

AUGUST 2009

# Tropical Fish

THE UK'S ONLY DEDICATED TROPICAL & MARINE FISH MAGAZINE

# 100

## CELEBRATING 100 ISSUES

**WIN**

A TRIP TO AFRICA WITH JBL - A YEAR'S FAMILY PASS TO THE BLUE REEF AQUARIUM - A RIVER REEF TANK FROM INTERPET - A BIORB LIFE TANK FROM REEF ONE - AN AQUACARE SYSTEM FROM TETRA

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## Sparsholt College news

**B**ristol Zoo - fish removal  
- April 2009 - First year  
National Diploma students  
in Fish Management (Ornamental)  
recently travelled to Bristol Zoo to  
meet a request made by Aquarist,  
Jonny Rudd.

The Zoo had asked for some  
help with the removal of some rather  
large fish from the 45,000-litre South  
American display tank (formally a  
Gorilla enclosure!) The tank was in  
need of some renovation, hence the  
need for the temporary re-homing in



various aquariums around the site.

The large fish included a shoal  
of 50-60lb Pacus, 80lb Red Tailed  
catfish, two 3ft Ripsaw catfish, several  
large arowana, and more of the  
Amazon's finest. The team certainly  
had their work cut out!

Needless to say, with the help of  
two divers, several snorkellers and  
an electronic winch, all the fish were  
safely removed and relocated around  
the site. And on the last count

everyone still had all their fingers  
and toes!

A big thanks to Jonny and  
everyone else at Bristol Zoo for  
involving us in this operation, it was  
both lots of fun and an invaluable  
experience for the whole team.  
Sparsholt College Hampshire,  
Westley Lane, Sparsholt, Winchester  
SO21 2NF. T: 01962 776441. Fx:  
01962 776587. Web: [www.sparsholt.ac.uk](http://www.sparsholt.ac.uk)  
ac.uk Email: [enquiry@sparsholt.ac.uk](mailto:enquiry@sparsholt.ac.uk)

## Ryedale Aquarist Society

**O**n Sunday 4th October Ryedale Aquarist Society will hold a mini-Open  
Show. Including seven classes and an auction of aquatic items.

You can find them at Kirkbymoorside Memorial Hall, Market Place,  
Kirkbymoorside, N. Yorks. YO62 6AD

Doors open 10.30am

For further details phone 01751 472715

## Plymouth Discus competition winners

Congratulations to our four lucky  
winners of the June Plymouth  
Discus competition. The answer to the  
question: How many different  
safe foods are in each Plymouth  
Discus Gourmet Hamper, was of  
course, seven.

So, well done to Charles Stanger  
from Great Sutton, Anthony Scorey  
from Essex, Alison Berry from  
Somerset and James Carmichael  
from Glasgow.

Thank you to Plymouth Discus  
for donating the prizes. **Ed.**

## Who found Pete piranaha?

Well done to Chris Jackin from Boston  
who correctly spotted Pete hiding on page  
34 of our June 2009 issue (behind the  
fact file box).

I hope you enjoy your  
year's subscription

**Ed.**







## Hikari Tropical Shrimp Cuisine

Since 'Red Bee Shrimp' is introduced in aquarium scene, keeping and breeding only Red Bee Shrimp with planted tank had established. Currently, those shrimp hobbyists are becoming like semi-professional, for example they select 'high-grade' shrimps (which has larger white area for instance) as parent stocks for breeding and have multiple breeding tank only for shrimps. Furthermore, various wild-caught or artificial bred shrimps were introduced which helps increase opportunity to see those freshwater ornamental shrimps in aquarium shops.

Such shrimp hobbyists normally feed frozen bloodworm, boiled vegetables, tropical fish foods, shrimp foods which were introduced from competitions, or a food which was originally produced for shrimp farming. Unfortunately, those are not formulated for herbivorous shrimps like Red Bee Shrimps which require plant origin nutrients.

Kyorin therefore developed a food for herbivorous ornamental shrimps, with selected plant origin ingredients that those shrimps naturally require to grow healthy.



## 75 years old and still going strong

The Ilford and District Aquarists and Pondkeepers Society is 75-years old this year. This society is probably one of the oldest and largest aquatic societies still thriving in the South Eastern area of England.

The Society was formed by a group of keen aquarists back in 1934. With a committee of 13, it was quite a venture in those days to set out on. In November 1935 the chairman remarked how well they had come through their first year with a balance on the right side. This has remained throughout the life of the society, and it is as healthy today as it was then. It still has a hard working, and loyal committee, albeit that most are long serving members and many are life members.

In 1939 the committee meeting minutes read 'meeting cancelled due to the outbreak of war. The society still met during the war years although quiet at times due

to members on active duty, but in February 1940 one of the raffle prizes was a Gas Mask Cover.

The Society always used to have an Annual Show. In 1984 on the society's 50th the main hall of the Ilford Town Hall was booked for its annual show. With over some 2,000 visitors coming through the doors it was a very successful show to mark their 50th. The other event that year, was booking the Meeting Rooms of the Zoological Society of London at London Zoo. With two prominent speakers, Dr Christopher Andrews of Tetra, and Dr Keith Bannister of the British Museum of Natural History it was a resounding success. The one thing that was different about Ilford was that the show was a closed show due the support of its membership, unlike most shows which were and are open. Sadly the society does not have an annual show these days due to various reasons, but at its monthly meetings there are still speakers well known in the aquatic world who enjoy coming

to Ilford to speak.

This year to celebrate their 75th the society will be holding a garden picnic at one of their members, and a dinner at a local restaurant.

The present Chairman Ken Wrightson together with his Vice Chairman Ray Downer (who is also their Public Relations Officer) hope to see many more years ahead for the Society. Their main aim is to keep the hobby of fish keeping alive, and enjoyable.

A warm welcome is always made to new members, and with a membership of very keen, and experienced aquarists, a new member will always be able to find help in solving a problem, be it tropical, coldwater, marines or ponds.

The society meets on the second Monday of every month at The Library Rooms, Spratt Hall Road, Wanstead, London E11 2RQ, with regular attendances around the 40 mark. The societies website is also available for information on, [www.ilfordaquarists.co.uk](http://www.ilfordaquarists.co.uk).

## It's all go at Fishworld

Never one to stand still, Matthew Hamill, MD of Northern Fishworld Ltd, is constantly striving to improve his aquatic shop. Fishworld would probably be classed as a medium-sized shop and, as such, space is at a premium but Matthew believes it is important for customers to feel at ease and to have space to wonder round at their leisure.

For those customers who may not have visited the shop for a while, recent improvements and additions have included a pond room (known as Pond World), moving the critter system out of the main marine room to allow more room for customers, a new plant display system to make the plants more accessible and making more use of wall space for dry goods to enable more walkable floor space.

Pond World opened at Easter and has a variety of pond fish including Koi, Shubunkins and Orfe, together with a good selection of dry goods – pumps, filters, medications, food etc.

The next stage of the changes at Fishworld will include:

- Moving all stock from behind the counter into the main shop area so that it is more accessible for customers to peruse the products before purchase
- Install new fancy coldwater tanks in the pond room so that all coldwater fish are together
- Convert the existing coldwater room into a tropical room catering for oddballs, rarities and fish suitable for nano tanks

Fishworld have recently launched a new website ([www.fishworldoldham.co.uk](http://www.fishworldoldham.co.uk)) which we believe is a cut above the

rest. So many fantastic websites are launched only to find that they are rarely, or never, updated. Fishworld's website is updated regularly and, in particular, the marine fish and tropical fish pages are updated virtually every week to show what fish are in stock. The photos on the marine page are of actual fish and corals in the shop, whilst the photos on the tropical page are of fish either in the shop or at the wholesalers prior to transportation to the shop.

So, whether you are new to the hobby of fishkeeping, a new customer or an old customer, please pay Fishworld a visit – we're sure you won't be disappointed.

Fishworld, 756 Middleton Road, Chadderton, Oldham, OL9 0PA. Tel: 01625 665 2831. Website: [www.fishworldoldham.co.uk](http://www.fishworldoldham.co.uk)



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Letters are courtesy of members from [www.fishforums.net](http://www.fishforums.net) unless otherwise stated. Tropical Fish would like to thank the website for its participation in our Q&A pages that helps bring real life fish keeping matters to the attention of our readers. Ed.

### ON THE PANEL



#### Nathan Hill

A former retailer and public aquarist, turned writer and photographer, his knowledge covers all aspects of freshwater fish keeping, as well as various ethical issues. He has recently started work at Reading College.



#### Tim Haywood

Tim has gained a huge amount of experience with all aspects of the hobby. He has worked at several large public aquariums and gained a higher biological degree.



#### Peter Hiscock

[Thinkfish.co.uk](http://Thinkfish.co.uk) - Peter specialises in freshwater fish, communities, and fish behaviour. He has studied aquatics at Sparsholt, and has many years of retail experience.



#### Dr. Neale Monks

Neale has been keeping fish for over 20 years. With a science education and a passion for oddball species, Neale has published a number of books and writes for many magazines.



#### Chris Ingham

After over 24 years of keeping tropical fish, this path has now taken Chris into the trade with retailing/fiscur.



#### Chris Ralph

Chris specialises in catfish species and has over 10 years experience keeping and writing about them.



#### Marc Foord

Marc has been keeping marine for approximately seven years, prior to that freshwater for eight years. He runs the west London reef club which has approximately 40 members.



#### Dave Wolfenden

Dave Wolfenden has over six years of experience in the aquatics industry and is now a lecturer at Reading College and a consultant to the Tetra Information Centre.



#### Testing testing

**Q:** Dear Tropical Fish,

I have been using Mardel Sin1 test strips and they show safe nitrates, nitrites and hardness. Consistently low, however, are total alkalinity and pH. It's always in the bottom of the 'add pH Plus' and 'add buffer up'.

We've had the tank for about three months, and the pregnant platy we initially got that had a couple of babies, seemed to still be pregnant and then died. I didn't think much about it, but we have/had five females and two males and none of the females have given birth. Several have looked pregnant, but then nothing ever happens.

I had missed a couple of water changes, so I did the last one along with a brief siphon vacuuming and probably half water change. Since then, we lost one of our female platies and our snail. All levels, according to the strips, are normal except for the consistently two low levels.

What could be going on?

**Thanks**

**A:** Dear reader,

Platies can be prolific breeders but in a community aquarium the young are often eaten before we get a chance to see them, so it is quite possible that your platies have had several 'unseen' broods. Breeding traps are available to house pregnant females in, so

that the young are caught when born, but these can stress the female so I prefer the option of a separate 'birthing' tank, which you can then use to raise the young fry once the female has given birth.

Regarding your low pH levels, firstly I would double check with another test kit or at your retailer, there is always the chance that the test kit could be wrong. Having said this it is not uncommon to have a low pH but still retain a decent hardness level, and as long as the pH level is stable it should not be a problem. Have you tested your source water to see what pH it is? It may be that you live in an area with a low pH and if this is the case a good local fish shop will be able to tell you what is considered 'normal'. Without knowing the exact pH it is hard to advise, but anywhere between 6.5 to eight is usually fine for most commercial aquarium fish, although platies do prefer it at the higher end.

Regarding the missed water changes, it is best to resume normal water changes rather than try and 'make up' for the missed changes. Doing a water change of 50% is far too much and very disruptive and damaging for your fish and the bacteria in your filter, and is quite likely a factor in the loss of your snail and platy.

Regards  
**Peter Hiscock**



#### Intruder in the tank

**Q:** Dear Tropical Fish,

I was dutifully cleaning out my tank on Saturday morning when I noticed this little creature had found its way into my bucket! I put it back in my tank, but I'm not sure what it is or how it got there!

Do you have any idea what it might be and if it would be harmful/beneficial to my tank/fish?

**Thanks**

**A:** Dear reader,

I shall presume that you siphoned the little chap out when you were gravel cleaning your aquarium. I'm not a bug man, so I will not try and identify him fully from one photo, but he is certainly a nymph of some sort. Animals of this kind can very easily enter a tank unnoticed either as an egg or when very small. The main route for getting into a tank is either from plants or live food, especially if both are collected from the wild. I would be reluctant to leave him in the aquarium as many, such as the Dragonfly larvae are incredibly predatory and will strike at fish larger than themselves; equally animals from the wild are a potential source of disease and parasites.

The little chap I expect will find your aquarium too warm to thrive, though he may survive. If it was me, I would be tempted to release him in a closed body of water such as a very small garden pond that was away from any natural body of water.

All the best

**Tim Haywood**



[OSAquatics.co.uk](http://OSAquatics.co.uk)



# Q&As

## Questions & Answers



### Starting from scratch

**Q:** Dear Tropical Fish,

After a little thinking, instead of getting another betta, I've decided to try a Dwarf puffer in the small tank I have (20-litres).

I just have a few questions:

Will normal gravel be okay?

Will an uncovered heater be okay?

What sort of environment is best, heavily planted (the tank could fit about six plants in it I think).

And what temperatures should I aim for?

And one other thing, are they okay to eat bloodworm?

Any other advice given would be appreciated, I basically need to

completely clean out the tank, wash the filter down so it's a new system. But my LFS has informed me they can order them in especially which is great news.

**Thanks**

**A:** Dear reader,

20-litres (about 4.5 Imperial gallons) isn't nearly big enough for a Dwarf puffer (*Carinotetraodon* spp.) so forget about this idea! While individuals may only need about 15 to 20 litres of space to avoid territorial issues, to get the good, stable water conditions you need requires much more water volume. By my reckoning, 35-litres is the absolute minimum.

So, once you've bought a bigger tank, to answer your remaining questions, firstly, yes, plain gravel is fine. Normal heaters can be used, though as ever, using a heater guard is always helpful, and some heaters come with them as standard anyway.

As for habitat, these fish naturally live among plants, sunken wood and leaf litter. Most people keeping these fish find a mix of lava rock and

Java ferns works well by creating a complex habitat that allows each fish to keep out of the line of sight of the others. The water is soft, slightly acidic, and gently flowing. Water temperature isn't critical, but 25 to 30°C is about right.

Their diet should be varied. While bloodworms are certainly consumed with relish, this should be augmented with live daphnia, tiny earthworms, very small snails, frozen mysis, and other suitably sized items. Although they don't eat adult shrimps, baby shrimps will be eaten, so if you decide to add some Cherry shrimps, don't expect to see much increase in their numbers!

The single most important pieces of advice when keeping Dwarf puffers is to ensure good water quality: like most puffers, they're basically adaptable in terms of water chemistry, but they have little tolerance for ammonia and nitrite, and tolerate only low levels of nitrate. So a big, well-filtered aquarium with regular water changes is what's required.

Good luck

**Neale Monks**

### Mollies are not for beginners

**Q:** Dear Tropical Fish,

So, it was suggested that my molly had columnaris. She has had white cottony growths (just a few) for a while now and nothing I have done makes them go away completely. I just treated with a seven-day course of Pimafix and it helped her perk up (she was clamping) and she seems like a happy, healthy fish, except for a very small patch on her body near her dorsal fin.

It did improve with the Pimafix but did not go away completely. Any more ideas before I go another round with the Pimafix?

She is in the hospital tank right now, so she has five-gallons of clean, stable water all to herself to get better. I just performed the 20% water change that they recommend after a course of treatment yesterday and was going to move her into the big tank, but noticed she had just a trace still of whatever it is.

The lady at the pet store tried to sell me a treatment for ich. It is most certainly not that. She did have that when I moved a school of tetras into her tank and was treated and

recovered beautifully from that. This problem far pre-existed the ich anyway.

Beats me.

**Thanks!**

**A:** Dear reader,

Mollies quite commonly develop the unholy trinity of finrot, skin fungus, and columnaris (often called mouth fungus) when kept in freshwater conditions. There's really little else to be said here except that mollies are best kept in slightly brackish water. If they're kept in freshwater, they are acutely sensitive to water quality issues, including high levels of nitrate. They are also very sensitive to pH changes, and the background acidification normal to freshwater aquaria can cause them great stress.

So, before all else, consider moving your mollies into brackish water conditions; I'd recommend a salinity of about six-grams of marine salt mix per litre of water; this corresponds to a specific gravity of around 1.003 at 25°C. It goes without saying that most freshwater fish won't tolerate this amount of salt, but then mollies aren't community fish, and you shouldn't be keeping them in a



community tank anyway.

Do note that marine salt mix doesn't just raise salinity, it also raises pH and carbonate hardness, and it's the combination of all three of these things that makes marine salt mix so helpful. Plain tonic salt (or aquarium salt) isn't nearly so useful; at best, plain sodium chloride moderates the toxicity of nitrite and nitrate, but it has no impact on pH and carbonate hardness at all.

While this will improve their health in the long term, you will need to treat your mollies appropriately. Pimafix, and indeed all products based on tea-tree oil, are unreliable cures. While acceptable perhaps as preventatives to be used when transporting fish or if fish have been fighting, I wouldn't ever rely on them

to cure diseases once established.

For columnaris, my medication of choice is eSHA 2000 from eSHA Labs. Used as instructed it cures not just columnaris but also fungus and finrot, so identifying the disease in question isn't important.

It's a shame so many retailers insist on selling mollies as community fish, when experts have written to the contrary for decades. Mollies are delicate fish when maintained under freshwater conditions, and cannot be recommended for beginners. But kept in brackish and saltwater aquaria, they're virtually indestructible, which probably says all you need to know about their water chemistry preferences!

Cheers

**Neale Monks**



### Discus worms

**Q:** Dear Tropical Fish,

One of my fish has not been eating properly and doing white poo, so I thought it might have constipation. I've heard that Epson salt was good for discus so ordered some and it actually arrived today. I was told one tablespoon per 10-gallons, is this right before I add any?

Anyway, the fish did a massive white poo today and I was a bit worried so I took some pictures, can anyone identify what's wrong?

**Thanks**

**A:** Dear reader,

This is a very common problem with discus, and at first glance looks like worms. Keepers then use wormers and shout: "It doesn't work" when the problem is not resolved. The problem here is an intestinal parasite problem, but when 'jelly like' such as your picture, it is also bacterial too. So no wormer treatment's on the market will fix this on its own.

I have used two ways in the past to solve this problem. The first way is to use a full dose of Wormer Plus on day one with a full dose of Interpet number 9, then use half a dose of both every day until the problem is solved, which can take up to a week depending how severe the infestation is.

My second way is to treat with 'Octozin' made by Waterlife, and do a three day treatment. A second dose is normally needed in heavy infestations. So after the three day course, do a 35% water change on day four. On day five start a second three-day course again, this usually works.

Epsom salts is not a good idea in a discus tank unless you need to harden the water, as this is what it will do. By the sound of the dosage it may be that you are getting confused with cooking salt. With a problem such as this, cooking or aquatic salt can be added to help speed up this sort of problem. Because salt kills bacteria, this will help the medication off to a good start. But remember, salt can also harden the water, so keep to the heaped tablespoon for every 10-gallons of aquarium water, and no more. Salt can also be used with the first method of Wormer Plus also.

**Chris Ingham**



**PLYMOUTH DISCUS**  
www.plymouthdiscus.com

### Getting the right marine set-up

**Q:** Dear Tropical Fish,

I have a 29-gallon tank that I would like to convert into a saltwater tank - nothing extravagant though. Our daughter wants the clownfish (Nemo to her) of course.

I am not looking to add expensive corals, at least not right off the bat. I would like to be able to use all the equipment that is currently in the tank with as little, or no, modifications as possible. The temperature stays very regular with the heater I have now. I was told at one LFS that a 30 is the minimum they would use (and have one running this size themselves), but at another LFS say they only use a 10-gallon, which contains coral with low lighting.

I have read a lot about the LR, but all the LFSs around here only sell it in bags, which I was told had NO life in it, will this work? I have one of the LFSs that will give me one of their used filters to use in my tank to help get it cycled, and I might even be able to talk them out of a bit of their LR to go in my tank. I was also told that I do not want starfish in my tank as they will eat almost anything, is this true?

The Nemo's are the main ones I want in this tank, and maybe a Blue tang - Dori of course.

Any help and advice you can give is GREATLY appreciated!

**Thanks!**

**A:** Dear reader,

Firstly, I'm not sure why your LFS would advise 30-gallons being the minimum - some of the most popular 'nanos' at the moment (for instance, the d&d - 24 US-gallons) are less than that and can make excellent little set-ups as long as you are sensible with what you stock.

You will find keeping the tank cool on the hotter days more of an issue and concern than heating it to be honest, so you need to consider options there - whether a

fan blowing over the surface of the aquarium would be suitable or all the way up to a mini chiller unit, just something to definitely think about and factor in.

Live rock in a bag? That will definitely not be live rock in that case, just decorative dead rock. If your LFS uses TMC (Tropical Marine Centre) for their livestock (which most in the UK do), then they will be able to get you proper live rock, or otherwise you need to shop further out to find a retailer who does. Many will do mail order, but you are best to hand pick nice sizes and shapes yourself. Quality live rock is a great investment when starting a new set-up.



If you use live rock then you don't really need to use filters to cycle the tank - just a lot of patience and let the live rock do its job! A scattering of sand(s) from an existing setup(s) can also help give a boost to a new set-up in terms of the variety of life introduced alongside the live rock.

Regarding starfish - there are some predatory and non-reef safe starfish, but many that are perfectly safe (sand sifters and blue linkias as two examples). However, on the whole, all but the sand sifters are generally quite hard to maintain for any significant length of time - even more so in a smaller setup. Not that much is known about their feeding requirements, so sadly I'm sure many simply starve to death over time - so I would personally give them a miss if you can resist the temptation!

Finally, you would need to skip adding 'Dori' along with 'Nemo'. I'm afraid - Regal tangs will very quickly outgrow a 29-gallon setup - generally most people will suggest a minimum of a four-foot set-up for these fish. You would still be able to keep a few other small but colourful fish with your pair of clownfish - just think smaller!

I hope that helps, and the best of luck with your new setup.

**Marc Foord**



# Trip of a lifetime

An amazing opportunity for one very lucky Tropical Fish reader! JBL are offering a seat on their third Workshop to Tanzania/Central Africa in February 2010

#### About JBL

It all started with a specialist pet shop which Joachim Böhme opened in Ludwigshafen/Rhine in 1960. The first product he developed himself was Punktol, a preparation against 'white spot' disease, known as



'Ichthyo' in aquarium circles. This product is still available today. After the 'start of the JBL brand name', JBL quickly developed into one of the largest full-range producers in the field of aquatics and herpetology in Germany. The company has been based in Neuhofen/Pfalz since 1984. Today JBL supplies their products to more than 50 countries and has over 100 employees. In Neuhofen, JBL develops and produces medications and food in the form of flakes, sticks or tablets for fish, turtles and reptiles. From the production of flakes, to the finished fish food tablet, all production takes place at the Neuhofen site. The main focus is on the production of

fish food, offering a wide selection of food in the NOVO and PREMIUM ranges. Medication for ornamental fish, water treatment preparations, fertilisers, water tests, pond fish food and care products, filter materials, CO<sub>2</sub> systems as well as turtle food and care products are the other core products in the production range. Rollers for the production of flake food, a special mill which guarantees particularly fine milling of the raw materials and a fully automated filling line for food stuffs all ensure the production of top quality products.

JBL organises short training courses and seminars for the specialist retail trade, giving information about the existing product range and the latest new developments and providing support for the sales of high-turnover articles.

#### About the workshop

Following the two successful JBL Workshops to the Red Sea in 2005 and to the Philippines in 2007, there will be a third JBL Workshop to tropical Africa in 2010. For one week, 60 persons (10 team members, 50 participants) will be able to carry out intense research for the aquarium and terrarium under the instruction of local specialists.

The first part of the JBL Workshop takes the participants to the steppes at the foot of Kilimanjaro, where, with the help of native snake hunters, we will search for reptiles and spiders in order to analyze their habitat. To help carry out this research, a substantial amount of



Lux taking in the Savannah. Photos courtesy of JBL

equipment to measure light, UV, temperature and moisture will be available to the participants.

The second part takes the participants to the rain forest of Mount Meru, where there are streams whose fauna has never been investigated. At the foot of Mount Meru is Momella Lodge, (well-known from the John Wayne/Hardy Krüger film HATARI), which will serve the participants as a base.

During the third part of the workshop the participants will go to the island of Zanzibar in the Indian Ocean by internal flight. At the northernmost point of the island are two resorts which will serve as a base camp for the team during the sea water research programme. Due to strong tides, all investigations, including diving and snorkelling activities, will be carried out in co-operation with an on-site dive-centre, which will take the participants by boat to the coral reefs and the spots where enthusiasts are able to see whale

sharks and mantas, found in these areas in February.

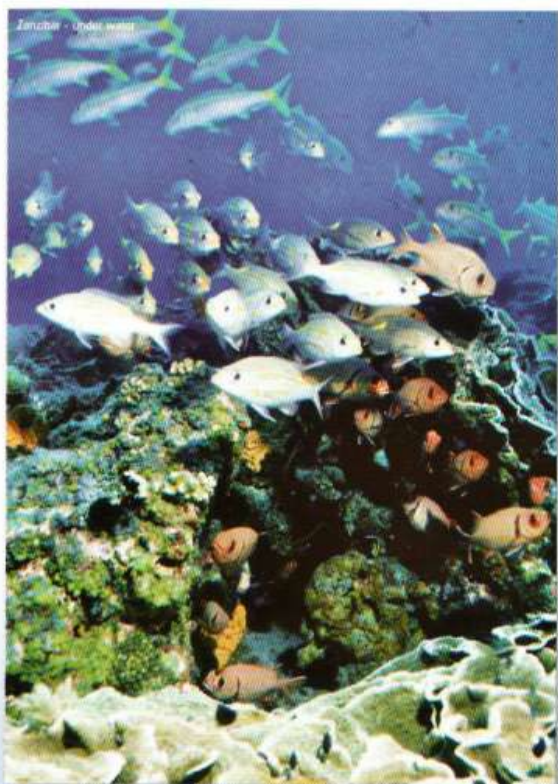
This third JBL Workshop will take place from 10<sup>th</sup> to 18<sup>th</sup> February 2010 and will cost those participants flying out from Frankfurt/Main in Germany approximately 1,300 euros. Participants arriving from other parts of the world should expect to pay a contribution of 700 euros for accommodation, food and the internal flight, in addition to their own costs of travel to the country.

Anyone interested can subsequently accompany the JBL research team to Lake Tanganyika near Kigoma, where a further three days of research tasks and fish observations are scheduled. This separate connecting trip at the end of the workshop will cost an additional surcharge. The amount is not yet clear, however it is estimated to be approximately 400 euros.

#### Come and join us!

Enthusiasts can find information and





a registration form on this highly interesting JBL Workshop by logging onto the JBL homepage at: [www.jbl.de](http://www.jbl.de). The deadline for applications is 28 July 2009. In the event that more applications are received than there are seats available, lots will have to be drawn. Preference will be given to participants who have never before

taken part in a JBL Expedition or a JBL Workshop.

**The prize**

For one lucky Tropical Fish reader, JBL have offered and all expenses paid place on this trip/workshop. The winner will travel with JBL on the week 10th to 18th February 2010. You must be 18-years or over to enter the competition.

**How to enter**

Just answer the question on the entry form and get it into us by 31st August 2010. Good luck.



**Question:**

Where were the last two JBL workshops held?

**Answer:**

\_\_\_\_\_  
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Postcode: \_\_\_\_\_

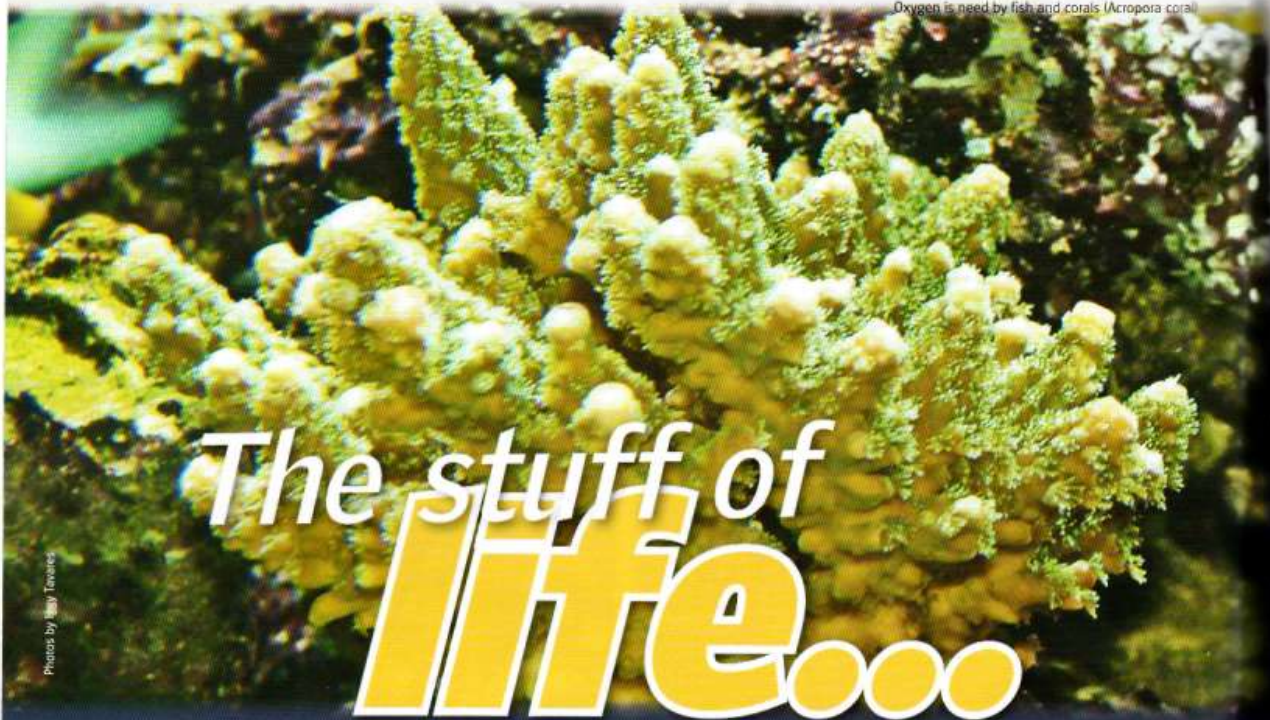
Tel (inc. STD code): \_\_\_\_\_

Email: \_\_\_\_\_

Please send entries into: Tropical Fish Magazine: JBL Competition August 09, Alexander House, Ling Road, Tower Park, Poole, Dorset, BH12 4NZ. CLOSING DATE: 31st August 2009.



Oxygen is need by fish and corals (Acropora coral)



Photos by Tony Taveres

# The stuff of *life*...

**Oxygen is, of course, quite literally vital to the animals we keep in our aquaria; so how do we achieve sufficient oxygenation? How is oxygen measured in the aquarium, how much is enough, and for that matter, can there be too much?**



**Dave Wolfenden**  
Dave Wolfenden has over six years of experience in the aquatics industry and is now a lecturer at Reaseheath College and a consultant to the Tetra Information Centre. [www.tetra.net](http://www.tetra.net)



**P**hysiologically speaking, respiration (breathing) in water is actually fairly difficult, because water can only generally contain about 5% of the oxygen contained in the equivalent volume of air – fish have therefore had to evolve a very efficient method of respiration to cope with life in such a challenging medium. Their gills have an extraordinarily large surface area, and are equipped with a rich blood supply to maximise efficiency, and quickly transport the blood, which carries oxygen to the body (as well as ridding the body of waste carbon dioxide).

Oxygen is, obviously, needed by our fish, as well as any invertebrates we may keep as well, but it's not just the beasties we can see with the naked eye that crave O<sub>2</sub> – the bacteria which we rely on to maintain a healthy environment need it too; bear in mind that the processes which allow the conversion of ammonia to nitrite and then nitrate are oxidative processes – in other words, they require oxygen, and quite a lot of it too!

**Here comes BOD...**

The combined demand for oxygen for all of the aquarium's inhabitants, including the microbial communities, is known as the Biological Oxygen Demand (or BOD) – one of our jobs as aquarists is to meet the BOD of the aquarium to ensure a healthy environment. Many marine aquaria have a relatively high BOD, due to intensive stocking plans and the associated dense microbial communities, which deal with the 'macro' organisms' wastes. (Lurking detritus and

general waste products also have to be broken down by bacteria and other microorganisms, which adds to the aquarium's BOD – so regular maintenance can help reduce it.)

Temperature has a huge influence on the oxygen content of the water; as water becomes warmer, it becomes saturated with O<sub>2</sub> at lower and lower levels (saturation simply meaning the maximum level of oxygen that a given sample of water can contain). The table below gives approximate oxygen saturation levels for seawater (35‰) at various temperatures...

Temperature (C/F)	100% Saturation of O <sub>2</sub> in mg/l
5°C/41°F	9.9 mg/l
10°C/50°F	8.8 mg/l
15°C/59°F	7.9 mg/l
20°C/68°F	7.2 mg/l
25°C/77°F	6.6 mg/l
30°C/86°F	6.1 mg/l
35°C/95°F	5.6 mg/l

Notice the quite dramatic fall in saturation levels as the temperature increases. Another factor which influences the oxygen saturation of water is the salinity – full strength sea water can hold considerably less oxygen than fresh water at a similar temperature, because salt water is denser than fresh.





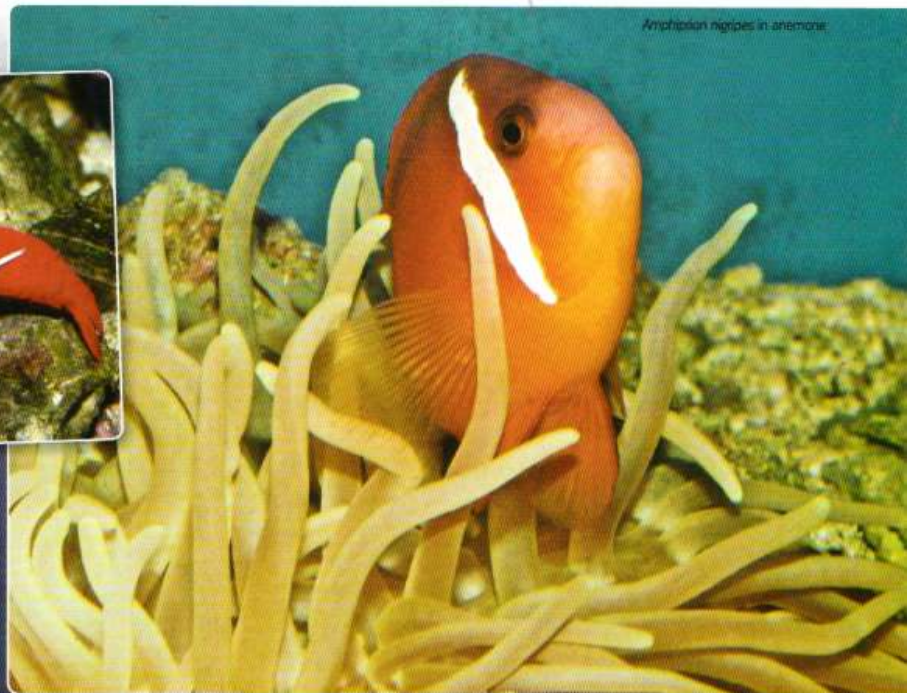
Within a short time oxygen bubbles can effect invertebrates (Blood shrimp)

Notice the quite dramatic fall in saturation levels as the temperature increases. Another factor which influences the oxygen saturation of water is the salinity – full strength sea water can hold considerably less oxygen than fresh water at a similar temperature, because salt water is denser than fresh.

**How can we ensure adequate oxygenation?**

Oxygen enters the aquarium via the process of diffusion – the movement of molecules from an area of high concentration to an area of low concentration (and, as with the fishes' own respiratory processes, carbon dioxide is driven off). To achieve sufficient rates of diffusion, adequate movement or agitation of the water needs to take place, because this effectively increases the surface area of the water, and greater amounts of diffusion takes place over greater surface areas. This is why most reef aquariums require vigorous water movement, usually courtesy of powerful pumps, but possibly also through wave devices and/or airstones: oxygenation is most effective if a strong disturbance of the water's surface can be achieved.

Airstones do not directly 'inject' oxygen into the water, contrary to popular belief – in fact, they perform the same task as the pumps, turning the water over exposes it to the surface for diffusion to occur – bubbles don't necessarily result in oxygenation! Many marine aquarists actually find airstones to be relatively ineffective at generating the turnover necessary



*Amphiprion nigripes* in anemone

Full strength sea water can hold considerably less oxygen than fresh water at a similar temperature, because salt water is denser than fresh

without an extremely powerful air pump, and their appearance can be a little unnatural. Skimming helps to increase the oxygenation of the water, especially if used in conjunction with ozone (O<sub>3</sub>) – a highly unstable form of oxygen – although caution needs to be exercised with its use, as we shall



Oxygen is vital for fish and plants (Wrasse, *Bodianus rufus*)

see later in this series... Algae will also contribute oxygen to the aquarium (although they actually consume oxygen, and release CO<sub>2</sub> in their so-called 'dark phase' when they are not illuminated).

**How long can the inhabitants of a marine aquarium survive if oxygenation is interrupted?**

In the event of, say, a power cut to



Bubble-tipped anemone

the aquarium, negative effects will actually be noticed within a very short time. Obviously, this depends on variables such as water temperature and stocking density, but perhaps within half an hour, the bacterial communities within the biofilter will start to die off as they are the first to suffer from the effects of oxygen depletion – they're surprisingly sensitive. For this reason, it's best to temporarily reduce feeding on an aquarium that has experienced a significant power cut whilst it re-establishes itself. Invertebrates

and fish will often start to suffer quite quickly, perhaps after only an hour. The oxygen requirements of fishes vary from species to species, and are a direct result of the evolutionary adaptations to their habitats, but it's certainly fair to say that in general, ornamental reef species are pretty intolerant of low oxygen levels. Of course, too little oxygen can be fatal, but short-term sub-lethal effects include stress and immunosuppression – leading to increased incidence of disease. For a price, it's possible to install battery-powered back-up ▶





systems to maintain the aquarium during power outages, and these could be considered a worthwhile investment. Alternatively, battery air pumps or good old-fashioned buckets can be used to turn the water over during power cuts.

**So - what levels are required, and how can oxygen levels be tested?**

It's simple to answer the second of those questions: in the marine aquarium, oxygen should be as close to saturation as possible! There are two ways in which DO (Dissolved Oxygen) levels can be measured in the aquarium:

Firstly, liquid test kits are available, which can be perfectly adequate in terms of accuracy for most hobbyists. Oxygen test kits are generally very simple to use, but it's extremely important to follow the manufacturer's instructions - swilling

the test vial around can, of course, introduce oxygen and rendering the test result meaningless! Test kits will read in mg/l or ppm, and if the temperature and salinity of the water are known, the oxygen saturation of the water can be calculated.

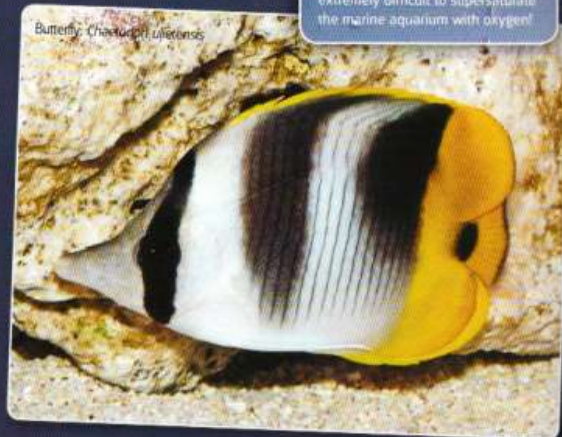
Electronic meters are a more expensive alternative; whilst much more pricey than liquid test kits (several hundred pounds

for a decent model), they tend to be much more accurate, but may require complex calibration on a regular basis. In general, electronic DO meters tend to only be used by public aquaria and other professionals in the field, and it's hard to justify them for the vast majority of hobbyists. Many meters

*Airstones do not directly 'inject' oxygen into the water, contrary to popular belief*



Java Moon coral



Butterflyfish (Chaetodon ulianus)

actually read in mg/l and / or ppm as well as percentage saturation.

Testing should be used in conjunction with observations of the behaviour of the aquarium's inhabitants - the signs of oxygen depletion (hypoxia) in fish, for example, include gasping at the surface and increased rate of opercular (gill cover) movement (dyspnoea).

**Too much of a good thing?**

Is it possible for the aquarium's inhabitants to get too much oxygen? Well, yes it is; salt water can occasionally become supersaturated, a phenomenon in which more oxygen is dissolved in the water than would normally be possible. This is quite rare, but occasionally happens if tiny pinhole leaks occur in the pipework around external pumps (it's occasionally seen in public aquaria where very powerful pumps may be used) - gases in the air may be forced into the water under pressure, resulting in the aquarium taking on a 'milky' appearance. This can be lethal, and fish in such conditions may suffer from gas emboli, in which gas bubbles become lodged in the tissues (this may actually include nitrogen as well as oxygen). Somewhat paradoxically, should this ever occur, the saturation level of the water can be brought down by eliminating the source of supersaturation and then adding an airstone. Airstones increase the surface area, and help to drive off the excess oxygen. It has to be said that supersaturating water with oxygen is pretty rare, and most marine aquarists will never encounter the phenomenon; in normal circumstances, it is extremely difficult to supersaturate the marine aquarium with oxygen.

**Conclusion**

Oxygen is an extremely important factor in the success of any marine aquarium - fortunately, maintaining sufficient oxygen levels is relatively easy to achieve - we should aim for saturation of the water with oxygen at all times to maintain a healthy environment.



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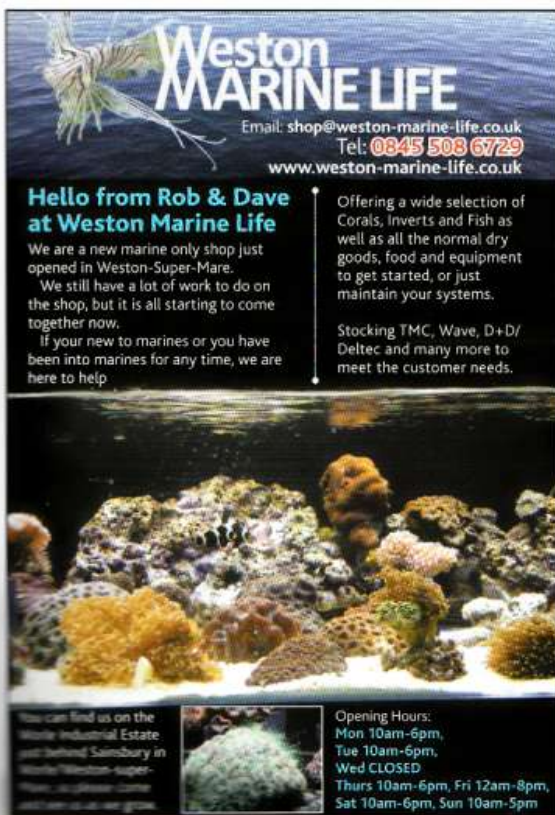
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# Dive into the **Ocean Blue**

*Tropical Fish magazine with the Blue Reef Aquariums have come together to celebrate our 100th issue by giving 10 of our lucky reader's the chance to find a golden ticket...*

**T**o celebrate our centenary issue, Blue Reef aquariums have donated 10 annual family passes for our reader's to find among our August issues.

**About the Blue Reef Aquariums**  
Blue Reef Aquarium is part of an exciting new generation of wildlife attractions designed to inspire deeper understanding and appreciation of the natural world.

Open-top tanks allow close encounters with friendly rays while 'hands-on' tide-pools and crashing surf displays recreate the seas' many different aspects.

At the heart of the visit giant ocean tanks with spectacular underwater walkthrough tunnels offer unforgettable journeys through exotic coral reefs - home to sharks and shimmering shoals of brightly-coloured fish.

#### **Newquay**

Situated on Towan Beach in the centre of Newquay, opposite the famous island, the Blue Reef Aquarium is a stunning visit. Be amazed by the local marine species from the Cornish coast to hundreds of tropical species in the gigantic ocean display complete with underwater tunnel. New for 2008 - Shark Lagoon!

#### **How to find us:**

For Blue Reef Aquarium follow signs to town centre car parks and pedestrian signs will direct to Towan Beach via Beach Road if you wish to avoid steps. Signs will also direct you through the green area called Killacourt - where there are some quite steep steps down to the beach. Don't forget you can also fly to Newquay via Air Southwest. Have a look at their [www.airsouthwest.com](http://www.airsouthwest.com) for more information.

For more detailed directions, visit [multimap.com](http://multimap.com).

**Blue Reef Aquarium, Towan Promenade, Newquay, TR7 1DU. Tel 01637 878134**

For more information about Newquay where you can Plunge into the waves of adventure, indulge in the tastes of the seasons, kickback and feast your eyes on the sea views, feel the buzz or simply chill out - why not get a copy of the new guide visit [www.visitnewquay.com/wall.co.uk](http://www.visitnewquay.com/wall.co.uk)

#### **Portsmouth**

The Blue Reef Aquarium in Southsea, Portsmouth, voted Visitor Attraction of the Year by Tourism South East is situated on Clarence Esplanade, between the two piers overlooking the busy Solent, Blue Reef Aquarium is a great visit whatever the weather.

Be amazed by animals ranging from local marine species to the hundreds of tropical fish in the gigantic ocean display complete with underwater tunnel.

#### **How to find us:**

By Road - Follow Tourist Information signs for Seafront. Local signs along the seafront will direct you to the aquarium. Pay and Display Car



Parking facilities are available along the Esplanade.

By Train/Bus - Alight at Portsmouth Harbour Station. Numbers 5 and 700 buses depart approximately every 30 minutes from the Hard Interchange (adjacent to Portsmouth Harbour Station). Alternatively, several buses stop at Palmeston Road which is only five minutes walk from us.

For more detailed directions, please go to [multimap.com](http://multimap.com).

**Blue Reef Aquarium, Clarence Esplanade, Southsea, Portsmouth, PO5 3PB.**

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#### **How to find us:**

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Tel: 01424 718776 Fax: 01424 721483 Email: [hastings@bluereefaquarium.co.uk](mailto:hastings@bluereefaquarium.co.uk)

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By Road - Follow A19 taking the A1058 (Coast Road) signposted to Tynemouth. Tourism signage will then direct you to the aquarium on the seafront. Or take the Metro to Cullercoats.

For more detailed directions, please go to [multimap.com](http://multimap.com).

**Blue Reef Aquarium, Grand Parade, Tynemouth, Tyne & Wear, NE30 4JF**

#### **The golden tickets**

If the number inside this box is printed with the number 100 the you have won membership to Blue Reef Aquariums. Valid until July 2010 membership will admit two adults and two children entry into any Blue Reef Aquarium. Admission prices and opening times vary for each location.

For more information visit [www.bluereefaquarium.co.uk](http://www.bluereefaquarium.co.uk).

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## History of marine keeping



Photos by Nigel Fineman  
Sump with protein skimmer – the skimmer was introduced in the 60s

# As time goes by

Taking a look at the history of marine keeping, it seems that the majority of developments came about as breakthroughs in the 1960s, here Marc Foord takes us through some history behind the reef and some concerns for its future

A lot of us have friends or relatives who we might have heard say they've kept fish for 'a long time' (and may reminisce about the 'good old days' with hardly any equipment!), but more often than not, this tends to be freshwater aquariums. It never ceases to amaze me that my local fish shop (specialising in marines) has been running for well over 20-years now... and with the same owners in all that time too!

So, just how long have marine (saltwater) fish been kept and how has the technology and methods changed in that time?

Although the aquarium hobby itself can be traced back as far as the 1920s (believe it or not!), as you can imagine these were pretty limited to say the least. Plus, it was only after the aviation industry really developed after WWII that fish could be flown the sort of distances needed to get to the wider marketplace.

Up until the 1960s, most filters and circulation devices were powered by

air – I'm sure most of us are familiar with, or have at least heard of, the undergravel filters that were still popular up until fairly recently (indeed, when I set up my first freshwater aquarium it ran off an undergravel filter, and it wasn't THAT long ago!)

It was not really until the 1950s that records showed the keeping of marine species such as *Percula*



In the 80's there was an import ban on some angelfish (Angels: *Centropyge bicinctus*)

downs and Blue damsels. Dead coral skeletons were typically used for decoration, and lighting needed to be very low to avoid algae problems.

### 1960s

The real innovations started in the 1960s. The first powerhead (a

device so commonly used for various applications currently) was actually invented in 1960 by a German gentleman with a surname that most current day marine keepers will instantly recognise – Mr Norbert Tunze. It was also he who convinced Eheim to diversify from making pumps for toys into water pumps for aquariums – again, another name very familiar to us today.

Alongside the powerhead, the 1960s also saw the invention and introduction of the now ubiquitous protein skimmer. Again, Norbert Tunze, this time together with Erwin Sander, was involved in the research and eventual release of these devices.

Heaters suitable for saltwater use and ultra violet (UV) sterilisers were also introduced in the late 1960s, and around the same sort of timeframe, the first proper artificial salt mixes were available.

A method still much supported and respected today was also born in the 1960s – Lee Eng's natural system (aka 'ecosystem method'), based around bio-balls, caulerpa algae and



miracle mud all lit in a sump-like set-up connected to the main system.

Average tank sizes in the '60s tended to be roughly 20-gallons or thereabouts, but methods did not differ vastly from the '50s – undergravel filters, coral skeletons for decoration and crushed coral substrate were still very much the order of the day.

Erwin Sander's ozonizer was also introduced, along with acrylic and silicon sealed tanks. Some magazines mentioned keeping corals, but also stated expected life spans were short – probably due to the low light levels and high nutrient concentrations. What was interesting were articles about breeding of Neon gobies and even keeping the Giant Pacific octopus, so clearly some innovators were at work trying to push the boundaries of the hobby!

In an article in 1966 the benefits of live rock to help purify the water and thus enable us to keep more tricky species was published.

**1970s**

There were a number of significant events in the 1970s. Peter Wilken's book 'The Saltwater Aquarium for Tropical Marine Invertebrates' is seen by many as one of the defining moments of the hobby, as it laid down many of the techniques that were later to become known as the 'Berlin method'. Also on the reading material side, it was not until 1975 that the then fairly limited audience was treated to some reading material in the form of a magazine for the hobby – 'Saltwater Aquarium'.

Martin Moe also did a lot of pioneering work in the 1970s with breeding clownfish.

The frozen food that we so take for granted today can be traced back to origins in the 1970s – the San Francisco Bay brand (still going strong today) was first introduced in the mid '70s.

A much wider range of fish, protein skimmers and canister filters also became available in the 1970s, as did the first all glass tanks.

**1980s**

Moving into the 1980s, the first HQI (metal halide) bulb was introduced – in the 10,000k colour temperature (which is actually nearer natural sun

light, as opposed to the more commonly used 10,000k, 14,000k and 20,000k bulbs we currently utilise).

In Germany, there was an import ban on angel and butterfly fish. This had the effect of forcing hobbyists to look for other sources of colourfulness – which really pushed forward the keeping of corals.

The use of live rock also increased significantly during



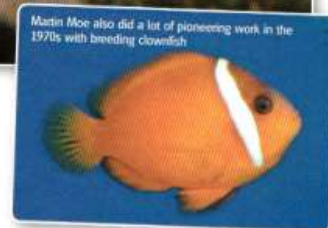
Anthias



Canystrope goby

published until 1994.

A further highly regarded book 'The Modern Coral Reef Aquarium' by Nilsen and Fossa also added to the knowledge base – but by which time the American authors were beginning to also chip in with their own works.



Martin Moe also did a lot of pioneering work in the 1970s with breeding clownfish.

the 1980s – with the negative effect of the environmental concerns of exactly how much rock was being taken from the wild reefs for the hobby not being voiced openly until the 1990s – and it's popularity has not abated since then really.

Martin Moe pops up once again in the '80s, publishing the very influential 'The Marine Aquarium Handbook' (1982), followed by 'The Marine Aquarium Reference' (1989).

In the late '80s, the articles of Charles Delbeek and Julian Sprung helped further the hobby in the USA, although their landmark book 'The Reef Aquarium' was not

**The Internet influence**

Of course, one great innovation that has revolutionised the flow of information in the hobby (and indeed how quickly this can be disseminated or questions answered) is, of course, the Internet. The world famous Reef Central site in the USA and UltimateReef.com in the UK has proved invaluable sources of information to many. Not to mention of course, the many published articles available at the end of a simple 'Google'!

**Environmental issues**

The current concerns for the hobby are not just held by environmentalists or so called 'green activists', but hobbyists themselves are all too aware that the beautiful animals we keep in our aquariums are (much more often than not sadly) wild caught/collected and are very much a finite resource. Certain fish (taking food fish as an example – the cod) cannot breed quickly enough to cope with large demands. Many corals are very slow growing or do not regularly breed/divide in the wild, so it is especially concerning to see the large numbers of the large polyped stony (LPS) corals which are very much the current 'fad' in the hobby, being imported – as you really do wonder physically how many of these animals there are left in the wild and what overall impact their

collection for the aquarium trade is.

There is also concern over the amount of anemones taken from the wild – with the obvious impact of making the associated clownfish homeless at the same time of course – and although some anemones can reproduce and grow on fairly quickly, again, the numbers are pretty frightening. Sadder still, it is an unfortunate fact that many aquarists cannot resist the temptation of keeping these beautiful animals – even in completely unsuitable and un-readied tanks – resulting in their untimely demise.

**Importing and exporting figures**

Referring to the excellent report by the United Nations Environment Programme's World Conservation Monitoring Centre at [http://www.unep-wcmc.org/resources/publications/UNEP\\_WCMC\\_bio\\_series/17.htm](http://www.unep-wcmc.org/resources/publications/UNEP_WCMC_bio_series/17.htm), in terms of fish, importers records



The Canister filter became available in the 70s



Another piece of equipment to posse with our fish is the cooler



## History of marine keeping

Copperband butterfly – there was an import ban on some butterfly fish in the 80s



Yellow tang

A number of corals in particular are protected by CITES but sadly, this does not stop some unscrupulous dealers importing such species in the black market. However, those that are caught importing such corals face the corals being confiscated (many of which end up at the London Zoo aquarium) and potentially a hefty fine and/or prison sentence.

Homemade 'rock' is certainly more than possible – indeed, there are a number of tanks utilising such 'rock' and various 'recipes' on the internet – but obviously the benefits usually associated with live rock (abundance of life, excellent filtration ability, etc) are missing and you do need to be careful what source materials you use to make it in the first place. I would hope this is an area that could, and indeed should, see further innovations in the coming years...

### Fragging

In terms of corals, 'fragging' (effectively taking cuttings from corals) has become more popular, with a number of companies now available that deal almost completely with coral frags only... some of which are doing the job properly, but a number that are also (in order to supply growing demand by hobbyists wanting to do the right thing) simply buying in whole corals and crudely chopping these into pieces and selling these on as 'frags' – which they blatantly aren't. These 'chop shops' are obviously not doing the wild reefs any favours – apart from the fact that perhaps 10 frags of one coral may result in a few doing well, which may then end up being fragged themselves, rather than the worse case scenario of the whole original coral dying) – and in reality

are simply lining the pockets of those doing the 'chopping'.

There is also now the concept of maricultured corals – that is, corals that are grown from frags in the sea in specific facilities. This is seen by many as being near to the ideal – no extra resources (lighting, heating, cooling etc) are needed as nature provides all those and the frags grow on at a much faster rate in their natural environment. Additionally, there can be benefits of sustainable employment for local people and also a potential for re-populating the local reefs themselves – for instance projects such as <http://www.coralsforconservation.com>.

### Captive bred species

In terms of fish, TMC (Tropical Marine Centre) in the UK captive breeds a select few species – Clown fish, Neon gobies and Banggai cardinal fish spring immediately to mind – which gives the customers a choice of buying healthy, hardy tank raised fish and takes some of the pressure off the wild populations. Additionally, a number of hobbyists also captive breed fish themselves (Orchid dottybacks, seahorses, various species of Clown fish etc).

With the emphasis being very much on environmental friendliness (and during the credit crunch, with those running tanks looking to keep costs down – especially with regard to electricity bills!), many are looking to LED lights instead of metal halides or T5's (very low electricity use, long life without bulb changes), pumps/power heads with ever lower 'bang for the buck' (i.e. more powerful but with less electricity use) and so on – and I can only see this area being concentrated on in the next few years. In particular, I can see LED lighting technology really coming on leaps and bounds and getting to the same sort of power and overall quality as metal halides sooner rather than later.

### Summary

The future of the reefs themselves is of course questionable – many are forecasting that global warming will raise the temperature of the oceans while others are predicting that heightened levels of CO2 will result in the die-off of many coral reefs – so who knows how long we have until we will have to rely on our own propagated corals or captive bred fish... a sad but sobering thought indeed.

suggest just under eight-million fish were traded between 1991 and 2003. We can of course imagine the figure was likely to be higher than this (and interesting how the exporters and importers figure vary so much!).

Over the period 1998 – 2002, over one-million corals were detailed as being exported – but once again, we can expect the actual figures to be many more than this – the report suggests that there were problems with false records being kept – and one again discrepancies between the exporters and importers figures.

In terms of live rock, the report states that in 2001 alone, more than 800 tonnes were extracted just from Fiji. Although the report states that this is being looked into from the Fijian side, it still does raise some serious concerns.

CITES (Convention on International



Homemade 'rock' is certainly more than possible, but obviously the benefits usually associated with live rock are missing.

Trade in Endangered Species – <http://www.cites.org>) lays down restrictions on the export and import of various corals and fish (sometimes globally, sometimes restricted in, say, Europe, but not other areas). Animals are classified as appendix I (threatened with extinction), appendix II (not necessarily threatened with extinction, but trade must be controlled to protect the species) or appendix III (where one or more country has asked for CITES to assist with controlling trade).



The reef tank



An enhanced, natural salt manufactured by solar evaporation of water taken from one of the richest coral seas on the planet. This results in a salt in which every bucket contains over 70 trace elements in exact natural proportions including 23 which occur at less than 1 PPM.

This pure base salt is then specially enhanced for the reef aquarium by the elevation of specific parameters required for growth and colour such as magnesium, calcium, potassium and dKH.

The result is a unique formulation which gives you fantastic results.

# The ultimate high magnesium salt

# H<sub>2</sub>Ocean<sup>PRO+</sup>

A natural salt harvested from the reef

#### WHAT IS IN YOUR BUCKET?

Even if you can detect all of the elements that occur naturally in the water around the reef and determine the levels correctly. Imagine attempting to blend these 23+ minor trace elements evenly during the manufacture of a synthetic salt when they occur at less than 1 gram to 1 tonne of salt. What is the effect of these trace elements if you get more than your fair share in your bucket?

With H<sub>2</sub>Ocean Pro+ we let nature be your mixing pot so we guarantee you every bucket is correct.

#### GUARANTEED PARAMETERS

When you mix correctly to a salinity of 35.5ppt (1.025@25C)

Parameters	Level	Range	Units
pH	8.3	8.2 - 8.4	
dKH	9.3	8.7 - 9.8	
Calcium (Ca <sup>2+</sup> )	440	430 - 460	mg/l
Magnesium (Mg <sup>2+</sup> )	1340	1300 - 1380	mg/l
Chloride (Cl <sup>-</sup> )	19550	19960 - 20130	mg/l
Potassium (K <sup>+</sup> )	410	380 - 420	mg/l

#### VISIBLE RESULTS

The formulation for H<sub>2</sub>Ocean Pro+ salt was developed to give you the optimum chemistry for a healthy reef aquarium and to allow growth of even the most difficult corals and sponges and to date the demand for this salt and the positive feedback from both hobbyists and experts alike have exceeded our expectations.

#### PRO PLUS FORMULA - BOOSTING YOUR MAGNESIUM

Many salts concentrate on enhancing calcium levels and often ignore the importance of magnesium. The correct magnesium level has an enormous impact on how easy it is to maintain the calcium level, pH and alkalinity in your tank and can halve the time that you need to run your calcium reactor.

We recommend that you use a D-D portable refractometer for accurate and consistent measurement of the salinity in your aquarium. These are widely available from your D-D retailer.

#### RO WATER

H<sub>2</sub>Ocean Pro+ is designed for use with reverse osmosis, deionised or soft water with a calcium level below 30mg/l. As the calcium level in H<sub>2</sub>Ocean Pro+ is already boosted to 440mg/l then mixing it with hard tap water containing additional calcium may exceed the point at which it will precipitate out of solution.

Reverse osmosis removes ions such as nitrate and phosphate from your tap water which otherwise would contribute towards nuisance algae in your aquarium. A range of D-D Reverse Osmosis units is available from your local retailer.



**D-D**  
The Aquarium Solution

[www.theaquariumsolution.com](http://www.theaquariumsolution.com)



# That 'sinking' feeding



*Acanthopneustes*

## DID YOU KNOW?

Hikari was the only company ever chosen to develop a specialised diet for Space Shuttle aquatic experiments!

As sampled by you personally, courtesy of the freebie on this month's cover, here is our resident catfish expert Chris Ralph with his experience on Hikari's Tropical Sinking Wafers



*Auchenipterichthys coracoides*

When feeding aquarium fish I wonder how many aquarists ever stop to think about the nutritional requirements of their fish. In their natural environments fish have evolved and adapted to feed upon those foods which are naturally occurring within their immediate surroundings. Evolution has led to fish being as efficient as possible without expending vast amounts of energy in search of specific food items in order to fulfil their dietary requirements. Specialist companies such as Hikari have developed a wide range of products aimed at specific types, or groups of fish which ultimately meet the dietary needs of aquarium fish.

These specific food products have been developed over many years, and have involved considerable research into the target fish species both in terms of their nutritional requirements as well as palatability testing of the chosen food product

with representative fish species.

Hikari have kindly sponsored the 100th edition of *Tropical Fish* magazine and have provided you with a free sample to feed to your own fish with their compliments. If you have never tried products from Hikari on your fish in the past, I am sure that you will agree that your fish will find them very appetising. There are numerous products available to the aquarist in the Hikari range aimed at the fish that you might be keeping, whether they are catfish, cichlids or guppies to name a small selection of fish.

### Research and development

For over 100 years Hikari have spent considerable time and research in order to gain an insight into the nutritional needs of fish. This research has allowed Hikari to produce fish diets that not only maintain the health of fish, but assist in keeping aquariums in top form.

Your free sample of Hikari

Tropical Sinking Wafers is specifically aimed at bottom feeding species of fish such as catfish and loaches. The wafer is of a size which appeals to small to medium sized species of fish, smells good and fresh and is easily digested by the fish feeding upon it. The fish are almost immediately attracted to the product when it is added to the aquarium, making it a very good product to feed to them. Following extensive research undertaken by Hikari the food has been manufactured to offer superior palatability to your fish. In addition the product contains a well-balanced combination of nutritious ingredients which have been supplemented with the vitamins and minerals required by bottom feeding fish.

Hikari Tropical Sinking Wafers are rich in stabilised vitamin C which promotes resistance to stress and immunity to infectious disease. As part of the research into this product Hikari have developed this unique wafer shape to allow





*Baryancistrus* sp 1085  
Golden Midget is sold as an ornamental fish

bottom feeding species with small downward facing mouths to be able to feed upon them. Hikari have been offering aquatic pets balanced nutritional excellence through exploration, breeding and technological innovation since 1877.

**Catfish feeding**

Catfish or any fish for that matter, fall into the following main categories in terms of their dietary requirements: carnivore, herbivore, limnivore and omnivore. There are a number of examples of catfish that fall into one or more of these dietary categories, but the majority of commercially available catfish species fall into the categories of omnivore or herbivore. Herbivores include catfish such as the whiptails or *Rineloricaria* sp and the Bristle-nosed catfish or *Ancistrus* sp. Omnivores include catfish such as *Synodontis* sp, *Corydoras* sp and Talking catfishes. Eating a varied diet provides our fish with the necessary dietary requirements in terms of vitamins, trace elements, carbohydrates, proteins etc that they need in order to survive. It is important to feed catfish a balanced diet in order for them to survive within the confines of an aquarium.

From my own observations watching Sucker mouth catfish feeding on Hikari Tropical Sinking Wafers, they place their disc-like mouths over the wafer and rasp at it with their teeth, just as they would rasp on rocks or bogwood in their natural habitats. The softer the wafer the easier it seems to be for the catfish to rasp at it.



*Sucker mouth*



*Ancistrus* sp (Bristle-nosed catfish) feeding on Hikari Tropical Wafers

**DID YOU KNOW?**

Hikari is a brand that I have personally used over many years now and is one that is highly recommended by many aquarists throughout the world

*Corydoras* catfish tend to take delicate little nibbles from the wafers after they have softened. From observing loaches feeding on the wafers they tend to poke their snouts into them almost breaking off small pieces which in turn are swallowed and eaten. When keeping catfish or any other type of fish prepared foods can and should be offered as part of their captive diet.

**Residing together**

In addition to feeding a healthy and well balanced diet to our fish such as catfish, it is also important to keep the fish in suitable numbers within a community aquarium. With regard to *Corydoras* for example these catfish should ideally be kept in small shoals of at least six, but as an absolute minimum I would suggest three specimens, as these catfish can be found in vast shoals in their natural habitats. Catfish such as *Ancistrus* sp can be kept singly or preferably as sexed pairs. *Otocinclus* sp and *Parotocinclus* sp can be kept

successfully in small groups. The smaller representatives of the family Doradidae or 'Talking catfish' can be kept in small groups of three or more. Some of the slightly larger and more predatory species of catfish should be kept as single specimens and with other larger species of fish assuming that their tank mates will not ultimately feature as part of their diet.

**General care**

In terms of general care for catfish, consideration should be given to water quality and general welfare and husbandry of the fish. Wherever possible I would suggest that a minimum of 25% water change is undertaken fortnightly, combined with regular sand and or gravel cleaning as part of this regime. By carrying out regular water changes and substrate

cleaning it will help to prevent bacterial problems from occurring with, for example, barbel damage which can be a significant problem when keeping *Corydoras*, as they are prone to this kind of damage when kept on sharp substrates. In order to overcome this problem especially

**Glossary of terms**

**Omnivore** is defined as an animal that feeds on both animal and vegetable substances. **Carnivore** is defined as a flesh eating animal. **Herbivore** is defined as any animal that feeds chiefly on plants. **Linnivore** is defined as an animal that consumes mud.



*Clown loach*



*Parotocinclus*



## Special feature - Feeding with Hikari



*Gyptoperichthys gibbiceps* med  
Hurlough cat - Barbours Aquatics, Sydney



Horse Face loaches

good aquatic retailers will be able to offer this kind of information to you.

Given optimal conditions in which to thrive you might observe your catfish breeding within your aquarium. Optimum conditions would not only include providing your catfish with good water quality, but also providing them with a good nutritional diet which includes products such as

with *Corydoras* I would recommend that you keep these catfish on good quality aquarium sand such as BD Aquarium Sand, which is very similar to the substrates found in their natural habitats.

### Available species

There are numerous types and species of catfish represented by a wide range of families. The majority of catfish kept in home aquaria originate from far reaching places such as South America, Africa, India and South East Asia to name but a few. Catfish come in many shapes and sizes and range in size from 25mm to in excess of two-metres in some cases such as the larger predatory species.

South American catfish

families include Doradidae (Talking catfishes), Callichthyidae (*Corydoras*), Pimelodidae (Whiskered catfishes), Auchenipteridae (Driftwood catfishes) and Aspredinidae (Banjo catfishes). African catfish families include Bagridae, Clariidae (*Clarias*) and Mochokidae (*Synodontis*). Asian catfish families include Chacidae (Frog-mouthed catfishes) and Bagridae (Asian Bumblebee catfishes). There are many loaches to take into consideration such as *Botia* sp which can be found in South East Asia and India.

Most fish keepers have at some stage assumed that all sucker mouthed catfish are herbivores. This is most definitely not the case especially when mentioning catfish such as the Gold nugget

(*Baryancistrus* spp.) and the Imperial Zebra (*Hypancistrus zebra*) to name but two of these wonderful L-numbered catfish. These catfish are ideally suited to an omnivorous diet.

### Research and buying

I would suggest that before purchasing a catfish that you carry out some research prior to actually obtaining it from the retailer. If at all possible try to read up on the catfish that you are interested in so that you know in advance what foods to offer it (easier said than done I know!), and if you are still not sure then ask the retailer to tell you what the particular catfish has been feeding on before you take it home. Most



*Pseudorasbora parva*

### ©Hikari Tropical Sinking Wafers.

In order to breed fish the aquarist must ensure that the fish in their care are given the best environment to be successful in their aims. It is important therefore, to feed your catfish on a well balanced diet that includes tried and tested products such as those manufactured by ©Hikari.

With regard to tank mates for your catfish these will ultimately depend upon the catfish being kept, but as a general rule of thumb small tetras and barbs would be ideal companions for catfish such as *Corydoras* and Dwarf sucker mouths including *Ancistrus*, *Otocinclus*, *Parotocinclus* and *Farlowella*. If you are keeping African cichlids then *Synodontis* catfish would be ideally suited with most of these fish. **FIN**



*Dorsal catfish*



*Synodontis anthurus*  
should mix well with  
African cichlids

### Details

For further details on the complete product range from ©Hikari visit [www.hikari.info/tropical](http://www.hikari.info/tropical) or ask your local retailer for details, or to order specific food items for your fish.





# ALGAE WAFERS

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For Plecostomus & other algae eaters



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- Complete & balanced nutrition
- High levels of vegetable matter
- Will not dissolve or cloud the water
- Easy & convenient way to feed bottom feeders of all sizes
- Revolutionary disk shape complements the way Plecostomus eat
- Made from the finest quality ingredients

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### Don't just take our word for it...

*Hikari Algae Wafers are now my No1 choice because they are a low waste, high quality sinking wafer that holds together & doesn't affect my aquarium water clarity, my fish love 'em!*

*John P*

*The fish react to them hitting the water quicker than anything else. They like the smell and the taste.*

*Grant B*

*There's only one algae wafer as far as fish are concerned.*

*Alan S*



The world's most recognised premium aquatic diets!

For more information or to find your local stockist visit [www.hikari.uk.com](http://www.hikari.uk.com)



The Acuario in VeraCruz, Mexico

Photos supplied by author

# 100 years of fishkeeping

**A personal view by Dr David Ford...**

Congratulations to *Tropical Fish* magazine on their 100th issue! To help celebrate the occasion the editor asked me to write an article about 100-years of fishkeeping. Not that I am 100 years old (soon will be), but certainly my family have been aquarists for all those years.

As an infant I remember my father telling me how he once kept a goldfish in a glazed, iron-framed tank, as the family pet. That was when he too was a child – back in 1909, 100 years ago. Fed tit-bits from the family table, the goldfish survived for years with regular rainwater changes. It passed away in 1914 with no chance of replacement as the First World War started.

I was born in 1934 and when I reached my fifth birthday I was told that I too could have my own goldfish. But then came the Second World War and goldfish – indeed any pet fish – were unavailable. History repeats itself.

It was 1945 before I saw my first real goldfish. Few pets were available in post-war austerity and tropical fish were only seen in biology books. Keeping corallfish in captivity

was a fantasy. Hence the existence of exotic goldfish was unknown to me. That is why it was such a shock to see a Veiltail goldfish on display in the window of the only petshop in my home town of Nottingham.

With its golden sheen and long flowing fins I thought it was the most beautiful creature ever. The owner said it was five pounds – a good week's wages in those days. I rushed home to tell my father and he agreed to double whatever I earned towards the cost of ownership. After school I delivered groceries (on the type of bicycle you see in old adverts for Hovis) and passed the pet shop daily to check the

goldfish was still there. It took a month to earn two pounds and fifty pence.

During that month I built an aquarium for the goldfish. Metal was still scarce so a framed tank was not possible. So I built a wooden frame and poured a cement mix to make a small concrete tank. The front was a sheet of glass bedded into black putty (no Silicone Sealer in those days).

It was an exciting day when I collected the Veiltail and installed it in my own aquarium. It was to be a proud moment the following

day when I invited all my friends and neighbours to see the glory of my very own pet fish. But that next day... the fish was dead.

Of course the cement was not





cured and the alkali poisoned the water... but I knew nothing of water chemistry or husbandry. In shock, I vowed to learn about such a thing, so never again would I lose a fish in my care. I studied chemistry, eventually taking a doctorate in the Physical Chemistry of Aqueous Systems. I became Head of the Waltham Aquacentre – for 30 years – and ran the Aquarian Advisory Service to help tens of thousands of hobbyists. Some compensation for killing that beautiful creature.

So, what have I seen change over those years...

**Aquariology**

Of course, keeping fish in captivity started thousands of years ago, but it was our very own London Zoo that was the first in the world to build a public aquarium. That was over 100 years ago (1853 actually), but the concept of using glazed iron

centre for the importation of exotic fish via their sea trade. Berlin Zoo (opened in 1844) built a public aquarium in 1913 (and still active today).

**Design breakthroughs**

The greatest breakthrough came in the early 1980s when it was found that Silicone Sealer could replace putty for glazed frame tanks. The building trade compounds are toxic to fish, but manufacturers soon offered a safe aquarium quality. It was then found that the Sealer could glue the sheet glass together, dispensing with the need for an iron frame. This made the standard home aquarium much lighter and the traditional 24 by 12 by 12-inch tank became the more popular 36 by 15 by 12-inch (the empty weight of which a man could comfortably carry – and home furniture could support).

Even glass is heavy and the public aquaria of the world developed the plastic tank for their giant aquaria.



Our time frame starts in 1909, by which time (Direct Current) electricity was being installed in the homes of the wealthy Edwardians (including my dad, who wasn't). But not until the 1950s was the change from DC to AC current completed for British homes and the technology was then available to use thermal strips for controlled heating. With DC these gadgets would burn out, but AC meant a clean break for an 'on and off' and so the bimetal strip in a glass tube heater-thermostat was born.

With that system came a boom in tropical fishkeeping and imported wild fish from South America arrived via the new airfreight trades. Special aquatic shops, rather than just pet shops, started to open importing these exotic fish and the equipment needed to keep them alive. But even AC operated thermostats sometimes burnt out – or stuck permanently 'on' killing valuable (and then expensive) pet fish.

It was also in the 60s that the microchip was developed (actually 1958 for the first one) and so the technology was available to replace the bimetal strip with a more reliable heating control for the tropical system. The manufacturers' research people took another 20 years though to exploit this potential. I developed one such heaterstat in the 80s, within the 'Atlantis' range, called 'Capricorn' which was a heating coil buried in a plastic plate controlled by a microchip pre-programmed to heat only to 26°C. Never launched beyond a test market in England, so if you have one, it will become a collectors' item.

Another 20 years on and digital heaterstats, such as the Rena SmartHeat (with resin replacing glass) are available. The original bimetal strip heaterstats are still sold

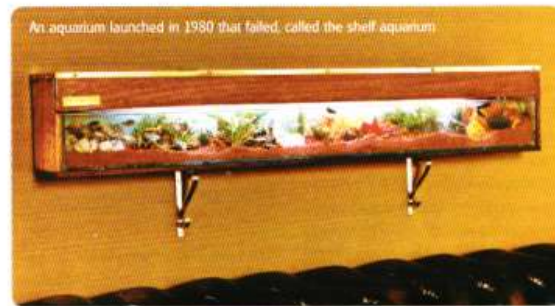
because they are cheaper and reliability has improved with new materials. But the future is digital!

**Lighting**

The Victorian aquaria must have been lit by candlelight (over the top rather than underneath) or oil lamps. Canada's Woodward and Evans patented an incandescent light bulb back in 1875, but it was Thomas Edison of the USA who developed the idea a few years later – and then the world was lit up by electricity.

The filament bulb was the natural choice for aquarists to place over their tanks in the 50s and 60s. Very successful they were too because the energy level of the photons the incandescent bulb emits is ideal for photosynthesis. Hence aquarists could become water-gardeners too. The furnished aquarium had arrived, with themes such as an Amazonian scene with forests of Vallisneria under blankets of Azolla.

The tradition was to use one, two or more bulbs fitted sideways inside a metal or wooden box 'hood' of 25, 40 even 100 watts. The socket was protected from condensation and splashes by adding a short piece of bicycle innertube to cover the fitting – we all did it. The problem was that these bulbs generated a lot of heat and the 'sagging' filament had a short life. So those R&D (research and development) teams soon offered the trade the 'new' fluorescent tubes. Not all that new actually, the fluorescent tube was invented by Edmund Gurner back in 1926 but USA's General Electric developed the lighting in 1938. ▶



An aquarium launched in 1980 that failed, called the shelf aquarium

frames as aquaria was first seen in Britain's 'Great Exhibition' of 1851. This revelation (the iron tanks were originally designed to house exotic plants on long sea voyages from the far flung parts of the British Empire). The Victorians obtained these tanks for keeping pet fish in the home – even for tropical fish species by having a metal plate base under which a candle would keep the water heated.

By 1900 there was even a Royal Aquarium. This was built in 1876 opposite the Houses of Parliament, but no fish were installed before it was demolished in 1902 to build the current Westminster Central Hall. Across the river Thames there is now the London Aquarium in County Hall – one of the largest public aquariums in Europe.

Back in the 1900s the Germans noted the Victorian innovations and they adopted the iron-frame aquarium with Hamburg becoming an important

Acrylic was the ideal material because of its clarity and strength. Hundreds of new public aquaria opened in the last quarter century in every developed country of the world using acrylic sheet and Silicone Sealer to display their fish in many novel ways, with walk-through (even moving walkways) aquariums. This idea was adopted by the hobbyist and plastic aquaria became common in the 90s, from Goldfish Bowls to Tubular Tanks for a living display in the 'Ideal Home'.

**Tropicals**

My first tropical aquarium was in the 50s when a glazed, metal framed aquarium with a slate bottom could be bought. This allowed a tiny oil lamp to be installed under that slate to maintain the water at a tropical temperature. The system worked quite well providing the oil lamp was properly maintained and I successfully bred guppies with this method.

*The greatest breakthrough came in the early 1980s when it was found that Silicone Sealer could replace putty for glazed frame tanks*



## History of fishkeeping

How aquariums became ornaments for the home (Dr David Ford's tank)



Now it is 2009 and yet another change is on the way – to become 'green' energy saving Halogens with low voltages are being fitted to aquarium hoods

### Fluorescents

Initially the typical warm-white tubes from office lighting were sold, but aquarists soon found that the photon energy was not right for aquatic plants. They needed the (to our eyes) blue light (wavelength 400 to 450nm) that penetrates water as well as the yellowish light (500nm) of the overhead tropical sun. Fluorescents with specific wavelengths were marketed by the late 80s and early 90s with names such as Triton, Beauty Light, Coralife, Aqua Glo, Aquastar etc.

The tubes also became thinner and so easier to fit – this was based on the number of 1/8ths of an inch diameter, i.e. T5 is thinner than a T8 – and a longer life. The traditional fluorescent light can halve its output (Lumens) in just six

months. We may not notice, but the plants do. The phosphor used within the glass tube is now chemically fixed in place to prevent migration (the cause of fading) and lifespan of 5,000 hours are guaranteed with consistent Lumens output.

Now it is 2009 and yet another change is on the way – to become 'green' energy saving Halogens with low voltages are being fitted to aquarium hoods. But the future is LEDs, already being sold as clip-over units.

### Aquarists

The fish haven't changed in millions and millions of years, let alone 100. But the people have. Like all good Britons, as soon as a hobby became popular (and fishkeeping is indeed

one of the top hobbies) they formed a club. I haven't found a 100-year old fish club, but many are 50-years old and the major association – the Federation of British Aquatic Societies (FBAS) – celebrated 70-years in 2008. It was in the late 40s and early 50s that most towns and cities formed their own local fish club. They became affiliated to the FBAS so they could get information and certificated judges for the popular 'Open Shows' where aquarists displayed their prize-winning pet fish.

Over 300 societies were registered by the 60s and 70s. Then, like all committees the world over, they split into geophysical or political groups. The A of A (Association of Aquarists) formed in competition to the FBAS. Scotland formed their own association, the FSAS (Federation of Scottish Aquarist Societies) and they too eventually had competition with USA (Union of Scottish Aquarists). Northern England felt neglected and formed their own Federation of Northern Aquarium Societies (FNAS) – but this was centred in Lancashire, which was the wrong side of the Pennines, so Yorkshire went their own way and formed the Yorkshire Association of Aquarist Societies (YAAS). The War of the Roses continues. Wales, Ireland (back then the aquarists association included Northern Ireland and Eire) even Cornwall, formed their own groups.

The associations then held their own 'Open Shows' which grew in the 80s into huge affairs. The FBAS occupied Alexander Palace with fish competitions and member clubs built tableaux for fame and prizes. The aquarium industry attended with stands for marketing or sales and they recruited the 'Top Aquarists' for advertising. The YAAS responded with an annual Yorkshire Aquarists Festival at the Doncaster Racecourse. FNAS held theirs in Manchester with the British Aquarist Festival. These national shows attracted prize-winning fishes and so awards such as Champion of Champions (at BAF) and Fish of Fishes (at YAF) were created. These fish and their proud owners appeared in many adverts in the aquarium magazines of those times.

### Clubs of the future

The national shows survived into the 90s with attendances over a two-day weekend numbering more than 10,000! Then people changed,

### Public aquariums to visit

100 years ago there was only London Zoo Aquarium (and the Royal Aquarium with no fish), now there are 30 Public Aquariums in the UK where you can visit and marvel:

Alton Towers Aquarium  
Anglesey Sea Zoo Aquarium of the Lakes  
Blackpool Sea Life Centre  
Blackpool Tower Aquarium  
Blue Planet Aquarium  
Blue Reef Aquarium  
Bolton Museum Aquarium  
Bournemouth Oceanarium  
Brighton Sea Life Aquarium  
Bristol Zoo Aquarium  
Chester Zoo Aquarium  
Deep Sea World  
Exploris, N.Ireland  
Great Yarmouth Sea Life Aquarium  
Lake District Coast Aquarium  
Liverpool World Museum Aquarium  
London Aquarium  
London Zoo Aquarium  
Macduff Marine Aquarium  
National Marine Aquarium  
National Sea Life Centre  
National Seal Sanctuary  
Oban Seal and Marine Centre  
St Andrews Aquarium  
Scarborough Sea Life Centre  
The Deep, Hull  
Underwater World at Birdworld  
Underwater World, Hastings  
Weymouth Sea Life Park

Most have websites where you can get more details – just Google.

The costs of travel increased dramatically, the cost of renting the venues inflated and by the turn of the century the Internet had arrived with instant information. No need to spend money travelling to Fish Shows for help with your hobby.

Some shows have survived to 2009 – the FBAS now occupy a holiday village at Hayling Island for a weekend in October each year. Their Supreme Championship is still awarded and industry attends with stands of their products. The FNAS's Champion of Champions is also awarded but now at a small one-day Open Show in Darwin in August. Yorkshire still have a Fish of Fishes, but at a village Show at Stockton On the Forest (near York) in July each year. No longer do thousands attend, just a few devoted aquarists who are fanatical about their fish.

As the local aquarium clubs declined, the popularity of a different type of fish club developed – the specialist society. The lovers of Catfish formed the Catfish Association of Great Britain, which has evolved into an

In 2009 you can get low voltage instant aquaria with a Rena Tank





international group (CSG, Catfish Study Group) who hold an annual conference at a Preston Hotel each year with guests from around the World. There is a Killifish Society, the British Cichlid Society, a Livebearers Group, the Neobentid society, several marine groups and of course the Goldfish lovers – the GSGB (Goldfish Society of Great Britain), with its Midland cousins IMMG (Association of Midland Goldfish Keepers) and Northern cousins the NGPS (Northern Goldfish and Pondkeepers Society). With Internet pages, video conferencing, email connections and often home meetings, these are the fish clubs of the future.

**Industry**

As the hobby of fishkeeping developed over the last century, so the industry grew to cater for the hobbyist's needs. There are many small firms specialising in ornamental fish imports or breeding, aquatic plants, aquariums and their accessories. Some firms have grown to international status, driven by the competition of the capitalist system. Mars – the largest privately-owned group of companies in the world – have their own unit devoted exclusively to fishcare (indeed, called 'Mars Fishcare') with their own research units. Germany's 'Tetra' and 'Sera' brands are now global, Canada's 'Hagen' products are sold worldwide. The USA has 'Wardleys', 'Penn-Plax', 'Jungle', 'Mardel', 'API' and more, and Japan exports 'Hikari' by 'Kyorin'.

British companies include 'Interpet', 'King British' and more. All usually sell fish foods and water treatments, remedies and accessories. Complete aquarium systems can be found where all you need do is fill with water, plug-in and switch-on. Then later, of course) decide what fish to



People can walk into Aquaria in 2009

*With Internet pages, video conferencing, email connections and often home meetings, these are the fish clubs of the future*

install. This sophistication has changed the hobby over the last half of our hundred years. Earlier times, the hobby was male orientated since one had to be a carpenter, electrician and biologist as well as a DIY enthusiast. Now the aquarium can be an easy-to-install living ornament making it attractive to the ladies. One obvious result of this change is the appearance of fish foods on the supermarket shelves.

That fish food too has changed over 100 years – initially it was table scraps (said dad) and then it became crumbs and dried ant eggs some 50 years ago. Now it is flake, tablet, sticks, granules, pellets, powder, frozen, freeze dried, irradiated and live!

The industries making all these products have their own controlling bodies where the members agree to a code of ethics for their businesses.

Here in the UK we have OATA (Ornamental Aquatic Trade Association – since 1991) and internationally there is OFI (Ornamental Fish International – since 1980). The latter covers 44 countries.

International trade shows take place too, so large and complicated they are biannual such as 'InterZoo' in Germany and 'Aquamara' in Singapore. In the UK the pet trade shows such as PATS (Pet & Aquatics Trade Shows) take place annually in the South and North of England.

**The Fish**

Actually it is not strictly true to say that all fish have not changed in the last 100-years. For tens of millions of years they lived happily in their own way until man (meaning woman too, of course) came along and started to eat them.

Man then domesticated some species, especially carp, and developed goldfish and koi for ornament. But it is within the last 100-years that the most changes can be seen as captured wild species are bred in captivity for the ornamentals trade. The fish farms of the Far East and Southern USA developed rapidly after the 50s and 60s created that market. Pet fish is now the top export earner for Singapore. Jungle fish farms are numerous in Malaysia, Indonesia and Thailand. Israel, Italy, Japan and Chinese fish farms mass-produce and export ornamentals, especially goldfish and koi.

At the beginning of our considered century there were more fish aboard the sea-going liners than passengers, but now there are more flying fish than people. The most frequent flyers (or sailors) have remained consistent throughout those 100 years. Popularity polls by various aquatic publications vary slightly but the top ten are always goldfish, angels, tetras, guppies, mollies, swordtails, platies, zebbras, corydoras catfish and koi.

Despite global warming, pollution, even wars, their future seems assured.

**Conclusion**

100 years has seen dramatic changes in almost everything in our world – including the fascinating and rewarding hobby of fishkeeping. My father told me how great it was to look into the fish's silent and peaceful world. To view their grace and beauty. I in turn told my children, and then my grandchildren, now my great-grandchildren, the same story. I also explain that ever-evolving technology will continue to help our hobby, so the future looks great, but never forget – you are their god. **FM**



Illustration: Aquarium equipment including heater, power strip and filter.

**Further reading**

To read more of fishkeeping history visit these websites:  
[www.ifocas.org](http://www.ifocas.org) (IFOCAS is the International Federation of Online Clubs and Aquatic Societies who are dedicated to the promotion of the fishkeeping hobby worldwide.  
[www.yorkshireaquaristsociety.co.uk](http://www.yorkshireaquaristsociety.co.uk) and click on 'badges' to see a collection of British Fish Club badges from the last 50 years.  
[www.fbas.co.uk](http://www.fbas.co.uk) for the latest news on shows and club meetings in the UK fishkeeping scene.  
[www.scottishaquarist.co.uk](http://www.scottishaquarist.co.uk) for our Scottish readers.  
 Or to contribute, my email address is [ddford@men.com](mailto:ddford@men.com)





# Understand the nitrogen cycle

A well established and healthy collection of plants will use up nitrates which will be removed when you prune the plants.

**An important part of keeping our aquariums running efficiently and effectively is understanding some simple mechanics behind it – one of the most important being the nitrogen cycle. Peter Hiscock simplifies and explains for us...**

**T**he nitrogen cycle in simple terms, is the route nitrogen takes from our atmosphere through living organisms and back again. The first stage of this process is 'fixation' where nitrogen is removed from the atmosphere by bacteria, bound to other molecules, and enters the food chain. After this there is a long chain of transfers and conversions where the nitrogen molecule is used in different compounds, by several organisms before finally being released, again by bacteria, back into the atmosphere. Whilst this is all very interesting science, it is also one of the single most important things to understand in order to keep fish healthy in an aquarium.

A simplified version of the nitrogen cycle takes place in an aquarium, and it involves pollutants that can

be very harmful, causing disease, poisoning, and death to our fish if they are not kept under control. By understanding the nitrogen cycle that takes place in an aquarium, we can manage it to ensure our fish are kept as healthy as possible.

**Stage 1 – Ammonia production**  
Ammonia (NH<sub>3</sub>) is made up from nitrogen (N) and hydrogen (H) and is the first step of our nitrogen cycle. Ammonia is produced as a waste product from fish and from the breakdown of organic waste such as solid fish waste, dead plants, and food. Ammonia is highly toxic to fish and should be kept at almost zero at all times. Because our fish need feeding, and will always be producing wastes, ammonia production is unavoidable, which is where the next stage of the cycle comes into play

**Stage 2 – Conversion to nitrite**  
Providing there are sufficient bacteria of the right type present, they will convert the ammonia in the aquarium into nitrite (NO<sub>2</sub>). This is still a toxic compound to your fish, but a necessary step towards complete removal of waste products.

**Stage 3 – Conversion to nitrate**  
Another set of bacteria, again if present in sufficient amounts, will

convert nitrites into nitrates (NO<sub>3</sub>), which are far less harmful to fish and can reach quite high levels over longer periods before any noticeable adverse affects arise.

**Stage 4 – Removal of nitrates**  
The final stage in the cycle, removal of nitrates, occurs through several processes. Bacteria again can be responsible for some nitrate removal, although this only occurs in anaerobic conditions such as in deep substrates or in clogged filter material. In most cases nitrate removal is achieved by plant uptake, water changes, or nitrate removing filter media like carbon.

**How it works in our tanks**  
In our aquarium nitrogen cycle, the nitrogen is introduced in the form of highly toxic ammonia from food and fish waste, and is finally removed through plant uptake, water changes, and filtration media. This cycle needs to be working to avoid the build up of ammonia, nitrites, and nitrates in the aquarium that will cause problems for our fish. There is often a phrase seen in fish keeping literature that goes something like 'look after your water, and your fish look after themselves', part of looking after your water is ensuring the nitrogen cycle is being carried out completely and at a sufficient level to remove pollutants.



Delicate species of fish and other creatures like this shrimp are sensitive to pollutants which will kill them if levels get out of control.



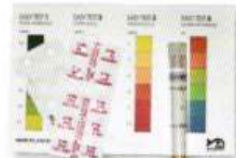
To do this there are two key steps, one is getting the cycle going in the first place, and the second is making sure it keeps going without disruption.

**Getting a cycle started**

When an aquarium is first set up, there are hardly any bacteria present in the filter to process ammonia and start the cycle going, these bacteria will occur naturally once ammonia is present, but this can take some time. This is the problem with getting a cycle started – ammonia and nitrite need to be present before bacteria can establish to process them, but we need bacteria to remove these pollutants before they cause harm to our fish. To avoid ammonia and nitrites reaching harmful levels, their production must be limited at first and increased gradually until there are enough bacteria to support a reasonable number of fish. The traditional way of doing this is to stock a tank slowly over a long period of time, adding just a few fish each week for a couple of months,

thereby gradually increasing the amount of waste produced. If you were to stock too quickly, ammonia will rise to dangerous levels rapidly and your fish will suffer or even die. A better method of 'cycling' is to use a live bacteria product which

The nitrogen cycle is an invisible process so water testing is essential to see what's going on



will introduce large populations of bacteria to process wastes, followed by the introduction of fish to produce those wastes. Whichever method of cycling you use, the most important thing is to test your water regularly so that you know how well the cycle is working in your tank.

**Keeping the cycle going**

Once you have a working nitrogen cycle in place it is vital that it is kept going. In a fully stocked tank which will be producing large quantities of ammonia from fish waste, a sudden breakdown of the nitrogen cycle is just about the worst thing that can happen and will very quickly result in high ammonia and nitrite levels, and serious trouble for your fish. Anything that can kill the bacteria in your filter will disrupt the nitrogen cycle; the most common causes are rapid temperature changes or rapid water chemistry changes caused by too much water being changed at once, and incorrect filter maintenance. Changing all your filter media at one time will remove all the useful bacteria, and cleaning filter media in tap water will kill bacteria. Switching filters off for an hour or more can also kill bacteria, and in sealed external filters will cause other problems once the filter



The primary source of nitrogen based waste is from your food, so keep a tight check on feeding levels

**Managing a 'crash' situation**

A sudden loss of bacteria, for whatever reason, results in a breakdown of the nitrogen cycle causing a rapid rise of ammonia or nitrite and is often referred to as a 'crash'. In a crash situation the two vital steps are to remove all ammonia and nitrite and re-establish the bacteria. To do this you can use a chemical filter media like carbon or zeolite to rapidly remove ammonia and nitrites, along with stopping all feeding for a few days to reduce production of ammonia. Re-establishing the bacteria can be done with a live bacteria product, but once you resume feeding it should be done at a heavily reduced rate, gradually increasing back to normal levels over a few weeks.

**Feeding rates**

The amount of ammonia produced in a tank is in direct proportion to the amount of feeding. Over feeding will cause an over production of ammonia and the nitrogen cycle in your tank may not be able to cope, so it is vital to avoid over feeding.

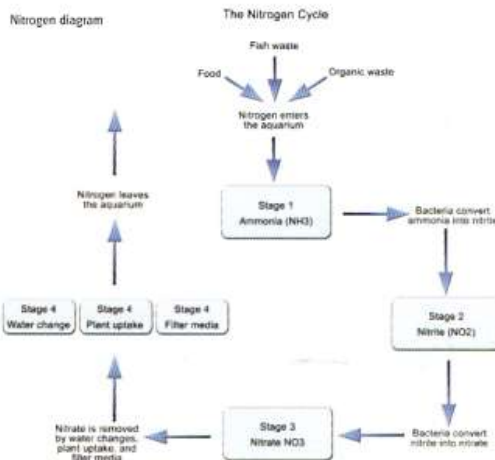


Washing all your filter media under chlorinated tap-water will kill the bacteria which the cycle depends on

is switched back on. Being aware of the nitrogen cycle and how it works is key to understanding what is going on when, or if, your tank suddenly experiences problems. **FIN**

**Water testing**

You can only ever know how well the nitrogen cycle is working in your tank, and how much water you should be changing if you are doing regular water tests.



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Aquarists Evening to meet Cichlid Hobbyists with buffet & bar on  
3rd Oct 09. **Location:** Kraftzentrale im Landschaftspark DU-Nord,  
Emscherstraße 71, 47137 Duisburg, Germany

Further information from Frank Ringelmann: [dcgrn@gmx.de](mailto:dcgrn@gmx.de)  
Please visit: <http://www.dcg-online.de/noFrames/files/>

Opening hours:  
9:00 a.m. – 6:00 p.m.

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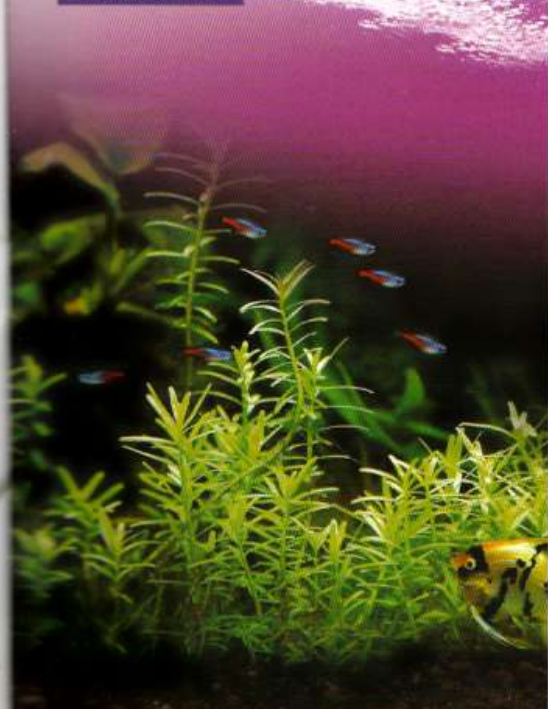
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## Company profile

Hikari's production premises

PHOTOS - Courtesy of Hikari

# Dazzling results with **Hikari diets**



As a treat for our reader's this month, (with more planned for future issues) we have given everyone a free sample of some of Hikari's world renowned food. Here is a bit of background on the company that produces 'show winning' results with their food

**H**ikari fish foods, recognised globally for their exceptional quality, are available for all types of tropical, goldfish, koi and other pond fish. The Hikari brand is manufactured in Japan by the Kamihata Fish Industry Group. 130-years of ornamental fish breeding experience has helped make Hikari the most popular brand in Japan, a nation known for its passion and knowledge of keeping beautiful ornamental fish and a brand which is now available in more than 40 countries worldwide.

#### Research and development

All Hikari fish foods are developed with the health and longevity of fish first and foremost in mind and the Hikari team firmly believe that the very start of the development process for any new diet is the requirement to investigate and obtain a thorough understanding of the fishes natural habitat. Studying the fishes ecology first hand gives

a unique insight into their eating habits and dietary requirements and is essential to help provide a scientific base on which all Hikari aquatic diets are developed.

The Hikari field research team, designated the 'Kamihata Expedition Team' is headed by the company's chairman Mr Shigezo Kamihata with explorations taking place as far afield as Irian Jaya, Lake Malawi, Guiana Highland, Indian Ocean, the jungle of Southeast Asia and the Holy River Ayeyawady, all of which offer many secrets to fish health, colouration and long life.

Hikari's highly experienced and knowledgeable staff combine this invaluable field research with a leading scientific approach at their state of the art research and development facility in Japan. The Hikari aquatic laboratory includes a total of 445 aquariums housed in rooms operating low, high and variable temperatures with water temperatures being adjustable

between 5°C and 30°C to help meet the needs of any research required.

In addition, Kamihata also own the world renowned Yamasaki Koi Farm, one of the largest koi farms in Japan covering almost 10 acres with 50 culture ponds and six greenhouses. This first hand experience breeding and raising fish, and the scientific data



Hikari Algae Wafers





Hikari Cichlid Medium Pellet



Hikari Staple Medium Pellet

collected during this process, gives the Hikari team a clear roadmap for future product development, improvements and enhancements.

**Manufacturing**

Hikari start the manufacturing process for each of its premium aquatic diets by selecting only the highest quality raw materials. The selection of the highest quality ingredients is paramount with all raw materials undergoing quality and palatability verification processes to ensure the quality of the finished product is never compromised. Qualified Hikari personnel produce the Hikari range of diets across 11 different machines in four factories all under stringent quality control procedures with standards checked and analysed at each stage of the production process. Hikari's advanced and unique production systems produce pellets, granular and wafer diets, designed to meet the nutritional requirements of a variety of aquatic wildlife.

**Exceptional nutrition for all types of fish**

Whether you are keeping tropical fish, goldfish, koi or any other pond fish, Hikari have developed a

range of foods to meet the specific nutritional requirements of all types of fish. A combination of the finest quality ingredients and state of the art manufacturing facilities produce the finest foods with all the essential vitamins, minerals and trace elements required to maintain and enhance the health of your fish. Hikari fish foods do not contain artificial colours or flavourings, ensuring they will never cloud the water, and are enriched with stabilized Vitamin C.

**2009 All Japan Grand Champion fed and grown using Hikari**

This gorgeous Showa Sanshoku, owned by Mr. Fumio Fujiki, is nine years old, 93cm (over 36-inches) in length and was raised using Hikari diets including Saki-Hikari. Bred by Yamatoya Yorijo in the Shimane Prefecture it was primarily kept by Mr. Fujiki at his home with the technical support of Kurihara Yogyojo and Maruiyu Yorijo using Hikari as its primary daily diet.

This is the sixth consecutive All Japan Grand Champion to be raised on the world's most technologically advanced koi diet, Saki-Hakari.

Grand Champion



Hikari fish foods are available from all leading aquatic retailers. If you would like further information and technical help visit [www.hikari.info](http://www.hikari.info) or to find your nearest stockist visit [www.hikari.uk.com](http://www.hikari.uk.com)

For the best aquatic diets for your fish, look no further than Hikari **FN**



# For the aquarist who cares

To help keep your aquariums and fish in the best of health, Tetra are offering 10 packages of their new AquaCare-System to 10 of our reader's, read on to find out how you could win...

**K**eeping your fish healthy has never been simpler than it is with Tetra's AquaCare-System – a range of care products that work together to provide balanced, clear water and healthy fish.

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**Tetra Test 6in1**

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**EasyBalance**

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For more information visit: [www.tetra.net](http://www.tetra.net)

**The prize**

Tetra is offering 10 prizes of the Tetra AquaCare system. Each system includes:

- 1 x 100 ml AquaSafe @ £4.43
- 1 x 100 ml SafeStart @ £9.19
- 1 x 100 ml TetraTest 6 in 1 @ £10.35
- 1 x 100 ml EasyBalance @ £4.06
- Total value per package = £28.03

**How to enter**

Just answer the question on the entry form and send it into the usual address by 31st August 2009.

Good luck.



**Question:**  
How many products make up the Tetra AquaCare-System?

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Please send entries into Tropical Fish Magazine, Tetra Competition Wugant991, Alexander House, Ling Road, Tower Park, Poole, Dorset, BH12 4NZ. CLOSING DATE: 31st August 2009



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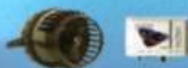
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*Tropheus brichardi*

Photos by Iggy Fawcett

# Reef alternatives

**Judging by my email inbox there seems to be a second wind of interest in fishes from Lake Tanganyika and the most popular of these is the lovely *Tropheus moori***



OSAquatics.co.uk

**W**hat appears to be happening, and I have to say from a personal view this is a good thing, is that some fish keepers are beginning to realise how unsustainable the collection and keeping of marines is becoming. The joy of keeping fish from the Rift valley is that the tank set-up can actually look 'marine', but without all the extra expense, and the keeper's conscience can be clear that they are not part of the problem in the exploitation of the reefs.

If you are one of those who is yet to try keeping *Tropheus moori* because they seem difficult and the subject of them is confusing, do not worry, they are easier to keep than you may think.

Firstly there is a great deal of mystery surrounding *Tropheus moori* with strange names bounding around such as Ikola, Nangu and Ndole. These names that follow

the scientific name are just colour variants of the same fish that occur from different localities.

In fact there are over 60 recognised variants of the same fish and work is being done to see if these are indeed separate species. As we know, evolution is fluid and give it another million years we can be confident that they all will become individual species.

#### **Origins and distribution**

They are endemic to Lake Tanganyika and inhabit the rocky coastal areas only down to depths of around two-metres. This is perfect for the fish keeper who wishes to recreate a little slice of the lake shore as the fish will be happy in a fairly shallow depth of water.

In a perfect world they should



*Tropheus moori*



The *Tropheus moorii* is a mouthbrooder



be kept in a species tank and the group size should be no less than 12. They can be initially expensive to buy, but the little ones soon grow and are cheaper of course. I would be reluctant to buy any smaller than five-centimetres though, as they can be a little delicate if less than this. By keeping them in a single species tank, not only will they develop better colouration, but also their fantastic behavioral patterns can be seen. Unlike some larger Rift Valley cichlids, *Tropheus moorii* are always on the go, busying themselves with chasing out rivals and showing off to potential mates.

**Aquarium set-up**

The aquarium should be no less than a four-footer and be filled with a great many rocks to form as many caves as possible. The substrate should be a deep layer of aquarium sand, so under gravel filtration is not an option. The lighting should be as bright as possible to encourage the algae. In taking a close look at the head of the fish one can see an excellent pair of lips, which are used for the constant stripping of algae

from the rocks. Filtration should be a large external canister filter with the addition of a couple of power heads to keep the water turned over. As can be seen, the set-up is a similar one to a marine set-up.

**Maintenance**

What is most important is regular water changes, as soon as the water begins to yellow, the fish will appear glum and the pH should not be allowed to fall. If the system is mature then 20% of the water should be changed weekly, the difference in fish from a tank that has weekly water changes to one that has fortnightly water changes is startling, the growth is so much better and the colours are so much brighter.

**To beware of...**

A word of warning though, the water used to top up the aquarium must be of the same temperature and parameters as the water that came out, otherwise the fish will drop to the bottom of the tank and in worse case situations even be killed. ▶

*In a perfect world they should be kept in a species tank and the group size should be no less than 12*



Males are generally smaller than females



They can be expensive to buy



## Freshwater **breeding**



### Tropheus moori fact file

<b>Name:</b>	Tropheus moori
<b>Species group:</b>	Rift Valley cichlid
<b>Water preferences:</b>	Temp: 23 to 26°C, pH eight; Hardness: moderately hard
<b>Breeding:</b>	Mouthbrooders
<b>Diet:</b>	Herbivore
<b>Distribution:</b>	Lake Tanganyika

*I know that they still command a high price, but I would encourage any competent fish keeper to give them a go*

The temperature should be 23° to 26°C, the water kept at a pH of eight, and moderately hard.

Another word of warning! Do not be tempted to offer food stuffs that are too high in protein. Their digestive tract has developed to deal with large amounts of green matter and only limited amounts of the animal matter. Do give them bloodworms or similar as a treat, but foodstuffs as these should never form the staple diet. I often visit a local friend whose Tropheus

tank is nearly self supporting, in that he only adds food once a week, such is the excellent growth of algae in the tank and the fish look incredible on it.

#### Breeding

Now for breeding. Well the first thing that has to be stated is different variants will cross breed and should not be allowed. There is much talk amongst *Tropheus moori* keepers of F1 and F2 variants; I am never too concerned

about such filial matters. The best set-ups are the ones which contain a single flavour colony that have been cared for correctly and raised to adulthood. In these aquariums breeding is most likely to occur naturally and this is how breeding should be encouraged.

A large Tropheus is only 14cm long and if the fish are mature and smaller than this they are most likely to be the male. A colony should have a healthy ratio mix with more than one male. Being cichlids from Lake Tanganyika then they are mouthbrooders. The joy of keeping a healthy adult group is that nearly all the work is done by the fish and the keeper has to do very little.

In breeding condition the colours will appear flusher for a few days

and then in the early morning a female will begin to drop eggs into the water and immediately turn to take them into her mouth. An obliging male will then fertilise the eggs where they will stay for up to a month. She may appear to look a little ragged and thin during the gestation, though she will still be able to eat. On occasion a few of the eggs may be eaten by accident, but that is how it goes sometimes.

#### Fry care

After the month the little fry will be seen to begin popping in and out of her mouth, but not venturing too far away. With any sign of danger they will all shoot back in with surprising speed. After a further week they will begin to be able to care for themselves and growth rates are very good. They should be offered a variety of food, such as newly hatched brine shrimp, but they will also be seen to eat algae from a very tender age.

#### Summary

To close, I know that they still command a high price, but I would encourage any competent fish keeper to give them a go. The prices of keeping marines is probably three times that of keeping *Tropheus moori* and believe me, once you keep tropheus you will be asking yourself why you didn't do it years ago and why you spent all that money! **FIN**



If you want a marine look without the cost - try the *Tropheus moori*



Be careful with their diet



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The planted tank

Photos by the author

# Planting pleasures

**Iggy Tavares visits a keen hobbyist in Delhi who, despite some challenging climate conditions, manages to maintain a beautifully planted tank**

**S**hriyans Jain from Delhi, India started keeping fish when he was 14. This happened inadvertently when his mother received a fish bowl with a pair of gold fish for her birthday. Shriyans moved the fish bowl to his room and took over the responsibility of caring for the fish, even though he had little knowledge about fish keeping. Unfortunately one of the goldfish died within a week, leaving him disheartened and confused as to whether to continue keeping fish or not. Anyway, he got another goldfish and this time they did pretty well for a long time. That was because after some reading on the subject, he fed the fish sensibly with small amounts of food and performed water changes three times a week.

By now, Shriyans was visiting all the nearby aquarium shops and got more and more interested in the hobby. Finally his parents allowed him to get a bigger tank after he did well in some school exams.

Once he got permission, he quickly finalised the deal with the owner of an aquarium shop right opposite his school. He had chosen a three-foot tank complete with filter, air pump, gravel and other equipments inside it. The shop owner kindly gave him a free beginner's book on fish keeping. Shriyans hired an auto rickshaw and put everything in it and left for home. That was one of the happiest days of his life.

#### Shriyans history

Shriyans has now been keeping fish for many years, keeping different species successfully and also breeding a few of them. At one point he had 11 tanks, but then because of lack of time and involvement in business he dismantled many of them. At one time he was a hardcore African cichlid fan and he even had a marine aquarium for four years.



Parkinson rainbow

Then one day he started a small fish hobbyist community on the internet in Delhi and met new friends that had beautifully set up planted tanks which got him interested in this aspect of the hobby. He started reading about the plants and the care they needed and finally decided to convert his large, old six by two by two-foot tank into a planted aquarium.

#### Preparing for the planted aquarium

Shriyans already had most of the equipment, apart from the lights and the carbon dioxide kit. A couple of 150W metal halides lamps were obtained from the local electrical



## Plant profile



His pride and joy though, are his discus, consisting of six Snake Skin discus and two Blue Diamond discus

dealer. The carbon dioxide cylinder (4.5kg) was purchased from a welding gas supplier and the dual gauge regulator and solenoid valve via business contacts. Gravel and silica sand were purchased from the nearby industrial minerals seller, while laterite soil rich in iron content and thus supposedly good for plants came from South India via a friend, as did a beautiful piece of wood imported from Singapore (XL size) from another friend. Finally, the plants that had been ordered arrived from Singapore and Shriyans was ready to set up the planted tank with the help of his friend Sujoy Banerjee, who had kindly brought me to see this planted tank during my visit to Delhi.

### Setting up the planted aquarium

The finely sieved laterite soil was placed in the tank and leveled. Added next was some organic plant fertiliser sold in local plant nurseries that do not contain any artificial additives or chemicals, thus making it fish safe. Gravel, followed by a thin layer of silica sand over the top completed the bed ready for the plants. Fishing line was used to tie the anubias on to the wood and Java moss and riccia on to the rocks, which was then covered with nylon net.

After the wood and the rocks were covered and placed, the tank was filled with an inch of water and the other plants were planted in the substrate in pre-planned places. The tank was then filled with water and later the same day after filling the sump with water, the filtration system that also supplied the water circulation was started. Lights, consisting of metal halides (two 150W) were hung centrally over the tank fixed to a length of steel square pipe, welded on to wall mounting brackets behind the tank to give even lighting over the whole tank.

### Adding the plants

Over the next few weeks there was a regular supply of plants arriving that had been ordered from Kerala (South India) and from Bangkok. This included several species of anubias, Java fern and Cryptocoryne, as well as Vallisneria, Hygrophila, Ludwigia



and Aponogeton. For the front, low growing plants included hair grass, Java moss, Hemianthus cuba and riccia among others. With all these plants in the tank, the slight hint of algae that was apparent when the tank was first started soon disappeared. To aid plant growth a carbon dioxide system was added. This comprised of a CO2 cylinder



fitted with a dual gauge regulator and a solenoid valve. With a bubble rate set at three bubbles per second, a power head is used to diffuse CO2 into the water. CO2 is only supplied during the day being turned off at night.

### Adding the fish

The fish in this planted tank were added over a period

of several months. Shriyans is keen on Rainbow fish as they are very colourful, active and hardy. Hence these were some of the first fish that he added to the tank and now include Bosemani rainbowfish and Parkinson rainbowfish, as well as the smaller Neon blue rainbowfish (*Melanotaenia praecox*). Other small fish include Harlequin rasboras, Rummy nose tetra and Corydoras catfish that occupy the substrate. Shriyans was able to source some Altum angels that can be hard to come by in Delhi. His



pride and joy though, are his discus, consisting of six Snake Skin discus and two Blue Diamond discus.

There is no problem between the angel and the discus at the moment as these are still young and have some growing to do before they reach full size in a few months time.

The fish in the tank get a varied diet consisting of tropical fish flakes, micro pellets, algae wafers, tetra bits, spirulina flakes and discus pellets all made by Hikari that Shriyans feeds in the morning and evening. Additionally, an automatic feeder dispenses a few grains of Tetra bits that all the fish and







not just discus eat with relish. All the fish also eagerly take the bloodworm that is fed at least once a week.

**Tank regimes**

Shriyans has a fixed routine for keeping the tank clean. This involves water changes on Monday, Wednesday and Friday. This is



dictated by the RO system that has a timer for around eight-hours to produce 100-liters of RO water. Hence the need to do water changes two to three times a week, rather than one big water change once a week.

The homemade filtration system consisting of a large sump (150 x 56 x 56cm) with filter floss, bio balls and a power head to pump the water back into the tank (5500l/hr) works very well keeping ammonia and nitrites to negligible levels. This is confirmed by the test kit that checks for ammonia, nitrite and nitrate as well as pH. Additional duties include cleaning and cropping yellowing or dead leaves as well as trimming back the faster growing plants.

**Climate issues**

A major problem that affects aquarium tanks in Delhi is the large seasonal variation in temperature



Angelfish

*Maintaining a planted tank in Delhi can be a bit of a challenge, particularly during the hot summer months*

since during their winter temperatures approach 0°C and in summer it can reach 48°C. When it is

cold it is simple enough to use a heater to maintain water temperature around 25° to 27°C. Shriyans main problem is getting the aquarium water temperature down without a chiller. With the help of four cooling fans left on 24-hours a day, water temperature can be reduced from the 34°C that it can reach, to around 30°C. By turning the metal halides lights off in the afternoon and floating



Corydoras

frozen plastic water bottles in the sump it was possible to maintain the tank's temperature at 28°C.

**Equipment problems**

Another problem in Delhi can be reliability of equipment. One night Shriyans smelt something burning. One of the ballasts of a metal halide lamp was burnt and had in fact melted. It was unplugged and replaced the next day, but it only lasted three days when the same thing happened again and again each time it was replaced. Then finally the ballast was replaced by a different brand and fitted with a voltage stabilizer, which has worked well as extra holes were also drilled in the housing to provide extra ventilation to keep it cool.

Maintaining a planted tank in Delhi can be a bit of a challenge, particularly during the hot summer months when outside temperatures are even too hot for humans. High temperatures adversely affect fish, as oxygen content in water drops off causing them to suffocate. If the temperature is not kept in check, it is also causes considerable loss of plants within a few days.

Shriyans has devised practical



Rockwork with liver moss

ways to keep the water temperature at the correct level during the hot summer months, without the use of an electrical chiller which are very expensive in Delhi. Use of laterite as a growing medium and addition of CO2 to the water ensures a lush growth of plants to provide an ideal home for Shriyans' discus, Altum angels and other fish. **FIM**



Angelfish



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Healthy Angel fish  
Photos by Ignatius Twinn

# What to do if your fish looks sick

**Not sure why your fish is sick? In this article we look at common causes of ill health in tropical fish, and show you how to become a fish health detective!**

## Routine health checks

Many common health problems in fish - such as caused by deteriorating water quality or whitespot disease - can quickly become serious, even life-threatening, so prompt action is vital.

It therefore pays to regularly monitor your fish. The first feed of the day provides a good opportunity to inspect your stock. The feeding response itself is a good barometer of

your fish's health - if all the aquarium inhabitants are tucking into their food then this is a good sign.

As you watch your fish feed, look for any individuals that aren't eating with their normal enthusiasm - they might be off their food because of illness, or stress. Scan the body surfaces of the fish - look for any unusual lumps, marks, or injuries on the skin, fins or eyes. This daily check will help nip any problems in the bud.

## Behavioural clues

A change in the fish's behaviour could indicate a health problem. Perhaps the fish has begun to swim abnormally (e.g. spiralling, swimming head down), or has breathing problems (fast gill beats, gasping at the surface). Or maybe a normally open-water fish is hiding away.

Of course, behavioural changes aren't always a sign that something is wrong. For example, some cichlids and catfishes retreat to a

cave or other hiding places in order to spawn. Certain botias, such as the Clown loach (*Chromobotia macracanthus*) sometimes lie flat on their sides, and this can give their owners a bit of a shock!

Hence, what is normal behaviour for one species may be abnormal for another. For example, some fish spend much, or all of their time at the water surface - such as Hatchet fishes (e.g. *Gasteropelecus*) and many killies. But if, say, a corydoras catfish remained at the surface then something would definitely be wrong. As you become familiar with the various types of fish you keep, you will discover what is normal, or abnormal behaviour for each species.

## Detective work

When fish become ill it can be difficult to tell what is actually wrong with them. If only fish could talk!

In many cases the symptoms are vague (e.g. the fish isn't feeding, or is ▶



Sick swordtail fish



## Fish health



Healthy Dwarf gourami

resting on the bottom of the tank) and don't provide useful clues as to what could be wrong. In these situations it can be tempting to pour in some general disease tonic in the hope of a cure. In fact, it is far better to work through a few questions in order to narrow down the possibilities.

### Key questions

1. What are the aquarium water parameters (temperature, pH, ammonia, etc) - are they all within acceptable limits?
2. How many fish are sick?



Sick discus

### Top tips for preventing health problems in fish

1. Buy only quality fish from a reputable dealer.
2. Maintain good aquarium hygiene including regular partial water changes (e.g. 20 to 25 per cent water change every week or two).
3. Regularly test the water.
4. Keep your filter in good working order - it is your aquarium's life support machine.
5. Don't overstock. Less fish means healthier fish.
6. Monitor your fish regularly for any signs of ill-health.

3. Has the illness developed suddenly (e.g. within 24-hours) or gradually?
4. Is the illness affecting only newly purchased fish?
5. If several fish are sick, did their onset of illness coincide with any changes made to the aquarium (e.g. large water change; addition of pH buffer or other chemicals)?  
These questions will be discussed further in this article.

### Prime suspect

Whenever an illness breaks out you should always investigate for a water problem. Adverse water conditions, such as high ammonia levels, are a common direct cause of ill-health in fish. In other situations, a water problem can increase the likelihood of a disease outbreak. For example, dirty water conditions will favour the proliferation of certain disease-causing bacteria and parasites (e.g. *Trichodina* skin parasites).

The important water parameters to check are: temperature (for most tropics this should be around 23° to 25°C), pH, ammonia, nitrite, and nitrate. Testing the hardness (e.g. GH, KH) may be relevant when keeping fish that need very hard or very soft water.

### Water test kits

A range of products are commercially available for testing the water chemistry. These include conventional liquid test kits and the more rapid dip strips. It is best to have a set of test kits at home, but failing that some aquarium stores offer a water testing service for a small fee. Take them some aquarium water in a clean glass jar. The shop staff will

explain the results and any action required. Ask the tester to write down the actual readings for your records, even if all water parameters are fine - many shops are lax at doing this.

Ideally, one should also check for dissolved oxygen (DO) levels, particularly if several fish exhibit fast gill beats or are gulping at the water surface. Unfortunately, there aren't many DO test kits on the market and the best ones are expensive electronic meters. Also, DO readings must be taken fresh, so it isn't a test that can be performed at the aquarium store.

### Disease scenarios

Look at the three ill-health scenarios below and decide which best fits the situation in your aquarium. This will help narrow down the likely causes.

#### 1) A new fish falls ill or dies within a few days of introduction into your aquarium

This assumes that all established fish (i.e. those that have been resident in your aquarium for several weeks or more) remain healthy.

- Is the new fish suited to your aquarium's water conditions (notably temperature and pH)? Perform some water tests. Read up about the species if you aren't sure.
- Could the new fish have died from nitrate shock? Check the nitrate level of your aquarium water.
- The new fish may have been ill or incubating a disease prior to purchase. Did it appear healthy when you acquired it? Does the fish display any visible disease signs? Keep a close check on your other fish over the next few days and weeks in case the disease is contagious.
- The fish may have been attacked

### Breathing tips

If several fish develop breathing problems (e.g. fast gill beats, gasping at the surface), increase aeration where appropriate (this is where a spare air pump comes in handy). Possible causes are: low DO level; nitrite poisoning; ammonia poisoning; gill damage caused by exposure to chlorine or chloramines in untreated tap water; gill infection (e.g. gill parasites or gill bacterial).

by its new tank-mates. This is not uncommon with aggressive or highly territorial fish such as many cichlids. Consider whether the new fish is compatible with your existing stock.

- Could the fish have been traumatised during its journey from shop to home? Perhaps it got too hot or too cold in its plastic bag?

**TIP:** Don't delay getting new fish home (do any shopping beforehand!).

#### A single established fish becomes ill or dies

This relates to a fish that has been resident in your aquarium for several weeks or more. It assumes that all the other fish in the aquarium remain healthy.

- The fish may have been attacked or killed by another. Some fish (e.g. cichlids) can become aggressive at spawning time, attacking other fish (or even their spawning mate) that enter their territory.
- Old age. Some fish (e.g. many tetras) live for only a year or two. If your aquarium contains many fish then expect to occasionally loose a specimen through old age.
- Injury. Injuries can be caused by



Sick gourami - Fungus on dorsal fin





fighting, by sharp rocks, or through clumsy handling (e.g. fish jumped out of net and onto floor).

- Adverse water conditions. The aquarium water conditions may have changed or deteriorated such that they are no longer tolerated by the affected fish but may still

be within tolerance limits of its tank-mates. Perform water tests.

- The fish may be suffering from an infectious disease (e.g. whitespot). Look for any obvious symptoms. Keep an eye on the other fish over the next few days and weeks in case it is something contagious.

**TIP**

If you have a spare aquarium then it is best to isolate a sick individual – this can help the fish recover in peace and quiet, and reduce the risk of it passing on an infectious disease.

**Multiple sudden illness or deaths of established stock**

If several previously healthy fish die within a period of 24-hours then suspect a water problem. Very few infectious diseases (e.g. bacteria, parasites) are capable of killing fish within such a short time.

Perform water tests and check the aquarium temperature.

- Consider whether you made any alterations to the aquarium just prior to the onset of illness or deaths. For example, if you performed a part water change did you remember to add a dechlorinator (aquarium water conditioner) to eliminate harmful chlorine and chloramines from the tap water? If you recently added pH buffers or other chemicals

is it possible that you accidentally overdosed or caused a dramatic pH shift (fish don't like sudden changes in pH)? Often, the last thing you did was to feed your fish! But unless you grossly overfed (risking water pollution) then it is highly unlikely that the fish food was to blame.

- Could a child have put anything toxic in the tank? One case of mass fish deaths occurred after a child poured milk into the aquarium!
- A very dirty or overcrowded aquarium can cause sudden multiple deaths due to a rapid fall in the dissolved oxygen (DO) level. Fish that have died of oxygen starvation often have their mouths wide open and gill covers flared. Often it is the larger fish that die first.

**Infectious diseases**

If you have ruled out a water problem or injury, then consider an infectious disease as the cause of ill-health or death(s). Infectious diseases are caused by various organisms, such as viruses, bacteria, fungi, and parasites. Infectious diseases can spread from fish to fish, sometimes rapidly, and some affect a wide range of fish species.

There are literally hundreds of diseases that can afflict aquarium fish, but fortunately most are only rarely encountered by the hobbyist. The table below lists five of the commoner ones.

**Using disease treatments**

Most disease treatments are added to the aquarium water - so make sure you know the volume of your aquarium in order to work out the correct dosage. Some disease remedies come with handy dosing ▶

**Invisible killers: ammonia & nitrite**

Ammonia and nitrite are major killers of fish, particularly in newly set up aquariums. Fish produce ammonia as a waste product of protein metabolism. Ammonia is highly toxic hence fish must eradicate this chemical from their bodies by excreting it across their gills and into the surrounding water. In the absence of any waste-removal mechanism, ammonia will gradually build up in the aquarium water, reaching levels that will harm or kill fish. Fortunately, Mother Nature comes to the rescue - for various types of aquatic bacteria consume ammonia as a food source, converting it to less toxic nitrite. Other bacteria consume the nitrite, converting it to weakly toxic nitrate. (The resultant nitrate levels are kept in check by performing those all-important regular part-water changes). An established ('mature') aquarium and its filter will be home to vast numbers of these important bacteria. (Your aquarium filter is basically a five-star hotel for them to flourish in!) If the aquarium or its filter lack sufficient numbers of these bacteria (as in the case of a newly set-up aquarium) then high ammonia and/or nitrite levels may occur. Just how much ammonia, nitrite, or nitrate a fish can tolerate will vary greatly between species and even between individuals of a species.



Sick Rainbow with a large abscess.

**Diseases and your fish's health**

Disease	Typical signs	Caused by	Treatment
Whitespot ('ich')	Several to numerous sugar-grain sized white-grey spots on skin and fins.	Tiny parasites (Ichthyophthirius) that live within the skin.	Commercial whitespot cure. Repeat doses may be necessary - see manufacturer's instructions.
Cotton-wool disease	One or more fluffy white-grey tufts on body surface.	Aquatic fungus (e.g. Saprolegnia)	Commercial fungus cure
Fin rot	Partial or complete erosion of the fin (more commonly affects the tail fin)	Usually bacteria	Fin rot remedy or general bacteria remedy
Body ulcers	Open sores on the body surface	Usually bacteria	Bacteria or ulcer remedy
Dropsy	Bloating of the body typically accompanied by projecting scales (notably around the belly region) and sometimes protruding eyes (pop-eye)	Various causes  Bacteria often to blame	Difficult to treat. Try an internal-bacteria remedy  Antibiotics (from vet) may help in some cases



## Fish health



Healthy swordtail



caps on the bottle, making it easier to dispense the correct amount.

### Still unsure why your fish are ill?

If in doubt, seek advice from your local aquarium shop. Failing that, the internet can be a good resource, but sadly it also contains a lot of misinformation, so beware! Leading aquatics manufacturers, such as AQUARIAN, offer free advice through their websites ([www.aquarian.com](http://www.aquarian.com)). You can submit your question and receive a personal reply from one of their fish experts. **FIN**

**AQUARIAN**



Healthy rainbow

### Author biography



Dr Peter Burgess is a PhD-qualified fish health scientist with a life-long passion for tropical

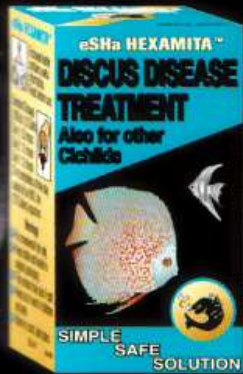
fishkeeping. He lectures on Aquarium Sciences at Plymouth University and is Senior Consultant to AQUARIAN (Mars Fishcare business). Peter has written over 300 articles and five books on fish health and husbandry. He also runs training courses for fish scientists and vets and is actively involved in fish conservation projects both in the UK and abroad.

### Water chemistry and your fish's health

Parameter	Ideal range	Adverse effects on fish	Common causes
pH	What constitutes a 'safe' pH depends on the types of fish kept. For most tropical fish, the pH should be above 6.0 and below 8.0. Some species need higher, or lower, pH levels.	Sudden exposure to very low or very high pH levels may cause fish to become stressed. They may develop tremors and become Extremes of pH can harm the skin, gills and other body surfaces. Gill damage results in breathing problems, manifesting as laboured breathing, fast gill beats, or gasping at the surface.	pH too high: - High pH water supply - Incorrect use of pH buffers  pH - too low: - Low pH water supply - Insufficient water changes - Incorrect use of pH buffers
Ammonia	Ideally zero. Maximum recommended level: 0.2 mg/L (= 0.2ppm) Ammonia toxicity increases with pH and with water temperature.	High levels of ammonia damage the fish's nervous system, causing excitability and convulsions. Death usually follows. Ammonia can also damage the skin, and may result in bruising (haemorrhaging) and skin sores (ulcers). Ammonia has also been linked with gill damage, resulting in gasping and laboured breathing. High ammonia and/or high nitrite levels are generally the result of inadequate biological filtration.	High ammonia and/or high nitrite levels are generally the result of inadequate biological filtration: - Filter lacks sufficient numbers of bacteria (a new filter takes two or more weeks to develop colonies of these bacterial). - Filter is too small for number of fish kept. - Filter is blocked or has failed e.g. due to a power outage. - A disease treatment (e.g. anti-bacterial) has destroyed the filter bacteria. - The aquarium isn't fitted with a biological filter.
Nitrite	Ideally zero. Maximum recommended level: 0.5 mg/L (= 0.5ppm)	Nitrite affects the fish's blood cells, making them less efficient at carrying oxygen around the body. Affected fish develop respiratory stress, manifesting as gasping and laboured or fast breathing. In worse cases, they may die of suffocation. Nitrite can also damage the fish's spleen and liver.	
Nitrate	Preferably not more than 70 mg/L (= 70ppm). Tolerance to high nitrate varies considerably between fish species.	Prolonged exposure to very high levels (say 200+ mg/L) can damage the gills, kidney and liver, and impair immunity.  In highly sensitive fish species and fry, even moderate levels of nitrate (say 100mg/L) can cause deaths. Fish that are hatched and reared under high nitrate conditions may develop spinal abnormalities.	Death from 'nitrate shock' can occur when newly purchased fish (typically accustomed to low-nitrate conditions in the dealer's shop) are placed in a home aquarium that has a high nitrate level. These deaths typically occur on the second or third day after introduction. High nitrate levels: -Insufficient part-water changes -Gross overfeeding -Heavily stocked aquarium (too many fish) -High nitrate level in tap water used to fill aquarium (tap water should have no more than 50 mg/L nitrate).



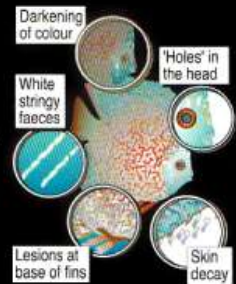
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This is a picture they never thought possible years ago. A healthy discus, living in a home aquarium and about to lay eggs on a spawning cone

Photos by the author

# Discus of the century

With the theme of '100' issues of *Tropical Fish* magazine being published this month, Chris Ingham looks at how discus and the discus hobby in general, has changed over the last '100' years

**T**he discus hobby has changed dramatically over the last '100' years. Well, actually nobody in this country even knew that discus existed until 1920, 89-years ago, even then they had only seen pictures of them. It was 1940 before live discus were seen in the flesh on English soil, with a price tag of eight pounds, which was a hefty price tag in those days, they were soon snapped up.

#### Getting to know you

With better knowledge, equipment, foods, medications and even new types (strains) of discus now available, no wonder the hobby is growing at a dramatic pace. It is also easier now to keep and breed discus because of a better understanding of their requirements. At first it was thought impossible to keep

these fish, let alone breed them, feeding was hit and miss, with keepers thinking the best food was live foods. This as we now know can be deadly if feeding the wrong kinds, such as tubiflex and bloodworms, but at first thought it sounded feasible, after all this is what Mother Nature has been feeding them on.

Yes, this is correct to a point, but when you look at what is actually in frozen bloodworm you may start to get a good idea on how beneficial the food is (or isn't). Over 94% of the frozen version is actually moisture (water!) so you are feeding your discus just over 5% of anything worthwhile, plus some frozen foods are not gamma-rayed, so will contain parasites anyway, and even if gamma-rayed it could still contain bacteria. A lot of

### DID YOU KNOW?

Discus are in fact one of the hardest fish to keep if kept in the right conditions, and will take larger temperature extremes than most other tropical freshwater fish

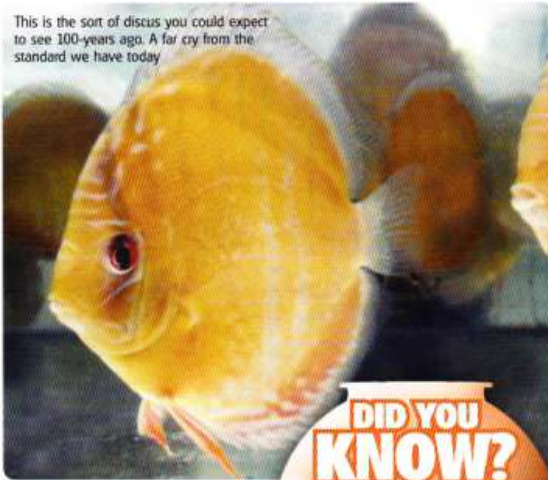
gamma-rayed food is defrosted, and then refrozen at least three times before it gets to you, which is deemed acceptable and normally causes other fish no problems at all, but discus will not tolerate such foods for long. They do love frozen bloodworm, but it is only time before a problem breaks out (usually bacterial).

This is my finding over the ▶



## Discus profile

This is the sort of discus you could expect to see 100-years ago. A far cry from the standard we have today



**DID YOU KNOW?**  
White worm, and live brine shrimps are one of the safest live foods to feed discus on

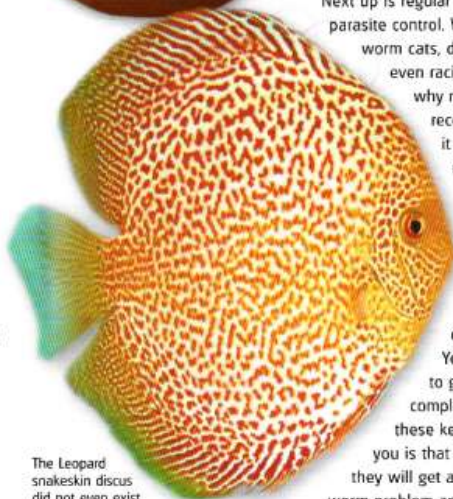
last 35-years of fish keeping, and I have proved it myself. Some discus breeders and keepers still take a chance, but with good man made safe foods available, is it worth taking that chance?

### Added support

With the support equipment, heaterstats, filters and such now available that we didn't have 100-years ago, it has made discus keeping a lot easier. One of the most important basics we have learnt is to keep the temperature up to at least 30°C/86°F, and now we have heaters that will maintain these temperatures. We also know that good quality filtration is paramount in successful discus keeping, and that discus will not tolerate ammonia for very long. So, good bacterial filtration is another top priority, along with good regular water changes of at least 25% per week, and if this can be carried out twice



The Chessboard Pigeon discus was made in the 90's



The Leopard snakeskin discus did not even exist 100-years ago



Still an old favorite of mine, a fish made in the 90's the White Dragon discus

a week, better still as it good husbandry. NB: Don't forget to clean down the inside glass of the tank as bacteria can stick to this. Another top of the trop's tip for hassle free discus keeping.

A little salt added to the tank, will also keep bad bacteria down to a safe number for your discus. Not too much, as salt will harden the water which needs to be kept soft for these Amazon fish.

### Lighting improvements

Over the years lighting has improved, but this can sometimes be too bright for discus, so if you do have strong lighting in your discus tanks, make sure they have some shaded cover to hide under if they feel threatened, or scared. Some floating plants are good for this, and will look natural, and interesting to the human eye.

### Protecting against parasite pest

Next up is regular worming and parasite control. We regularly worm cats, dogs, horses, pigs even racing pigeons, so why not our fish? It is recommended that it is done every month, although some breeders carry out this maintenance every three months, the same as other domestic animals. Yes, it is possible to get away with this completely, but what these keepers will not tell you is that at some point, they will get a bad fluke or worm problem and with the cost of some of these fish going into

**DID YOU KNOW?**  
By keeping your discus tanks at 30°C/86°F or above will control most parasite problems

hundreds of pounds, why begrudge a few pounds spent on worming products that could protect your fish and potentially save their lives?

One interesting secret we have found in the last decade is about keeping angelfish with discus. Years ago it was frowned upon to keep discus with angels, but why not, they live together in the wild, so why not in the home aquarium? But we have discovered that angelfish are more tolerant to disease than discus, and can in fact carry intestinal worms, parasites and other pests with no problem. Mixed with discus in a close system, or a small glass box, it is possible for discus to contract some problems from the angels. This is one reason why some discus keepers do not keep angels with discus, which has caused some confusion to the newcomers among us.

### Top dog

Discus have been called the king of the aquarium for years, but they should be called the king of the decade with all that has been achieved this century with them. They can be as friendly as a pet dog or cat, or be as aggressive as a cobra, but each discus will have its own individual character, just as us humans have. No doubt much more will be learnt and discovered, but for me, this is what makes discus keeping the top of the trop's.

### Conclusion

These are the main points we have discovered over the last decade of discus keeping, and no doubt more will be learnt over the next decade. The discus themselves have changed because of cross breeding, with what started off as just four strains of discus (with a fifth one just found in the wild)



### DID YOU KNOW?

Feed your discus little, but often of the right foods, and you should have years of trouble free discus keeping

Nowadays taste in discus has changed, with body shape, colour and pattern having to be perfect



### DID YOU KNOW?

Feed your discus in the same place every day, and they should get tame enough to feed from your hands. A daily head count can then be taken, and this will also give you the chance to check them up close for any problems

Although still popular, this wild discus was all we had many years ago, with just a few others to choose from

*One of the most important basics we have learnt is to keep the temperature up to at least 30°C/86°F*

we now have thousands of 'new' manmade discus of all different colours, spots and stripes.

Through selective breeding many new strains are being introduced all the time. For example, from the Green spotted Tefe Green, breeders have produced the Leopard discus. This was achieved by selecting the Tefe Green discus with the most spots, and then breeding it. From the young, the babies with the most spots were kept back and bred again. Through selective line breeding to fix the strain, this is how new discus are made. Not happy with this, someone somewhere found that

some spots were in the shape of circles - hence, the Ring Leopards were invented, then through careful selective breeding a spot was found in the centre of one of the rings and the Bulls eye Leopard was manmade. Then one day in South East Asia some white mutations were found amongst a batch of fry, these were kept back and line bred, then the Snow-White discus was born. Just to give you a few ideas of how new discus are being made, and produced now all over the world. **FIN**

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