hypancistrus zebras were used to illustrate 'Calling in the Cleaners' in the April issue of Today's Fishkeeper as it will no doubt encourage some people to buy these fish. It is one of the most striking of all the so-called 'Pleco' species and is very expensive, currently retailing at anything up to £85 each. Anyone having that kind of money to spend on a so called 'Algae eater' will find in not too long a time that the fish does not in fact eat algae at all, but is a carnivorous insectivorous animal and should be fed on a meaty diet and by the time that fact is realised the fish will in all probability have reached the point of no return.*

*There are quite a number of so called 'Pleco' species that are not true algae eaters in fact there are few, it would be better to call them 'Bio-film' eaters as they ingest all manner of microscopic life that forms on all kinds of surfaces including wood, which in some species is a necessary and essential part of their diet."*



Thank you for your observation Ian and for putting us right. I have done a bit of investigating and found out that the TKF team have to hold their hands up to sourcing the image.

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Perhaps you may be more likely to start breeding more fish from those species you have already got?

One way to track down fish you want or, conversely, dispose of those that you haven't room for is to look at a new service offered by [www.tropicalfishfinder.co.uk](http://www.tropicalfishfinder.co.uk), which has been available from April 19. Andrew Collins, its originator, has sent me some details:

*"The idea of the Surplus Fish Exchange is to give people the ability to advertise on the internet any surplus fish that they no longer want to keep. I believe that the facility we have incorporated into [tropicalfishfinder.co.uk](http://tropicalfishfinder.co.uk) will prove to be of particular interest to breeders and also people that have some fish they would now like to move on so as to make space in their tanks. The system itself is very easy to use and it is merely a case of typing in the scientific name of the fish in question, the price, size, location and email address. There is also space for people to type any additional information about the fish they are selling and we have included a facility*

*for people to upload photographs of their fish as well.*

*The site includes a database of species which is a work in progress and we have included where possible accompanying photographs. There is also a facility for shops to advertise on the site and we have included a very easy to use facility for them to list their current stock. This tends to be of particular interest to shops that stock rare and oddball fish because people are able to see that they have these fish in stock rather than leaving it to chance when they next visit. The participating shops have agreed to give TFF Discount Card holders discounts on their fish purchases; the details of which may be found on the site. The idea behind selling the discount card is to make the site self financing which will help us to keep the site running and hopefully incorporate a number of new features over the coming months. We have already had a considerable degree of success and are attracting several thousand visitors every week."*

That's a positive action in the right

direction, and we'll be interested to hear from any fishkeeper out there who has used the service. 'Dial-up fish', whatever next?

## Beat the green water

Sill with spring in mind, pond owners will be eagerly anticipating the coming warmer months. Is your pond ready for the new season? Did you take any precautions when shutting it down last autumn? And what steps will you be taking to avoid those perennial nuisances, green water and blanket weed?

With the proposed ban on barley straw remedies apparently now no longer threatening, how successful have you found this popular remedy for blanket weed?



Let us know how successful you are in beating this awful weed

## Keep those views coming

Let's have more views on any aspect of fishkeeping as soon as possible, using whatever method is most convenient to you: there's a whole world of fishkeeping readers waiting to disagree with you!

See you next month,

Dick Mills



people and their pets

... somebody has to understand them

telephone: 01952 883408

# May's show, auction and club meeting dates



Royal Gramma *Gramma loreto*



## Copy for Today's Diary Dates

Copy for Today's Diary Dates should be sent to Today's Fishkeeper, 6-7 The Rickyard, Clifton Reymes, Clivey, Bucks MK46 5LD. Telephone 01234 714784, fax 01234 714633 or e-mail editor@today's-fishkeeper.com. Copy deadline for June issue May 14

**Sat 1st** Southend, Leigh & D.A.S. Open Show. Contact 01702 305740

**Sun 2nd** Killybegs A.S. meeting. Contact John Reid on 01738 634689 or to Graham on 01932 780964 after 6pm or email: joed@ukanga.freemove.co.uk

**Mon 3rd** Solway A.S. meeting. Contact 01387 750606

**St Helens A.S. meeting.** Contact 01924 673403

**Ayrshire Fishkeepers Association meeting.** Contact 01794 665272

**Reigate & Redhill A.S.** Contact 01893 781818

**Mereside Aquarist Society meeting.** Contact 0155 260 3664

**Warrington A.S.** Contact 0925 483979

**Port Talbot A.S. Meeting.** Contact 01639 770736

**Tues 4th** Southend Leigh & D.A.S. Contact 01702 305740

**York & District A.S. meeting.** Contact 01904 418272

**Paideley & District A.S. meeting.** Contact: heathburn@theheronnet.co.uk

**The Irish Tropical Fish Society meeting.** Contact on 4561836

**Hallon A.S. meeting.** Contact 0151 2886390

**North Berks A.S. meeting.** Contact 01908 377333

**Preston A.S. meeting.** Contact 01772 311185

**Lang Toun Aquarists & Pondkeepers Group meeting.** Contact 01922 595835

**Wyle A.S. meeting.** Contact 01482 445543

**Wed 5th** Corby & D.A.S. meeting. Contact 01536 750932

**Oasis Fish Club (Sunderland) meeting.** Contact 01917814133

**Perth A.S. meeting.** Contact on 738 621704 or 01506 510558

**Clacton Fish Keeping Club meeting.** Contact 01235 428065

**Portsmouth A.S. meeting.** Contact 01673 885352

**Blackwell A.S. meeting.** Contact 01919 713874

**Ryedale A.S. meeting.** Contact: scdmrsh@talktalk.net

**Tameside A.S. meeting.** Contact 0161 339 6593

**Plymouth & District Aquarists & Pondkeepers Society meeting.** Contact 0795 642150

**Thurs 6th** Fairley A.S. meeting. Contact 01738 662191 or 01714 88807

**Mid Sussex A.S. meeting.** Contact 01924 660407

**Kings Lynn Fish Club meeting.** Contact 01553 769522 or 01553 763743

**Isle of Wight meeting.** Contact 01983 721246

**Fri 7th** Basingstoke A.S. meeting. Contact 018 970 1461

**South East Marine Aquarist Society.** Contact 01924 367086

**Yorkshire Chlid Group meeting.** Contact 01924 367086

**Sat 8th** Corby & District A.S. Open Show. Contact 01536 724 803

**Sun 9th** Ryedale Open Show, Pickering N Yorks. Contact 01751 472715

**Mon 10th** Killybegs A.S. meeting. Contact John Reid on 01738 634689 or to Graham on 01932 780964 after 6pm or email:

joed@ukanga.freemove.co.uk

**Bristol Aquarist Society (Goldfish) Meeting.** Contact 01292 207467

**Grimby & Cleethorpes meeting.** Contact 01472 349178

**St Helens AS meeting.** Contact 0924 671463

**Oldy AS meeting.** Contact 01274 531418

**Robin Hood AS meeting.** Contact: mellobor@corpnorva.freemove.co.uk

**Derby & District Aquarists meeting.** Contact 01332 773116

**Port Talbot & District A.S. Meeting.** Contact 01639 770736

**Durrah A.S. meeting.** Contact 01254 209295

**Tues 11th** Northwich A.S. meeting. Contact 01666 882966

**Caer Uffia A.S. meeting.** Contact 0191 5237464

**Pelton & D.A.S. meeting.** Contact 01922 409271 or 01922 664410

**Lang Toun Aquarists and Pondkeepers Group meeting.** Contact 01922 595835

**Northern Goldfish and Pondkeepers meeting.** Contact 0161 9697567

**Greenock D.A.S. Meeting.** Contact 0475 704219

**Bangor Aquarists & Breeders Society.** Contact 018 9187 3539

**Ordy Aquarist Society meeting.** Contact: jgheniff@net.freemove.co.uk

**Hill AS. meeting.** Contact 01964 562387

**Stroud & D.A.S. meeting.** Contact 01624 221291

**Abenden A.S. meeting.** Contact: abanden@btconnect.co.uk

**Wed 12th** Lullithgow Aquarist Society meeting. Contact 01506 510558

**Hullian A.S. meeting.** Contact 01274 880471

**Bradford A.S. meeting.** Contact 01274 652544 or 0113 247 7799

**Hounslow D.A.S. meeting.** Contact 020 8890 6933

**Hornstable & D. A. S. meeting.** Contact 01828 790564

**Harnellon & D.A.C. meeting.** Contact 01765 449644

**Plymouth & District Aquarists & Pondkeepers Society meeting.** Contact 0795 642150

**Thurs 13th** Gleneshes meeting. Contact D. Smart, 4 Lockby Ave., Kingskiss, File

**British Tropical Fish Club meeting.** Contact 017 973 2145

**Fairley A.S. (Perth AS) meeting.** Contact 01738 662191

**Sandpounders A. S.** Contact 01704 541177

**Fri 14th** Discuss Ireland meeting. Contact 061 318931

**Sat 15th** Wyle Open Show. Contact 01482 473035

**Sun 16th** Carlisle Study Group members' only show. See website: www.cafishclub.org.uk

**Mon 17th** North East Yorkshire Kill Group meeting. Contact 0463 658971

**Killybegs A.S. meeting.** Contact 01738 634689 or 01932 205566

**Norwich A. S. meeting.** Contact 01603 416559

**Solway A.S. meeting.** Contact 01387 750606

**Mereside A.S. meeting.** Contact 0151 260 3664

**Ayrshire Fishkeepers Assoc meeting.** Contact 01794 665272

**Oldham A. S. meeting.** Contact 0161 612 6207

**Southend Leigh & Dist A.S. Auction.** Contact 01702 305740

**Greater Manchester Chlid Society meeting.** Contact 01706 810084, 01706 353363, 0161 766 4457 or 01472 942 155

**Midlands Marine Aquarists Society.** Contact 0121 359 4469

**Lang Toun Aquarists and Pondkeepers Group meeting.** Contact 01922 595835

**Wyle A.S. meeting.** Contact 01482 445543

**South Park Aquatic Study Society.** Contact Eric 0208 692680

**West Yorkshire Marine Aquarist Group meeting.** Contact 01924 420101

**Clacton Fish Keeping Club meeting.** Contact 01235 428065

**Tongham Aquarists Society meeting.** Contact 01252 35686

**Portsmouth A.S. meeting.** Contact Gill Ullring, 9 Inverness Rd., Gosport, Hants.

**Perth A.S. meeting.** Contact on 738 621704 or 01506 510558

**Blackwell A.S. meeting.** Contact 01919 713874

**Warrington A.S. meeting.** Contact 0920 679951

**Thurs 20th** Mid Sussex A.S. meeting. Contact 01273 662407

**Earlbourne & District Pondkeeping.** Contact 01323 773169

**Fri 21st** West Cornwall Fishkeepers meeting. Contact 01209 64518

**Sat 22nd** Port Talbot & District A.S. Meeting. Contact 01639 770736.

**Mon 24th** Killybegs A.S. meeting. Contact 01738 634689 or 01592 205566

**Tues 25th** Northwich A.S. meeting. Contact 01666 882966

**Lang Toun Aquarists and Pondkeepers Group meeting.** Contact 01922 595835

**Greenock D.A.S. meeting.** Contact 0475 704219

**Croydon Aquarist Society meeting.** Contact 020 8854 0984

**Stroud & D.A.S. meeting.** Contact 01624 221291

**Castleford A.S. meeting.** Contact 01927 720774

**Hounslow D.A.S. meeting.** Contact 020 8890 6933

**Hullian A.S. meeting.** Contact 01274 880471

**Warrington A.S.** Contact 01920 679951

**Tameside A.S.** Contact 0161 339 6593

**Thurs 27th** Gleneshes meeting. Contact D. Smart, 4 Lockby Ave., Kingskiss, File

**British Tropical Fish Club meeting.** Contact 017 973 2145

**Fairley A.S. (Perth AS) meeting.** Contact 01738 662191

**Sandpounders A. S.** Contact 01704 541177

**Fri 28th** Earlbourne & District Pondkeeping. Contact 01323 773169

# Today's Fishkeeper's Show League awards

The show league competition is not a one day event where the showman presents his fish or fishes and only the results on the day count. These fishkeepers have, throughout the show season, been consistent winners everywhere and have amassed a large number of points, gaining three points for a first, two for a second and one for a third. At the end of the season all the points are added up and you have a winner.

These fishkeepers are the backbone of the show hobby and this award recognises their great contribution. The competition has increased the show entries and transcends the boundaries of all the different federations and associations. Exhibitors have travelled the length of this island and the winner Roy Chapman collected over 1,000 points. Bryan and Steve Chrich and Ian Wright were closely on his heels. Gavin Cowan came in a good third and John Egan was fourth.

Roy hails from Essex, the Chrich's are from Yorkshire, Gavin is a Scot and John hails from Wales. This cross-section of the country just goes to show that there are good fishkeepers everywhere.

Unfortunately Peter Burgess was unable to attend this year but David Ford stepped in and presented the four winners with a big bucket of Aquarian fish food.

## Livebearer auction in Chesterfield

The Viviparous auction went ahead on March 28 despite the recent death of the chairman and founder, Derek Lambert. This was held in the Chesterfield Hotel, Chesterfield and about 50-60 people attended.

Pat Lambert introduced the meeting by talking about Derek's life and work for the Livebearer

hobby and a minute's silence was held.

The auction was run by Alan Rothwell ably assisted by Graham and Wendy Booth, Bonnie Myers, Alan Dunne and Pat Lambert. This was a very special occasion at which the show league awards were presented.



Show League winner Roy Chapman, from Essex, who amassed over 1,000 points



## CATFISH CONVENTION 2004 NEAR WIGAN

The Catfish convention 2004 was held on March 21 and a good day was had by all, only marred by the same problems as last year when the heating was not fully on until it was time to go home.

There was a good attendance of about 50-60 and the meeting kicked off with an audio visual presentation by Brian Walsh, an excellent starter to whet the appetite for a lecture by Dr Jonathan Armbruster on the diversity and morphology of the wood eating Loricariids who gave a further lecture on collecting fishes in the Rupununi Portal Guyana. Between the two lectures Dr Peter Burgess gave everyone an insight into catfish diseases.

The prizes were wood carvings made by Brian Walsh. These are beautifully crafted fish carvings of catfish and are detailed replicas of the fish depicted.

All in all this was a good day out for catfish enthusiasts.

# 10 golden rules

## Success with your first tropical aquarium

Fishkeeping is such a great hobby and if you take time to research some of the basics before you start then you won't go wrong



We all have to start somewhere...

### DO YOU HAVE THE TIME?

All hobbies require time and effort, and to many people this provides part of the pleasure. So, for a 50-200 tank you can expect to spend about 30 minutes every other week doing partial water changes, cleaning the tank etc. You will also have to spend a few minutes once or twice a day feeding your fish, turning the lights on and off and generally checking over things.

The best bit of advice has to be 'do it once and do it right'. Learn the basics before you put fish in your tank and take it slowly. You will be rewarded with one of the best hobbies there is and some very happy fish.

So you've seen a tank with all its wondrous inhabitants and you know that you just have to have one. But stop for a moment and make sure you've asked yourself all the relevant questions. It's at this stage that many people rush into buying a tank without considering all the implications.

If you use common sense and take time to do a bit of research, making your first tank a success is not difficult. The following are TFK's 10 golden rules to making your new tank one to be proud of.

### 1. Patience is a virtue

Remember Rome wasn't built in a day! Many beginners find themselves buying a

tank, setting it up and stocking it with fish all in the same day. Whilst I am sure this has worked for some people, it's a recipe for disaster and can be an expensive mistake. As a rule of thumb, setting up and fully stocking your first tank with fish will take approximately two months.

### 2. Understand the nitrogen cycle

The rule above will become clearer if you know about the nitrogen cycle. Most fish deaths for beginner hobbyists are a result of not understanding the nitrogen cycle. In its basic terms, fish produce toxic waste

## TROPICAL: BACK TO BASICS

(ammonia) that must be broken down by bacteria through biological filtration. The bacteria will take time to colonise the filter media and will not cope with an overload of ammonia in a newly-stocked tank. (See the diagram on page 45).

### 3. Prevention is better than cure

Stress is one of the major killers of fish. It's not directly attributable but when fish become stressed, their immune systems become weak and they are more susceptible to disease. Make the fishes environment as stress free as possible. Here are a few ways to minimise stress:

- Don't overfeed
- Perform regular partial water changes
- Check that your filtration system works
- Give them enough space and keep them with compatible tank mates

### 4. Maintain your filter regularly

In an enclosed system such as your tank, the filter is all important and needs regular maintenance. Clogged filters don't work efficiently and, in the case of biological filtration, a clogged filter will be unable to remove ammonia properly. This will result in fish stress and eventually death. Clean sponge-based biological filters by gently rinsing them in used tank water that has been siphoned into a bucket. (Tap water will



Testing your water is essential to maintaining a healthy aquarium

kill off beneficial bacteria). Regularly vacuuming undergravel filters will keep them working efficiently.

### 5. Treat all tap water

Although tap water is safe for us humans, water companies add chemicals such as chlorine or chloramine which are toxic to

fish and can weaken, damage or even kill them. There are water purifiers available and products which you can add to your water to make it 'fish safe'.

### 6. Brush up on basic water chemistry

You don't have to go back to school but you should learn a bit about pH, hardness and buffering. It also pays to know what's in your local water supply so that you know the 'make up' of the water – some fish may not be able to survive in your water. You should be able to find out these details from a number of places including: your local water company, your local fish retailer, through the use of test kits, or from local aquarium clubs.

### 7. Keep the pH stable

Tank water has a natural tendency to become acidic because the nitrogen cycle produces nitric acid (nitrates). Rapid pH changes stress fish. The pH needs to be kept stable by having adequate 'buffering'. If your water is soft, you may need to add buffering agents. Stability is the key word here.

### 8. Choosing fish

It's much easier to select fish that have native waters with similar chemical properties (pH and GH) to your tap water. If you have soft water, choose soft water fish, and likewise, if you have hard water, choose hard water fish. This is important if

## DON'T USE TAP WATER

Tap water is fine for us but not so good for our fishy friends. Make sure you treat it properly before you fill your tank. Also remember to use a clean jug to fill your tank



MADE WITH IMAGES BY ANTHONY TULLOCH. SEE CREDIT ON PAGE 44



your water is outside the 'normal' 6.5-7.5 pH range.

Don't make things hard for yourself – changing the natural hardness (or pH) of your tap water can be time consuming. Also, if you get it wrong it can be worse for your fish than the original water conditions. Check with your local fish shop (or club) as to which fish live happily in your water.

Take time to research fish varieties and choose fish that are compatible with each other. It definitely pays to know how big your fish are going to grow. What can begin life as a sweet-looking tank mate can turn into a monster and view other fish as tasty meals.

Dependent on their size and temperament, fish have specific minimal space requirements. So make sure you choose fish whose needs will be met in your tank.

When you buy your fish make sure you never add shop water to your tank as it may contain diseases. New purchases need to be properly acclimatised before adding them to your tank. The best way of insuring you don't introduce problems is to quarantine all new fish for two to three weeks before adding them to your tank.

## 9. Perform regular water changes

It's a good idea to change 25% of your tank's water every other week. This has two purposes – it dilutes and removes nitrate before it accumulates to dangerous levels, and it replaces trace elements and buffers that get used up by bacteria, plants, etc.

Also, regular partial water changes will mean that your tank's water chemistry won't

## HOW THE NITROGEN CYCLE WORKS

Ammonia is excreted by fish through the gills and in their waste pockets

Nitrates are taken up by the plants as a fertiliser



Ammonia is converted to nitrites by bacteria in the filtration system

Nitrites are converted to nitrates by bacteria in the filtration system

IMAGE WITH THANKS TO FISHNET PUBLISHING. GET CHEEP! ON PAGE 54

differ to much from that of your tap water. This is important as if your fish are struck down by disease, water changes are the most important step in controlling disease.

So if you do have to do a large water change you have to remember that they're not safe unless the chemical composition of your tank's water is similar to your tap water.

## 10. Find a good retailer

Find a good local retailer and you're on your way to having a fulfilling hobby. There are good and bad retailers in every walk of life and it's up to you to source a good one. Spending a little more money to get quality fish is always worth it in the long run.

Word of mouth is the best way to source fish (i.e. if you join a club people may have some good contacts). You can also learn a lot by visiting a shop. Is it clean? Do the sales people know what they're talking about? Are the fish healthy and disease-free?

Some shops will try to sell you medications and equipment you don't really need. The best way to avoid this is to know your stuff – read books (and of course *Today's Fishkeeper*), surf on the internet and join a fish club. This way you will have an idea as to whether their advice is sound or not.

■ Next month tanks and equipment



Visit a few retailers before you buy fish. The right choice can make all the difference to your hobby

# Battle of the bettas

**Max Gibbs** gives us an insight into the breeding of the feisty Siamese Fighting fish

The original wild fish bears little resemblance to its domestic, pedigree relative, lacking the brilliant colour potential and extraordinarily highly developed finnage. But the aggressive nature of the domesticated aquarium fish when it is confronted by another male is every bit as rough and tough as its ancestor. The original natural form has been taken from the wild for generations in its native Thailand, and Pla gat ('Bite fish') contests are widely staged throughout that country, but rarely using wild fish. Specimens are line-bred to enhance their pugnacious nature and increase their body bulk, often to an amazing extent.

It is the defence of their restricted aquatic territory that instantly arouses the male fish to become fiery tempered and pitches it into battle. Usually the fighting is preceded by a non-contact display of spread fins and extended 'flared' gills, the purpose being to try and scare off the intruder before any actual contact and serious subsequent damage is inflicted.

## Home environment

In the poor visibility of the typical muddy paddy-field environment, where they occur in nature, the Siamese fighting fish cannot see any distance beyond its immediate surroundings, so the home territory is quite restricted. Rice crop stems also restrict the available space and vision range. Growing males seeking a territory will wander through the murky waters hoping to find a place to call their own, and in doing so will happen upon mature males by chance. Initially, the intruders will be put to flight by the larger resident males, but those that survive the rigours of nature and progress to maturity themselves become wiser as to the requirements for survival. They are eventually able to take on the older mature males and win the battle for territory, leaving the defeated and battered old male to limp away to die, if he has not already been dispatched 'in the field'.

Like many other anabantoid species Fighting fish build a bubble nest. The male takes a gulp of air from the surface and



A mature male fighting fish with his bubble nest



The pair of fighting fish displaying to each other under the bubble nest

***“Generally speaking it is true to say that a male Fighting fish accommodated in a community aquarium is no danger to the other occupants”***

blows it out as a mucus-coated sticky bubble, often using a floating leaf as a canopy under which it accumulates a mass of these bubbles. The bubbles are made one-by-one. When he has constructed a sizeable bubble nest he will patrol beneath it until a ripe female approaches. If she is showing signs that she is carrying spawn and displays the white ovipositor between her pelvic fins prominently, the male will display vigorously beneath the nest, inviting the ripe female to approach and examine the nursery he has prepared. After making her assessment she will move away, but if she is suitably impressed she will stay around within sight of the excited male who



A female fighting fish with her white ovipositor showing clearly

will then blow more and more bubbles to further impress the female. In aquarium conditions it is normal to have the female separated off from the male with a clear glass partition. This way they can display to each other and stimulate both the generation of spawn in the female, and give the male every encouragement to construct his bubble nest. When both show all the right signs of being prepared to breed the partition is removed and the fish are free to commence the courting performance.

## Spawning

The male will begin to move out from under his nest and display to the female, leading her towards the nest in the hope she will join him there. It often takes some time for the female to accept this 'invitation' to stay for more than the fleeting few moments under the nest, and she might receive some rough treatment from the highly charged male to show her he means business. In the

## TROPICAL: SIAMESE FIGHTING FISH

process the female will usually suffer torn fins and become more submissive. When she decides to join the male under the nest she will approach him cautiously, remembering the treatment she had been given previously. The final move to line up alongside the male will often be accompanied by flared gills and spread fins by her also. The male will rub his flanks along hers and all the time be flaring his fins as widely as he can, lightly caressing her with them in the process. If she is ready and sufficiently stimulated she will lie alongside him and turn her body onto its side, keeping her pelvic and anal fins close to her body. The male then curls his body and fins around the female and manoeuvres her into an upside down position under the nest, where she releases some eggs. The male's sperm is also released and is directed towards the ovipositor to fertilise the eggs as they fall away. The coupled fish sink slowly towards the bottom of the aquarium until they break apart and more eggs may be expelled. As the eggs drift towards the substrate the male hastily gathers them up in his mouth and swiftly returns to the nest to blow the eggs into it. Any that are not immediately retained and fall from the nest are caught up again and once more placed into the bubble nest. Some females will join in this gathering up of the spawn.

The male will now generally show little interest in food and spend his entire time patrolling beneath the nest, catching any falling eggs and replacing them. The eggs will hatch within about 36 hours if the conditions are right. Fighting fish prefer a relatively high temperature, and a close-fitting top to the breeding aquarium will allow the air space to be warm and humid. The tiny fry hang tail-down from the nest once hatched. Any that fall will be caught up by the attentive male and returned to the nest. But once the yolk sac contents have been absorbed the fry very quickly begin to swim horizontally and tend to wander away from the nest. At this point it is essential that the male be removed because he will quickly become frustrated and tire of trying to corral the fry, turning to eating them instead. The newly free-swimming fry, having assimilated their yolk sac, will now need some form of live food. Infusoria is probably the best first food to consider, and can easily be obtained by making an infusion from heated aquarium water poured over hay and left to cool and

### BREATHE EASY

Fighting fish are able to live in an environment that would be untenable to other species that do not have the labyrinth accessory breathing system. This organ enables the anabantoid species of fish to breathe atmospheric air, and is essential to their survival. The gills are also capable of supplying a degree of oxygen but the amount extracted is insufficient for their needs, and if deprived of access to the essential air above the water surface, they will suffocate and die. So the Fighting fish can survive in waters depleted in oxygen content through pollution that would quickly kill off any other fish species not equipped in this way.



The pair come together head to head before the female lies prone to allow the male to embrace her



After engaging in the embrace immediately under the bubble nest the pair slowly drift down towards the bottom before breaking apart

stand in containers. Proprietary packaged fry foods may be used, but best results will undoubtedly come from feeding cultured live foods. (A combination of the two might give good results). Once the fry are large enough to take minute newly-hatched brine shrimp their growth rate will accelerate appreciably.

### A SHORT STORY!

I was looking for different strains of Siamese fighting fish in the many retail aquarium stalls at the Weekend Market in Bangkok, and as I entered one such shop the owner watched me pass quickly by the first row of fish tanks, all well stocked with fine fish but not what I was looking for that day. As I turned to run my eyes along the second row of tanks he asked, "What you look for?" I replied, "I look for betta fish." His face fell and he looked quite disgusted. He then ventured, "What wrong with my fish?" It was not immediately clear to me what he meant, but then it dawned on me that "betta" sounded too close to "better" to his ears!



The eggs can be seen falling away from the coupled pair of fighters, to be gathered up and blown into the nest.

## Growing on fry

The fry may be kept together up to the point where male characteristics, indicated by colour and fin development, soon accompanied also by gill flaring, begin to show. Those developing males should be removed and grown on as individuals. It is not cruel to contain the growing males within quite small jars – flat-sided whisky bottles are widely used for this purpose in Thailand. Bear in mind that in nature the species requires virtually no 'swimming room', and is content to stay within the confines of its restricted territory. Indeed, it is often the case that a solitary male placed in a community of active fish finds it cannot adapt to the busy environment if the use of a quiet corner to retire to is denied to it. Generally speaking it is true to say that a male Fighting fish accommodated in a community aquarium is no danger to the other occupants. It is rare for a well-fed male to display aggression towards anything other than another competing male, or his own reflection! But the converse is often true of other species that can be aggravating to the sedentary male Fighting fish by nipping at his fins and generally harassing him. There is also the chance of the Fighting fish being deprived of sufficient food within a community, as it is often a slow feeder, especially if the accompanying species are hyperactive at feeding time.

Female Fighters can, of course, be kept together without problems occurring. They are capable of carrying as much colour as the males, but will lack the highly developed fins. But they do not fight each other. The females are also more likely to settle down to community aquarium life rather better than the males. They are more gregarious in nature as they move from one male-dominated territory to another when searching for a place to spawn. They will carry this characteristic into aquarium life as well. Their short fins are less tempting for potential fin nipping by aquarium companions. However, there is now a strain of Fighting fish that is

developing more body colour in the females, and the fins are also beginning to elongate. I cannot think that females will ever be developed to the extent that they could compete with the males in these two features, but I would not be surprised to see more progress with this developing feature in the future.

## Breeding Fighting fish

You can breed with the young Fighting fish from about 12 weeks old, but only if they have grown and matured sufficiently by then. Twice that length of time would be a better goal and after 24 weeks the chances of successfully breeding from a compatible pair are much greater. The early feeding regime for the Fighter fry is extremely important to ensure the onwards progress to the point where they may themselves become breeding stock fish. Cull out any weak or undersized

## KEEPING WATCH

The spawning process can take many hours, or it can be over and done with in less than an hour. That depends on the two participants. But once the female has released all of her eggs or at a point where the male is satisfied he has enough eggs in his nest, danger looms for the female. She is not required to stay around, and if she tries to do so she will be chased away aggressively by the male. If she is unable to hide away she will usually be killed, so it is essential that a watch be kept to ensure she is removed from the breeding tank to safety once her services have been dispensed with. (The actual spawning act might be preceded by several 'dummy runs' without eggs being released by the female).

fish as the time and trouble taken to try and coax them to improve is entirely futile. Sometimes it is difficult for the fishkeeper to face up to doing what 'raw nature' would do in the way of selecting the strongest and best fish to survive, and disposing of the culis. If you want to improve the strain this chore is an essential part of the process.

Fighting fish are not long lived. Two to three useful years is about as long as you may count on for enjoying your Fighters at their best. They will decline from their magnificent prime after that, often very rapidly. Aged specimens will sometimes retain their fighting spirit as well as their libido, but the seemingly inexhaustible energy required and enjoyed in their prime when breeding quickly fails them in old age. If you have succeeded in breeding and rearing some good stock remember to select the best fish and retain them as replacements in preparation for the demise of the parent fish. ■



The opaque white eggs are gathered beneath the bubbles of the nest, and are tended by the male who has now driven off the female



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

# DISCUS PROBLEM SOLVER



When buying discus pay close attention to the eyes  
Photo by M.P & C Peldnoir

## How many discus can I have?

**Q** I have recently set up a 180-litre tank for discus and it is now mature (nitrite 0, pH6.5, temperature 28°C). I have a small shoal of corydoras catfish, six Cardinal tetras and two Bristle nose catfish. Can you tell me how many discus the tank will hold and can I mix discus colours? Also what should I look for when choosing the fish as I would like to buy them small and grow them on.

Mark Laybourne, Norwich

**A** Your tank will certainly hold a shoal of six young discus and these should grow well in their new home. Yes, you can mix colours – this causes no problems to the

fish. When selecting young discus, look at the shoal in the dealer's tank and never choose a fish that is smaller than average. It's best to pick the fish that are above average size if possible as this shows they are competing well for the available food.

Check there are no obvious defects such as deformed fins or tails, also the colour and size of the eye needs close attention. They should be clear and bright and the size of the eye in relation to the head should be small – i.e. if you imagine a line from the front edge of the dorsal fin down through the eye to the ventral fin, there should be room to fit two more eyes either side of the actual eye.

## Have my fish gone blind?

**Q** Two of my shoal of discus appear to have gone blind, both eyes on the fish have turned white. I have tested all the water parameters and they are OK. Ph 6.8, nitrite 0, nitrate 25ppm, temperature 30°C. All the other fish appear fine – can you help?

Chris, via e-mail

**A** Cloudy eyes can be caused by a number of things but very often it is bacterial so I would advise a course of broad spectrum bactericide and the fish should be fine.

## When can I add discus?

**Q** My tank which will eventually be stocked with discus and other suitable companions is approximately 250 litres. It has been set up for two weeks and contains a four small

catfish which I am feeding on pellet food. When will I be able to add the discus and can I also add some tetras and a shoal of three clown loaches? I have already seeded the filter with bacteria.

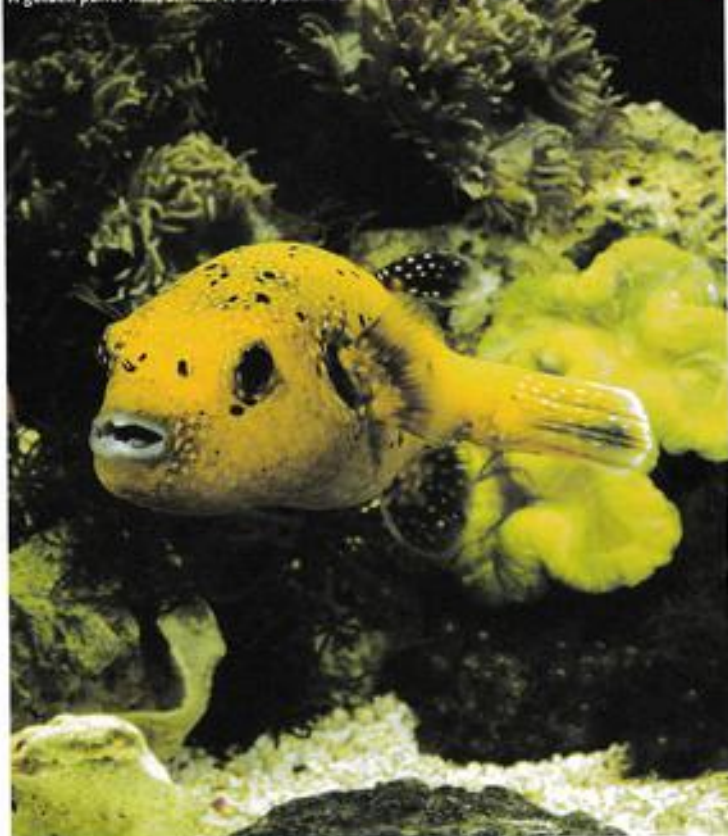
Frank Deville, Stowmarket

**A** Your tank will take approximately five to six weeks to complete the nitrite cycle. You need to test for

nitrite now and when the level begins to rise, dilute by doing water changes. Seeding the filter as you have done will speed up the process. When the nitrite is back to zero add your tetras – you may see a blip in your nitrite level again. The bacteria in your filter will increase to accommodate this, then add your clown loaches, as these are a more sensitive. Finally, when your nitrite is zero again you can add your discus.

# Today's Surgery

A golden puffer fish, similar to the patient Lance treated



Our resident vet, **Lance Jepson MA VetMB CBiol MIBiol MRCVS**, visited the owners of a spectacular marine aquarium and performed surgery on their puffer fish. Here's how he got on...

## Poorly puffer

It must be nearly a year since I was asked to look at a marine puffer fish – actually a golden morph of the guineafowl puffer (*Arothron melanocephalus*). The problem, the owner reported, was with one of his eyes – it was swollen and just looked 'wrong'.

As is best with these problems I paid a visit to the owner's house. The pufferfish was housed in a quite spectacular marine aquarium that dominated the lounge. The best part of 3m long and 1m high and wide, this aquarium was bigger than many ponds that I see. The stocking of this marine tank had to be seen to be believed – a large shoal of Chromis mixed with a smaller

group of adult regal tangs, whilst cutting through these groups was an adult Emperor angelfish, a Queen angelfish and a clown trigger fish some 15cm long. But most obvious of all, moving through all this chaos like a huge yellow zeppelin, was the puffer fish.

### The examination

Examination of the overall setup and discussion with the owner ruled out any concerns over water quality as an underlying cause, so I turned my attention to the fish itself. Overall this puffer appeared

to be in excellent condition apart from one thing – his left eye was grossly swollen. Comparing it with the good eye, the iris (the coloured part of the eye) looked deformed and the lens itself appeared whitish – a sign that the lens was swollen and inflamed. Amazingly this puffer was still feeding although I bet that he would have had a serious headache with that sort of inflammation at this head.

To examine him further he was enticed into a net so that we could bring him to the surface, but not out of the water in case he panicked and inflated himself with air. I applied a special dye to his eye to check for

any corneal damage, and sure enough the dye adhered to two small patches on the front of his eye, suggesting that here we had some damage, possibly the beginning of a corneal ulcer.

### The diagnosis

Having considered all the possibilities, it seemed that the most likely infection would be a bacterial infection, probably arising from accidental damage to the cornea. So we decided to treat him with antibiotic injections. One week later when I checked him again, if anything the swelling had got larger. After further discussion with the owner, it was decided to remove the eye. This is a decision not taken lightly – for a start there is a small but definite risk to the fish. No anaesthetic is 100% cast-iron safe. As for the eye, this was clearly non-functional – the fish was definitely blind in that eye and had been for some time, so whether it had one or two eyes was academic by this point. The problem was that this eye was probably infected and aside from any pain that the fish may be feeling, it is only a short distance from the eye, down the optic nerve and into the brain. Should this infection spread there then the fish would definitely die. This is why we decided to operate to remove the eye.

### The operation

The puffer fish was anaesthetised and placed on to the operating table. My trusty veterinary nurse continually squirted water into the puffer's mouth so that it trickled over the gills to keep him well oxygenated.

Luckily the removal of the eye turned out to be relatively straightforward and there appeared to be no obvious spread of infection outside of the eye structures. The remaining socket was covered by suturing

## WHAT CAUSES EYE DISEASE?

There are several different possibilities for this kind of eye disease:

#### 1. Bacterial infection

This could result from damage to the eye from external objects such as coral. The infection establishes on and around the eye and is able to invade into the eye. An outside-in infection if you like.

Alternatively the bacteria can come from some other source such as an infected cut or abrasion. These bacteria invade the blood stream and travel where the blood takes them. Such infections can establish in the eye, which has a very large and complex blood supply. These infections arise in an inside-out fashion. Of particular concern would be an infection with mycobacteria (fish tuberculosis) as these bacteria are difficult to treat and potentially infectious to the owner.

#### 2. Fungal disease

This would include such fungi as



The eye of the puffer was swollen and antibiotics were given to try to sort the problem

Ichthyophonus. An infection would arise in a similar fashion to that of bacterial infection.

#### 3. Neoplasia or tumours

Fish do get cancers from a variety of different causes – old age, viral infections, waterborne toxins and so on.

#### 4. Parasitic

Some parasites have intermediate stages that target the eyes, effectively blinding the fish and increasing its susceptibility to predation, which in turn allows the parasite to complete its life cycle.

the surrounding skin across the eye. Puffers are ideal for this as they have what appears to be a muscular ring around the eye that they can constrict to cover the cornea – almost like a true eyelid!

The pufferfish recovered well from its anaesthetic and was discharged with more antibiotic injections as a precaution.

Two weeks after surgery this pufferfish had once again resumed his position of "top-dog (fish!)" in the aquarium, and was feeding very well and negotiating the corals and other tank furniture with ease. I was especially pleased to hear from the owner

that he was now regaining some of his old habits that had been absent since he had become unwell. One such habit was squirting water from the surface and soaking his owner! ■

## WHAT THE LAB FOUND

The surgically removed eye was submitted to a laboratory for histopathological examination. This confirmed that there was an infection established there. In fact, it appeared that there was very little normal eye tissue left. There was no sign of mycobacteria or fungi.

After the antibiotics failed to work the eye had to be surgically removed





# Koi world



**Bernice Brewster** takes a look at what's happening in the world of koi. There are definitely positive vibes in the industry

It was with great sadness that I learned of the tragic and untimely death of Derek Lambert, former editor of this magazine. I have known Derek for a number of years and could not fail to admire the energy, enthusiasm and charismatic spirit with which he carried out his duties as editor, producing a magazine that covers the wide ranging interests of all fish hobbyists. In addition to his work on *Today's Fishkeeper*, Derek made significant contributions to the study of fish. He will be greatly missed. My condolences go to those left behind by his sudden death.

## KHV update

Such sad events tend to put a perspective on other issues in our lives. Koi Herpes Virus (KHV) continues to provoke attention. Following an outbreak in South Africa, the Retailers and hobbyists have got together to form an association, to try to cope with the problem together. What a refreshing change for people to be co-operating to try to cope with this disease problem. The South African retailers in this association have agreed for random visits to their premises and for two or three koi to be taken for sampling.

## Barley straw

Last year, the EU Biocides Directive came



Barley straw – could this be the cure for blanket weed?

into force and included among the substances which were banned was barley straw for the treatment of blanket weed and other nuisance algae. The reason for the ban was that there was no conclusive proof as to the

identity of the substance that was released and which inhibited the growth of algae.

Given that chemicals which were still approved for treating nuisance algae, the idea of banning a natural product such as barley straw smacked of bureaucratic nonsense. As a



consequence, I am really pleased to learn that common sense has finally prevailed in the EU and the ban on barley straw has

been lifted.

The barley straw trick only works on nuisance algae in those ponds in which the water is well aerated. The straw should be spread out, ideally in an onion sack and allowed to float close to the surface and it will have the desired effect on green water and blanket weed.

## SOME POSITIVE NEWS

You may recall in a previous article, I was very dismayed to read an article in *The Guardian* newspaper concerning the effect of KHV on wild carp in this country and the supposed threat from the import of koi. I am delighted to report that in February of this year an International Workshop on Koi Herpes Virus was held in London. It was sponsored by DEFRA and included an enormous input from OATA. An electronic copy of the report is available on the web at: [www.defra.gov.uk/science/Publications/Default.asp](http://www.defra.gov.uk/science/Publications/Default.asp) I found this a very interesting and extremely positive document, tracing the history of KHV as currently known, with many countries and the Ornamental Industry working together on a difficult problem. In view of my annoyance with the angling fraternity and in particular ECHO (English Carp Heritage Organisation) and the speed with which they pointed fingers at the Ornamental Industry, I just can't resist a snipe – where were you at this meeting?

# Ponderings



If released into the wild red eared terrapins can do great damage to our native fauna. All images by Dave Bevan



Spring has truly sprung and there's a lot going on in the pond as **Dave Bevan** discovers

## Red eared terrapin

During the early 1990s terrapins, particularly the red eared terrapin, were imported into this country in their thousands.

As tiny, penny-sized babies they did not seem to pose any threat but many people did not realise how large they could grow and how difficult they were to feed and keep clean. They soon out grew their tiny vivariums.

Well-meaning owners, released them into garden ponds and local parks where they managed to survive the winter and now some years later many are alive and well and still growing. As top predators they are quite capable of removing all the fish and amphibians from a small pond over a period of time.

Fortunately, so far, they do not appear to have bred successfully in the wild in this country but the red-eared terrapin illustrates very clearly the dangers of introducing alien species into our countryside. If the warnings on global warming prove to be correct then there is a very good chance that these terrapins will breed which will be to the detriment of our native fauna.

## DISAPPEARING TADPOLES

Earlier this year literally thousands of tadpoles hatched in my fish pond. They were everywhere, wriggling through the open water or clinging to the plants and pond liner. Now some six weeks later I am hard pressed to find even a single tadpole with the exception of a few in the planting baskets.

In the wild tadpoles have many enemies with large groups of insects like the dragonflies and water beetles dependant upon the annual harvest. For this reason frogs produce such large quantities of spawn so that a few survive to leave the pond as tiny frogs.

Tadpoles make a tasty treat for pond fish



But where had they all gone? As I watched the tadpoles in the planting basket one strayed outside and in a flash a goldfish turned and swallowed it. Goldfish love tadpoles so in a well-populated goldfish pond few frogs will reach maturity so if you want both frogs and fish in the garden then you may have to dig another pond for the frogs.

## GUPPY FACTFILE

<b>SPECIES:</b>	Guppy ( <i>Poecilia reticulata</i> )
<b>OTHER NAMES:</b>	Millions fish
<b>OTHER FORMS:</b>	Many different aquarium cultivated forms
<b>SIZE:</b>	3cm for males and 5cm for females
<b>WEIGHT:</b>	Few grams
<b>AVAILABILITY:</b>	Widely available from most aquatic outlets in many forms and colours
<b>HABITAT:</b>	Slow moving rivers and ponds, often heavily vegetated. Can tolerate brackish conditions
<b>IDENTIFICATION:</b>	Small brightly coloured fish which vary in form and finnage. Upward pointing mouth
<b>HABITS:</b>	Guppies are livebearers in that the female retains the fertilised eggs in her body until they hatch. A large female may produce over 100 young but a typical brood is around 30. They eat both live and vegetable foods

Broadtails and veiltails aren't really suitable for ponds so make sure you buy the wild type and swordtails



**PONDFISH VALUE:** With the genetic variants available it is an ideal candidate for the small pond but unfortunately they will not survive

They may be small but these water measurers play an important part in the lifecycle of a pond



## TINY WATER BUGS

Water measurers spend their lives on the surface film, occurring at the margins of still or slow flowing water. They are solitary hunters feeding on small creatures like water fleas and mosquito larvae which they spear with their sharp rostrums through the surface film.

Very slender, delicate-looking bugs which rarely exceed 12mm in length they are easy to recognise because of their stick insect-like appearance. Usually wingless they are brown or black in colour.

Water crickets are also members of the bug family. With a more rounded shape these tiny insects are usually found in slow moving water in quite large numbers where they wait for potential prey to be washed towards them.

The most common species, *Velia caprai*, is brown with a crimson stripe down each side of its body. These bugs are important members of the pond community helping to keep the surface layer clean.

## Pond lighting

If you want to watch your fish at night then probably the cheapest option is a good strong torch but if you also want your pond or water feature to be visible at night then the answer is a set of pond lights.

Although they are not cheap – expect to pay between £50 and £100 for a good set – they are fairly easy to retrofit into most ponds and water features. There are usually two or three waterproof lights connected via lengths of waterproof cable into a low voltage transformer and then into the mains power supply. Most lights have a swivel base which can be attached to a piece of board and held underwater with a stone or brick. Others actually come with anchoring ballast but in any event it is important to ensure the light is firmly fixed.

It is also possible to get coloured lens sets for pond lights and these can be very effective in a waterfall or fountain.



Lighting can transform your pond or water feature



## TAKING STOCK

Winter's over, spring is here and the fish pond looks a little empty. Time to visit the local aquarist to check out this year's stock. Do we really need any more fish? Those that we have will start to grow as spring progresses.

Work out the surface area of your pond and then estimate the total length of all the fish in the pond (excluding the tails). If you work on a maximum of 12in per square yard (25cm per square metre) then you will ensure there is sufficient space to allow the fish to grow during the forthcoming season.

One of the problems with this rule is that the pond looks empty and if you go for higher stocking levels then be prepared to monitor the water quality and to introduce additional filtration to cope with the volume of waste products produced by the growing fish.

Before making that first trip ensure you have an adequate quarantine tank up and running just in case you are tempted. Remember your fish are just coming out of winter and their resistance is low so the introduction of any disease could be fatal.

**Make sure you have enough space in your pond if you're going to add further fish**

## MAKE MORE OF MARGINALS

Marginals fill the area of the pond between shallow water and dry land with colour and form and, in conjunction with the bog plants, help to integrate the pond with the rest of the garden.

A wide ranging group of plants, they contain grasses, sedges and rushes as well as some spectacular flowers. Marsh marigold with its bright yellow flowers provides colour in spring and it also has double and white flowered varieties. Iris, particularly the Japanese iris have large spectacular flowers. The unusual skunk cabbage grows right down to the water's edge producing large yellow spathe-like flowers followed by a mass of luxuriant green leaves.

As most marginals die back in autumn their growth in spring and summer can be spectacular helping to keep nutrient levels under control as they absorb large amounts of phosphate and nitrate.



The delicate flowers of the flowering rush

## THE DREADED WEED

There can be few pond keepers who have not experienced the problems of blanket weed, a filamentous green alga, over the years. It usually strikes in the spring and can rapidly fill the pond with a mass of green slimy threads which wind their way amongst the plants and attach themselves to the pond liner.

Why is their growth so rapid? Algae are simple plants which reproduce by division so each thread can divide many times each day increasing in length as it divides. If a piece breaks off it does not die but continues to grow.

All they need for growth is light, warmth and food. During the winter months there is insufficient light and warmth for growth and if the water was clear in autumn then there was probably insufficient food and the pond was in balance giving the algae no chance to grow.

However, in spring there is a good chance that the balance will change. Both light and warmth increase fulfilling two of the three requirements for growth. Then we start to feed the fish and the fish produce waste (food to blanket weed) which puts the pond out of balance as the filters are not at full efficiency and the blanket weed starts to grow.

A partial water change can have the same effect because believe it or not most tap water is high in nutrients suitable for algal growth.



The bane of pondkeepers - blanket weed



There's nothing like the sight of a lushly planted aquarium with fish meandering through the fronds. **Peter Hiscock** gives his expert advice on how to grow plants and keep them thriving

# Healthy plants



A healthy, thriving aquarium contains not only fish but, in most cases, plant life as well. Plants obtain all their food and energy from a combination of light and nutrients in the water; without either of these they will not survive. This makes the correct water quality vital to the success of keeping aquarium plants, as well as fish.

To survive and grow in natural waters, plants utilise over 18 trace elements in the form of mineral salts, as well as organic compounds. These trace elements are picked up as the water passes through various layers of rock. Water that has

passed through rock often reaches streams and rivers via natural springs that rise up through the ground. In nature dense groupings of plant life can be found around these natural springs, because the water here is rich in mineral salts and trace elements.

Plants also need organic compounds – the result of decomposing waste – to survive. Organic compounds are basically carbon atoms bound onto other elements. Plants are made up of roughly 50% carbon, so the availability of organic compounds is clearly vital for them.

## Nutrients

For plants to survive in the aquarium, it is not simply a matter of providing these nutrients and leaving the plants to it. Nutrients are found in two forms, bivalent and trivalent. Only the bivalent form is water soluble and can be used by plants. In water with oxygen levels above 2mg/litre, a bivalent nutrient such as iron (bivalent form,  $Fe_2$ ) will bond with another iron atom ( $Fe$ ) into a trivalent nutrient ( $Fe_3$ ). The molecule is now too large to be absorbed by plants.

rendering it useless. Many nutrient atoms have the tendency to bond together. During the bonding process an oxygen atom is used up, so effectively a bivalent nutrient is being 'oxidised' into a trivalent one. Clearly, low oxygen levels would prevent this happening, but most aquarium fish need oxygen levels higher than 2mg/litre. To solve this problem, use liquid plant fertilisers that contain substances called chelates. These organic compounds attach to bivalent nutrients and prevent them from oxidising into the trivalent form. This allows nutrients to be available to plants in oxygen levels up to 8mg/litre. Above this level, chelates are destroyed. (Chelated fertilisers

### USING PEAT IN A PLANTED AQUARIUM

Contrary to popular belief, peat is not a good substrate or plant fertiliser in an aquarium. Peat is used in the aquarium to lower the pH and hardness of the water by introducing humic acids. In fact, peat can remove some useful nutrients and replace them with too much humic acid for most plants.

for garden plants help to make nutrients available in a similar way.)

### Carbon dioxide

Carbon dioxide  $\text{CO}_2$  is the most important nutrient for plants, considerable more than any other. Providing the required amount of  $\text{CO}_2$  in the planted aquarium creates the difference between plants that thrive and those that merely survive.

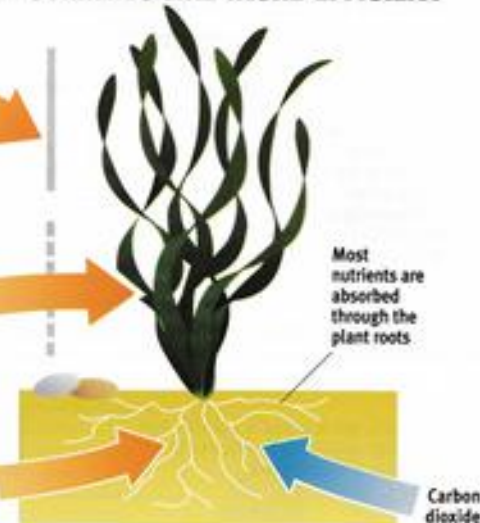
$\text{CO}_2$  is constantly produced in the aquarium by fish, plants and also by the bacteria in the substrate and filter. However, in a well-planted the demand for  $\text{CO}_2$  is more than the amount produced, so additional supplies are vitally important. The ideal level of  $\text{CO}_2$  in a planted aquarium is about 35-

### HOW CHELATED NUTRIENTS ARE MORE EFFICIENT

High oxygen levels in the water cause bivalent nutrients such as iron ( $\text{Fe}_2$ ) to become trivalent ( $\text{Fe}_3$ ). Aquarium plants cannot absorb these

Adding a chelated substance prevents the bivalent form of nutrient atoms from being changed to the trivalent form in high oxygen levels

The low oxygen conditions in the substrate mean that the nutrients remain in the useable bivalent form



45mg/litre; at levels above 100mg/litre, damage can be caused to some fish. For larger aquariums, there are a number of systems available that will introduce  $\text{CO}_2$  into the tank and maintain it at an ideal level. There are also cheaper systems that deliver  $\text{CO}_2$  at a constant rate and provide enough for plants without saturating the aquarium. Whichever  $\text{CO}_2$  system you choose, it will be the best investment you can make to keep your plants healthy and growing strongly.

### Providing a good substrate

Although not directly related to water quality, it is vital for plants to have a suitable substrate. The bacteria (releasing  $\text{CO}_2$ ), organic compounds and minerals within the substrate provide most of the nutrient requirements of plants, which they

### HOW TO ENCOURAGE GOOD GROWTH

- Use liquid fertilisers containing natural chelates.
- Reduce oxygen levels by placing the filter outlet 10cm (4in) below the water surface and do not use airpumps in the aquarium.
- Provide additional  $\text{CO}_2$  with a  $\text{CO}_2$  fertiliser system.
- Use strong, full spectrum lighting with a dedicated mercury vapour or metal halide spotlight, or fit at least three to four fluorescent tubes.
- Use a combination of lime-free substrates at least 7.5cm (3in) deep, with a nutrient-rich layer sandwiched in-between.

A simple but effective substrate for plants would be for example, from bottom to top: a heating cable covered with 5cm (2in) of fine lime-free gravel or sand, a nutrient-rich layer of either red tropical clay or a specifically designed planting substrate, and then a final 5cm layer of lime-free gravel (1-3mm diameter).

Lime-free gravel in inert and will not affect water quality. As a planting substrate, it simply holds everything in place

A thin layer of nutrient-rich substrate, such as this red clay-based material, will release nutrients slowly at a constant rate. A thin layer of nutrient-rich substrate, such as this red clay-based material, will release nutrients slowly at a constant rate

This silver sand will compact in the aquarium and contain little oxygen, ideal for holding bivalent nutrients that plants can use readily

The heating cable will create a very slow-moving circulation of water, carrying nutrients around the substrate



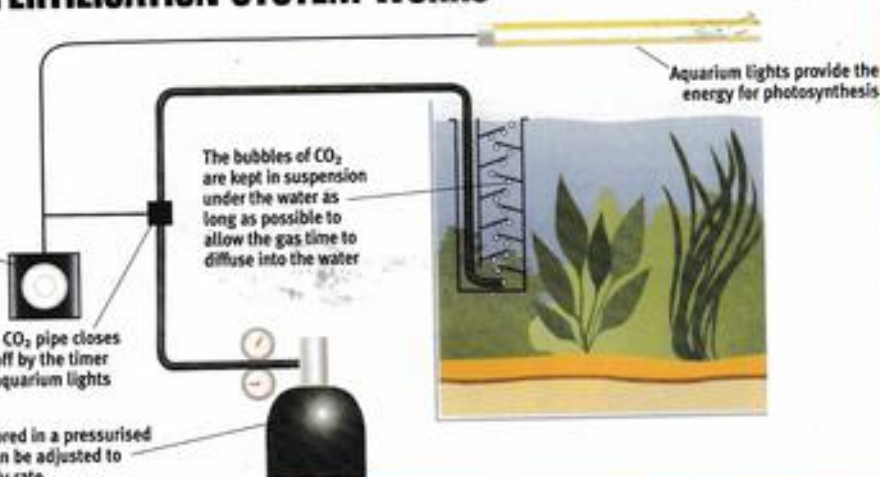
### AN IDEAL SUBSTRATE

## HOW A CO<sub>2</sub> FERTILISATION SYSTEM WORKS

The timer controls the lighting and the supply of CO<sub>2</sub> gas. Plants do not need CO<sub>2</sub> at night and so the gas supply is switched off at the same time as the lights, preventing a build-up of CO<sub>2</sub> in the tank.

This valve in the CO<sub>2</sub> pipe closes when switched off by the timer controlling the aquarium lights.

The CO<sub>2</sub> gas is stored in a pressurised canister, which can be adjusted to release at a steady rate.



take up through their roots. In most aquariums, the substrate is simply pre-cleaned and washed gravel, containing virtually nothing of use to the plants. This is why most people cannot keep plants, despite the use of liquid fertilisers.

A good substrate should be at least 7.5cm (3in) deep, providing space for the plants to spread their roots. A deep substrate also increases the likelihood of creating a low- or zero-oxygen layer. In zero-oxygen, nutrients are more easily available and this condition reflects the situation in nature, where aquatic plants root in anaerobic (no oxygen) substrate. Although roots do need oxygen to thrive, this is provided from the plant's leaves growing above the substrate. Nutrients also have to be circulated through the substrate. The best way of doing this is to install a low-power heating cable in a winding pattern within the lowest part of the substrate. The slighter warmer and cooler areas created between the turns of the heating cable circulate the nutrients slowly around the substrate. ■

### REDUCING OXYGEN LEVELS

In the aquarium, oxygen is introduced through surface movement created by the filter pump. To reduce this effect, place the filter outlet at least 10cm (4in) below the water surface.

Airpumps and/or air-powered filters, such as undergravel filters, will introduce excess oxygen and should not be used. In a healthy aquarium, the oxygen produced by plants photosynthesising during the day is enough to last through the night, even with CO<sub>2</sub> fertilisation.



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# Thorny catfish



*Miomodorus stenopetris*

**Erwin Schraml** thinks that Thorny catfish should be given a chance in the home aquarium. Here's why...



*Miomodorus humeralis*

When you hear the name 'Thorny catfish', what do you have in mind? Probably something like the Raphael catfish (*Platydoras costatus*), which is a pretty thing but spends most of its time hidden, or the Talking Thorny catfish (*Amblydoras honcockii*), which can grow if you take it out of the aquarium! Another catfish many aquarists will think of is a relatively large catfish, often seen in show-aquariums or zoos, and noted for its large thorns. If my memory serves me right it is called *Oxydoras niger*, the Ripsaw catfish, which is such a large growing fish (up to one metre) that it's not suitable for the home aquarium. So traditionally Thorny catfishes have been branded as particularly unattractive species.

## The Raphael catfish (*Platydoras costatus*)

Thorny catfish have had a bad press over the years. Of course their species aren't really blessed with bold colours, but many have an interesting shape, remain comparatively small, are not really predatory, and don't hide away. They are also present during the day and are lively swimmers making them eye-catching in a community aquarium which doesn't house other species that are too small.

There are 26 species of Thorny catfish in the photo-index of the *Aquarium Atlas*. In this book the *Liosomadoras* genus is lumped in with the Thorny catfishes

(Doradidae), but it really belongs to the Driftwood catfishes (Auchenipteridae). At present Thorny catfishes are a family with 74 described species, which are allocated to 30 genera. The latter number serves to highlight just how variable Thorny catfishes can be.

Recently Aquarium Glaser had a shipment of Thorny catfishes which consisted of four different species. Since there is no reliable literature in the hobby to identify these catfishes, I asked Mark Sabaj to have a look at the photos. He is a scientist familiar with this group, and it is thanks to him that these identifications are now available. At the same time he noted, that it is not always possible to identify fish by using pictures alone.



### *Nemadoras humeralis*

One of the species can now be referred to as *Nemadoras humeralis*. Kner had already described the fish in 1855 in the genus *Doras*. They were also placed temporarily in the genus *Opsodoras*, and *Oxydoras bochi* Boulenger (1898) is deemed to be a synonym of it. These fish are widespread in the Amazon basin and are approximately 13cm long up to the base of the caudal fin. The following water parameters, which occur in nature, are given in FishBase: pH 5.8-6.8 and dH 4.0-10.0; temperature 23-28°C. Normally you can keep these fish in harder tap water, which has a pH value a little over the neutral value. However, any breeding attempts should be made with water which corresponds to their natural environment. On this note we enter virgin territory, as up until now, Thorny catfishes were rarely spawned in captivity. There is no information on successful spawning in *Nemadoras humeralis*.

Because of its small mouth and acutely pointed snout it can be assumed this species preys in nature on small food animals like worms or insect larvae, which it finds in the sand. In the aquarium artificial and frozen food is also eaten. This diet applies for all the other species mentioned in this article.

### *Doras eigenmanni*

The next species could be named *Doras eigenmanni*. It was described in the genus *Oxydoras* by Boulenger (1895), but according to Mark Sabaj they belong to a new genus which is not yet described. This species is widespread in the entire Amazon basin, and also in the upper Rio Paraguay. The trade name 'Eigenmanns Dwarf Thorny catfish' refers to the fact that these animals



*Doras eigenmanni*



*Trachydoras steindachneri* or *T. nettereri*

*Amblydoras hancockii*, the Talking Thorny catfish





A juvenile *Oxydoras niger*, the Ripsaw catfish

don't grow particularly large – only to about 10cm. Their aquarium requirements are the same as *Nemadoras humeralis*.

### **Hemidoras stenopeltis**

There are several similar-looking species which fit the characteristics of the next catfish. Since the illustrated animal has small scales on the back between the dorsal and the adipose fin, the genus can correctly be assumed as *Hemidoras*. Furthermore, the fish has plates along the ventral midline anterior to the anal fin, so it might be *Hemidoras stenopeltis*.

*Hemidoras stenopeltis* is, up until now, unmentioned in the hobby but it has been known scientifically since 1855, as the Viennese zoologist Rudolf Kner described it in the genus *Doras*. This species is also widespread in the whole Amazon basin and should reach about 12.5cm in length.

This relatively slender catfish proved to be more delicate in the acclimatisation phase than the other species presented

here. They were more susceptible to bacterial infections. Presumably they originate from areas with a stronger water current. In the aquarium they need frequent water changes and the tank needs to be maintained regularly. If you wish to breed them you need to treat them in the same way as you would long snouted plated catfishes with additional power heads.

### **Trachydoras steindachneri or T. nattereri**

This last species could not be identified clearly using only photos. According to Mark Sabaj could it be *Trachydoras steindachneri* as well as *T. nattereri*. *T. steindachneri* was described by Perugia (1897) in the genus *Oxydoras*. *O. trachypteria* Boulenger (1898) and *Trachydoras atripes* Eigenmann (1925) both count as synonyms. This species should reach 8.6cm in length. *Trachydoras nattereri* was described by Steindachner (1881) and was also placed temporarily in

*Oxydoras*. Specimens of 10.3cm were found in this species.

Both species are widespread in the whole Amazon basin and until now were not mentioned in the hobby. Housing in the aquarium is possible under the same conditions as in the other species, and there are no special food requirements. The large eyes point to daylight activity which makes them interesting to watch in an aquarium. Other benefits are that Thorny catfishes don't damage plants and won't dig into the ground.

I think Thorny catfish should be given a chance as aquarium fishes. There is so much still to learn about them and, if you see beyond their dull colours, they make fascinating subjects. ■

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The Raphael catfish (*Platydoras costatus*)



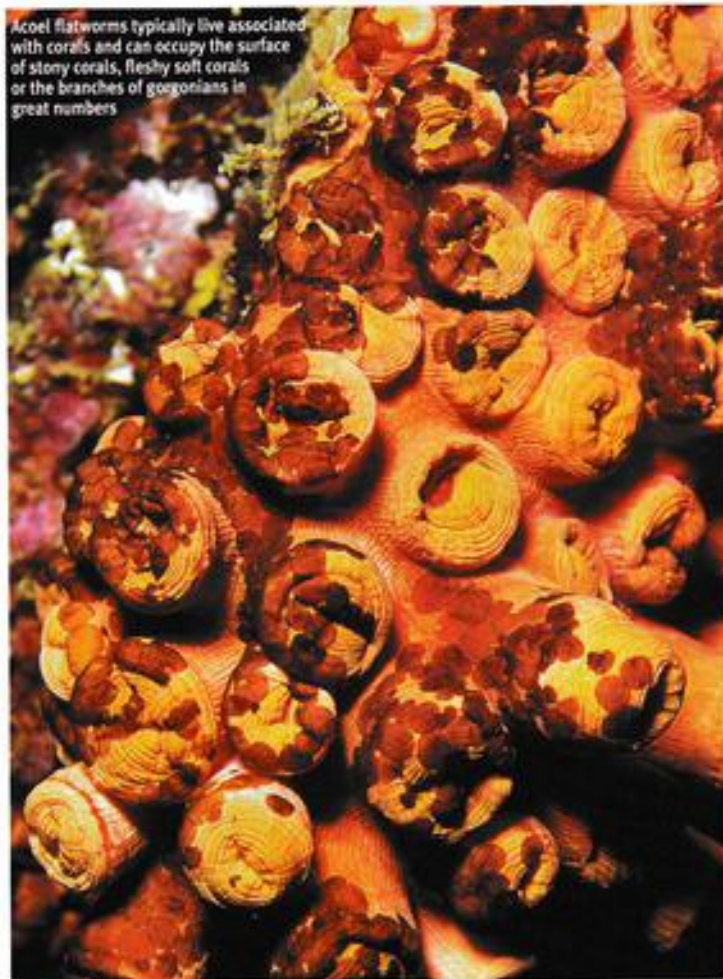
# Wonderful worms part 2



ALL PICS BY BIOQUATRO PHOTO: A.J. NILSEN

From looking pretty to performing a vital role in your aquarium, marine worms make fascinating subjects, says **Alf Nilsen**

Acoel flatworms typically live associated with corals and can occupy the surface of stony corals, fleshy soft corals or the branches of gorgonians in great numbers



A group of worms that is frequently seen by divers, but according to my knowledge has not yet been kept in private reef tanks, is the Sausage or Spoon worm (phylum Echiurida). Echiurids live in tubes, which are buried in sand, under rocks or anchored in crevices among coral rocks. In total there are about 130 known species. Many species occur at great depths, but there are also some which live in shallow water.

Sausage worms do not possess segments but are closely related to annelid worms. The body is soft and sausage-shaped and the animal has little protection against enemies. At the anterior end of the body there is a proboscis, which can be considered as an extension of the head since it also contains the brain. The edges are rolled ventrally so that the underside forms a gutter. The proboscis cannot be fully retracted, but instead it can be extended for several metres. It has been observed that an 8cm long specimen can extend its proboscis for 2m (Barnes, 1986). The proboscis gives off a mucus, to which food particles adhere. The tip of the proboscis is often flattened, but it can also be divided into two halves in some species. At the base of the proboscis we find the mouth opening. When diving on the reef it is the proboscis of a Sausage worm that you usually spot, the trunk is hidden deep in between the rocks or corals. Little work has been done on the group, and a revision is highly needed. The generic names used today are *Bonellia*, *Anelassorhynchus*, *Pseudobonellia* and *Achaetobonellia*.

## Ribbon worms

Another interesting group of marine worms that are relatively rarely seen, both on the reef itself as well as in the reef aquarium, are the ribbon worms from the phylum Nemertini. Although some members of the phylum must be regarded as 'long worms', reaching lengths of 30cm to a couple of metres, the majority are small, never growing longer than a few centimetres. There are, however, some

  
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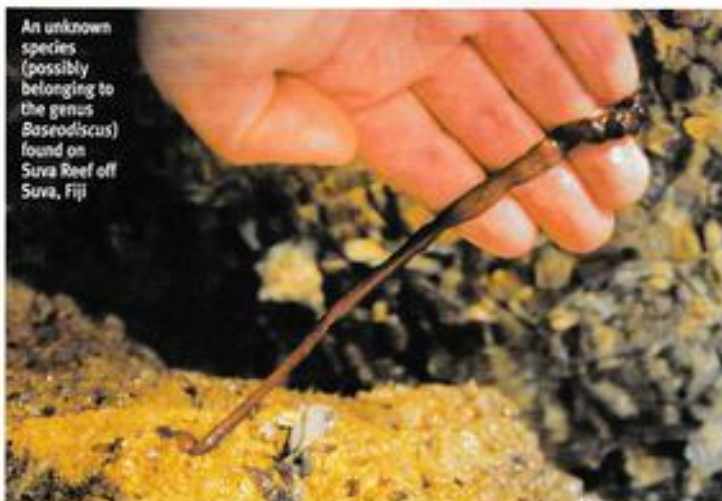
Corallimorpharians and soft corals are usually the hosts for acoel flatworms in aquaria

unbelievably long specimens among the Ribbon worms such as *Lineus longissimus* usually found in rock crevices off the coast of northern countries. I know divers who have pulled metre after metre of worms out of crevices... A record of 55m (!) is reported for this species. On the reef divers occasionally spot Ribbon worms among algae or in search for food among rubble or corals, but most

**“Worms are everywhere on the reef, often hiding out of sight to humans, but still present”**

species hide during the day. We found a number of specimens of an unknown species (possibly belonging to the genus *Baseodiscus*) on Suva Reef off Suva, Fiji where they hide in holes in rocks on the shallow reef flat. The Ribbon worms have a proboscis housed in a fluid-filled chamber extending above the gut.

An unknown species (possibly belonging to the genus *Baseodiscus*) found on Suva Reef off Suva, Fiji



Most Ribbon worms are carnivorous or scavengers feeding on other invertebrates. Many of the larger species found associated with corals reefs are brightly coloured possessing colourful longitudinal stripes or

transverse bands. The beautiful, longitudinal striped in black and white *Baseodiscus quinquelineatus* would indeed be a remarkable animal for the reef aquarium, but little is known about the keeping of the larger Ribbon worms in captivity.

## Flatworms

The bigger Flatworms in the phylum Platyhelminthes (Polycladida) are among the most colourful organisms on the coral reefs. A number of species exist and many species have recently been described, (Newman & Cannon, 1994, 1996a, 1996b, 1997 and 1998), most of which are extremely colourful and attractive. The species in *Pseudoceros* feed exclusively on colonial sea squirts, and are therefore not at all suited for the reef aquarium, while those in the genus *Pseudoboceros* feed on small invertebrates and should have a better chance for survival in captivity. In general all members of Polycladida should be regarded as very difficult animals to keep alive and should definitely be left on the reef. I once found a big flatworm in an aquarium that was emptied, proving that even this group can be introduced to our tanks with live rocks.

To aquarists the small, commensal species in the 'order Acoela' are well known. (Do note that the systematic within Platyhelminthes are changing and that the Acoela might not even belong to the phylum Platyhelminthes). Acoel flatworms typically live associated with corals and can occupy the surface of stony corals, fleshy soft corals or the branches of gorgonians in great numbers. They possess symbiotic algae and thereby utilise the energy from the sun. In aquaria they can become a plague as they tend to multiply without control as they lack natural predators. Sea slugs of the genus *Chelidonura* (family

The bigger Flatworms are among the most colourful organisms on the coral reefs



## A PLAGUE OF WORMS

The tiny acoel flatworms are a real plague, living amongst algae on the bottom or on the glasses of the reef aquarium. These worms are horrible and can reproduce to uncontrollable numbers. Aquarists have tried many ways to avoid and control these flatworms, but so far they haven't succeeded. The best advice is to remove any specimen as soon as it is spotted. Once the population gets out of control, there is no way back. I have

The tiny acoel flatworms are a real plague to the reef aquarium and can quickly take over



seen tanks where the bottom was completely covered with yellow-red, tiny acoel flatworms reminding us that not every worm is welcome in the reef aquarium!

Agallidae) are known to feed on acoel flatworms in the nature. We also have reports from Germany that the lipfish *Holichores marginatus* (family Labridae) prey on these organisms. Corallimorpharians and soft corals are usually the hosts for acoel flatworms in aquaria.

While many of the Bristle worms, Flatworms and Ribbon worms are big and easily spotted, the most numerous worms in the reef aquarium and on the reef are microscopic - they are the Round worms from the phylum Nematoda. Round worms are some of the most common organisms on Earth. It has been said that if you removed everything on Earth except for the Round worms, you would still be able to see the contours and shapes of the countries and continents. So far, more than 80,000 species of Round worms have been described, which are probably only about 10% of the free-living species actually present on Earth at this time.

## Round worms

Round worms frequently occur in bottom sediment and among detritus and algae, and play a very important role as decomposers both in the reef aquarium and in the nature. The free living species typically measure 0.2-1.0mm in length, but can occur in numbers as high as two million individuals per square metre in coral sand. The free-living Round worms are important food organisms for other invertebrates and fishes, in the nature as well as in the reef aquarium. Many species of Round worms are parasitic, living in other animals such as in the intestine or other internal organs in fishes. Worse are the nasty species that can use humans as hosts, such as *Wuchereria bancrofti* where the adult

worms block the lymph glands of humans causing the swelling of the tissue (elephantiasis). Luckily for us aquarists these are not a problem connected to coral reefs or reef aquaria.

When I skin-dived near the sandy beach in Rarotonga, Cook Islands, I noticed some strange worms living buried in the fine sand. I collected a couple of specimens and examined them closer at my hotel room. These worms turned out to be *Pycodero* sp. belonging to the phylum Hemichordata. Hemichordates are relatives of vertebrate animals but different only in that they do not have a notochord. Hemichordates also show many similarities to echinoderms. These are the reasons why they are so interesting to biologists. In total there are 90 known species, which are distributed over the classes Enteropneusta and Pterobranchia.

So... although the animals I found at Rarotonga are very different from the Bristle worms, Flat worms and Ribbon worms, they can undoubtedly fit into the expression 'worms'. Worms are everywhere on the reef, often hiding out of sight to humans, but still present... ■

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# Give geckos a go



Great for beginners, there are lots of geckos to choose from. **Val Davis** takes a look at some of her favourites

Some months ago we described the care of two of the most popular geckos in the hobby which are suitable for beginners. However, a look around good reptile outlets shows that other species are available too:

## Wonder gecko (*Teratoscincus* *species*)

Referred to as wonder or frog-eyed geckos, the terrestrial *Teratoscincus* are occasionally available sometimes as captive-bred or long term captive specimens. Wonder geckos are unique in that their scales overlap, as in fish, and so can easily become detached. They also shed the tail when stressed so these two factors mean they must be handled carefully. This behaviour ceases when they become accustomed to the keeper. Scales regenerate completely over two to four weeks.

Wonder geckos inhabit sandy areas from central and south west Asia to the Arabian peninsula. Comb-like scales on the eyelids and toes are adaptations to desert life. As with many species, males are aggressive towards other males. Gravid females should

be housed separately – they seem to feel more vulnerable when carrying eggs and sometimes attack the male. The skin of the Wonder gecko is able to carry out partial respiration which means it has special needs regarding substrate. The atmosphere needs to be dry but some damp sand is

needed for the gecko to bury into, enabling respiration to take place. One way to achieve this is 15cm (6in) of reptile or bird sand with pipes or tubes buried in one half, through which moisture can be added to the lower layers in that part of the vivarium. Good ventilation is extremely important.

## CARE OF THESE SPECIES

Although the vivarium set-up may differ slightly from species to species some aspects of the maintenance of these four geckos are similar.

- Daytime temperature range should be 34°C (93°F) at the hot spot, 26°C (79°F) at the cool end with a night time temperature of 20°C (68°F).
- Although all are crepuscular/nocturnal a photoperiod of 14 hours is needed. They will benefit from the provision of 2% UVB fluorescent tubes when they emerge in the early morning and late afternoon.
- All feed on the usual crickets, locusts, waxmoth larvae which should be dusted with a multivitamin/mineral/calcium supplement.
- These gecko species all benefit from a cooler period with temperatures falling to 12°C (55°F) for 8-10 weeks in winter especially if breeding is to be attempted.
- Females usually lay several clutches of two eggs over a period of six months. In order to avoid calcium deficiency tiny pieces of cuttlefish bone should be supplied in a shallow dish.
- In all cases males are incompatible with other males, keep as pairs (wonder gecko) or trios. Mating is often a violent affair, the male biting the neck to prevent the female escaping. These bites may look bad but heal quickly. Usually one mating is sufficient to fertilise all the eggs for the season.
- Eggs may be deposited in damp sand or in the case of climbing geckos in crevices. Young should be raised in a separate vivarium.



Moorish gecko. Frequently seen in houses in the Mediterranean region

### Tiger gecko (*Pachydactylus tigrinus*)

Imports from east Africa often contain these 10cm (4in) geckos. Unlike the previous species Tigers have adhesive toes and can move rapidly up vertical surfaces. They are prolific breeders with six clutches of two eggs laid in a season. The name 'tiger' comes from the juvenile pattern which changes as they become adult. A plump tail is the sign of a healthy specimen. A desert type vivarium with reptile or bird sand and rock piles with crevices and small water

dish is adequate. Eggs of this species can be incubated in dry vermiculite. The young measure 2.5cm (1in).

### Moorish gecko (*Tarentola mauritanica*)

The Moorish gecko is probably one of the commonest geckos available in reptile outlets. Because this frequently-imported species is so inexpensive serious captive breeding is rarely carried out. It can be commonly encountered in well-inhabited areas in the Mediterranean (Spain, Greece,

Canary Islands) and North Africa on houses and dry stone walls as well as cliff faces. The body is strong with noticeable tubercles along the back. The Moorish gecko reaches 15cm (6in), possesses adhesive toe pads and will climb any smooth, vertical surface. If threatened it raises the tail moving the tip from side to side in an S shape. They must be handled carefully otherwise the tail will break off at the fracture line. Although this regenerates it is not as long as the original. If grabbed by the head it makes a defensive chirp. Vivarium set-up is as for Tiger gecko.

### Bibron's gecko (*Pachydactylus bibroni*)

Another frequently imported and fairly inexpensive species from Africa, Bibron's gecko grows to about 20cm (8in). It possesses adhesive lamellae and in its native habitat is active early morning and evening climbing rocks, branches and house walls in search of insects. This largish gecko has a wide, triangular shaped head with granular scales on the body giving the skin a rough appearance. The tail has large, backward pointing tubercular scales. Some specimens are more attractive than others with reddish brown markings. The vivarium for Bibron's gecko should provide height to accommodate their climbing habits. A sand substrate, rocks and branches with small water bowl are suitable furnishings. A light, daily spray seems to help these creatures thrive in captivity. ■



Tiger gecko. Adults lack the distinctive yellow stripes shown on this juvenile

# Wet AND dry

Creating humid and dry areas in a vivarium can be tricky but **Val Davis** is here to help

One of the hardest environments to recreate for terrestrial reptiles and amphibians is that which has both dry and humid parts. Many of the creatures which live in such surroundings are also burrowers pursuing a nocturnal lifestyle. A friable substrate with some moisture-retentive properties is needed. This can be a mixture of potting soil, sphagnum moss, leaf litter and orchid bark or a ready made preparation from reptile outlets. For the drier area some reptile sand mixed in produces the required consistency. Such a habitat allows the inhabitants to exhibit their natural burrowing behaviour and thus reduces stress.

Although requiring different temperatures, depending upon species, this type of habitat is favoured by many commonly available toads such as green toad (*Bufo viridis*), Cane toad (*Bufo marinus*), Fire bellied toads (*Bombina* species) and Horned toads (*Ceratophrys* species). A topping of moss on the damper area helps to hold moisture in. The moss can be sprayed daily. In this type of set up a humidity level of 60-65% should be aimed for. In addition, water must be supplied. A dish sunk into the substrate is one method, alternatively a waterfall can be installed. In both cases water must be kept clean and the receptacles cleaned thoroughly.

## Air circulation

Beginners often make the mistake of thinking that humidity levels can be increased by reducing ventilation and whilst this is true it can lead to a build-up of stagnant conditions. Ventilation is essential! Larger species such as Cane and Horned toads have voracious appetites and so produce considerable quantities of waste. The substrate will need daily spot cleaning and full replacement at regular intervals to prevent bacterial infections such as red-leg.

Although many of these creatures burrow or spend much of their time partly buried, hides are still needed in both the drier and moister areas. A recent innovation features a hide constructed in two parts which contains magnets. One part, with a tunnel system is placed in the vivarium against the glass. Some substrate can be laid in the den. The other part fits to the outside wall of glass and is held in place by the magnets. This outer cover can easily be moved to allow observation of the occupants without any disturbance. Furnishings, although optional, create a more aesthetically pleasing look to the vivarium. Live plants can be used with small species but with the burrowing activity



European green toad (*Bufo viridis*) – a temperate amphibian which requires drier and moister parts to its habitat

of larger species may constantly be dug up. Artificial plants, which can be bought in a range of sizes, leaf shapes and variegations, can be adhered to hides and the sides of the vivarium to create a more natural look.

## Heating & lighting

Temperate, nocturnal reptiles have little need for heat and light. However, in a planted vivarium a 2% UVB fluorescent tube will encourage plant growth, is not harmful to amphibians and will not raise temperatures. In order to view nocturnal creatures more easily moonlight lamps ranging from 15watts to 75 watts can be installed. In the lower wattage heat from the bulb is minimal. The higher wattages can be used to prevent vivarium temperatures from falling too low especially at night, something the horned toad appreciates. For species which require ambient daytime temperatures around 21-24°C (70-75°F) a heat mat can be fitted to part of the back or side of the vivarium. ■



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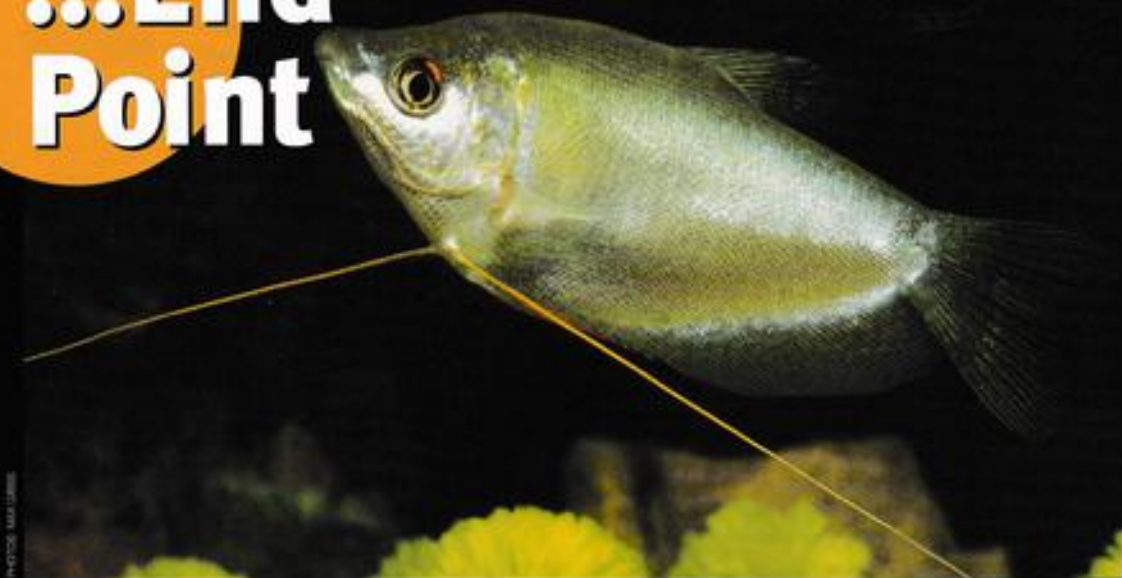


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# ...End Point

The reflective silver body makes the Moonlight gourami an attractive proposition for the community aquarium



## Kathy Jinkings takes a look at the peaceful Moonlight gourami which has a subtle beauty

The Moonlight gourami is an ethereal looking fish, with a subtle but nonetheless impressive beauty. Like all gouramis it is slow moving and graceful, and its reflective silver body makes it a very impressive fish gliding among tall plants and in an out of dark corners. As a counterpoint to the body, the adults have a striking red iris to the eye.

It naturally inhabits slow moving streams and standing waters; the low oxygen levels in such environments are not a problem for this labyrinth fish which can breathe air at the surface. This is a fish whose fragile appearance belies its hardness. Naturally it copes with a range of hardness between 2-25dH, preferring a pH from soft to neutral. Escapees from aquarium facilities have resulted in colonies in Columbia, where they have made themselves at home, and there may be further colonies in Singapore.

Although small, the Moonlight gourami is prized as a food fish in many places. As an aquarium inhabitant it is not, perhaps, prized as much as it should be, having been ousted from many aquaria in favour of more flashy fishes. Nonetheless, this is a fish that will,

literally, shine once you get it home. To show it at its best it needs a large aquarium where it can swim freely, and it prefers to have tall plants to swim amongst. Tough species, like Vallisneria, are best – more fragile plants will also show it off well and meet the gourami's approval, but the gourami may eat them. Fine pieces of vegetation are also an ideal medium for shoring up a bubble nest, and delicate plants may well end up in a frothy pile at the surface. To discourage such destructive behaviour, the gourami can be provided with fresh cucumber or lettuce, which will not only be a healthy dietary supplement but can also be used for construction works! A balanced diet is very important, and in addition to vegetables and staple flakes, a regular feed of live food will keep the gouramis in peak of health. Unfortunately, they may also regard very small fish as live food, but anything over about 2in should be safe.

### Breeding

A pair can be spawned in the aquarium quite easily. An adult male can be identified by his orange pelvic fins (which in gouramis are modified into long feelers, with which they explore their environment), while in the female they are a paler yellow. Males are aggressive towards each other, so a single male with one or more females is the best choice. Once settled in to their new home, the male will build his bubble nest in a quiet corner, supplementing it with bits of vegetation, and will lure the female underneath to spawn. Between 500 and 1,000 eggs will be stored in the bubble nest and guarded until they hatch. The fry are very

small, and need small foods – infusoria is a good first food until they have grown a little. As labyrinth fish, the fry will need to breathe at the surface, so should be reared in a tank with shallow water that is slightly disturbed to break the surface tension. The air above should be kept moist and humid for their first breaths. While not actually spawning, the female is not appreciated by the male, and a large roomy tank with plenty of hiding places serves to allow her to keep out of his way.

This is a very beautiful fish, which will enhance an aquarium of medium size fishes. Among the taste for brighter and brighter colours today, the moonlight gourami provides a graphic illustration that less is often more. ■

## PROFILE

<b>Name:</b>	Moonlight gourami, Moonbeam gourami
<b>Scientific name:</b>	<i>Trichogaster microlepis</i>
<b>Size:</b>	up to 6in
<b>Aquarium type:</b>	Community of peaceful, slow fishes
<b>Distribution:</b>	Vietnam, Cambodia, Thailand
<b>Diet:</b>	Flakes, live food, frozen food, vegetables
<b>Temperature:</b>	25-30°C