

NOVEMBER 1993

# A & P

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# A & P

**AQUARIST & PONDKEEPER**

NOVEMBER 1993  
VOL. 58 • NO. 8

## COMPETITION



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## A PRESENT FOR YOU!

We are pleased to give you the second issue of *THE WATER GARDENER* free with *A & P* this month.

Next spring will see the spectacular launch of *THE WATER GARDENER* as a magazine in its own right... Don't miss it!

# EDITORIAL

## NEW-LOOK A & P

**O**NE of the many pleasures of being editor of *Aquarist & Pondkeeper* is receiving our readers' letters, calls and comments regarding the magazine.

It's great to hear someone say that he or she loves *A&P* because we are always willing — and able — to tackle important issues with the care, respect and thoroughness they deserve. It's equally every bit as satisfying to receive a letter or phone call from someone who has just taken up aquarium or pondkeeping and has come across one of our hugely successful **Supplements**, or one of our many 'how-to-keep-and-breed' features.

It's always flattering to receive such supportive comments, of course, and when they come, not just from the UK, but from countries as far apart as Canada, New Zealand, Chile, Papua New Guinea or Thailand, it adds that little bit of an extra touch to the compliments.

We are, obviously, very proud of our international reputation as a leading magazine in our field, and will therefore continue to bring you all that's best in aquatics from around the world. And, as from this month, we will be doing so in an even more lively, all-embracing format than ever before.

The challenge facing us has been a difficult and exciting one, especially since the way in which we've been doing things has enjoyed such widespread popularity. Yet, we believe that we have managed to present our new editorial package in a fresh, colourful, 'reader-friendly', attractive style that will appeal to all aquarist and pondkeepers, both old and

new, without compromising our customary quality in any way. In the process, we may, in fact, have raised standards even further.

You, of course, are the ultimate judges. So, whether you are just taking up the hobby, or have been immersed in it for longer than you care to remember, please let us know what you think. Write us a letter, drop us a fax, give us a call, come to our stand at the next aquatic show. We'd love to hear your views.

In the meantime, we hope you'll enjoy reading the first of our 'new generation' *A&P*'s as much as we've enjoyed putting it together for you.



John Dawes  
Editor



## NEWS • NEWS • NEWS

### Giant carp draws crowds

An enormous Japanese carp worth £2,000 has been drawing crowds at a Leicestershire aquatics centre.

The fish, a Chagoi weighing an estimated 25lbs and over 30 inches in length, is one of a collection of colourful Japanese Koi at **Ullesthorpe Garden and Aquatics Centre** at Ullesthorpe, near Lutterworth, Leicestershire, where it has already become a star attraction.

"We have had visitors from as far afield as Scotland, and the Isle of Wight to buy fish," remarked **Ian Tallis**, manager of the centre. According to Ian, people have instantly taken to the Chagoi, which is so tame that it comes to the surface to take food. "We have had a couple of offers to sell the fish, but he is one of



AND AQUATICS CENTRE, ULLESTHORPE GARDEN

the family and we would be reluctant to part with it," he added.

Ian and his partner, **Ruth**, acquired Ullesthorpe Garden and Aquatics Centre only six months ago and have already turned the purpose-built premises into a roaring success.

**Ian Tallis** feeds the Chagoi that is so tame it comes to his hand to take food at Ullesthorpe Garden and Aquatics Centre, with **Ruth Daly** looking on.

**ENTER OUR  
SUPER  
COMPETITION  
ON  
PAGE 72**

# NEWS • NEWS • NEWS

## Last Call for Supreme Festival

More than 20 years since he last visited the UK, **Dr Herbert Axelrod** will be guest speaker at this year's **Supreme Festival of Fishkeeping (5-7 November)** at Pontin's Chalet Hotel, Sand Bay, Weston-super-Mare).

The festival, sponsored by **Interpet**, has become an annual highlight of the fishkeeping calendar. This year's event includes trade displays from leading manufacturers, audio visual



THE PUBLICATIONS INC

**Dr Herbert Axelrod** — guest speaker at the Weston show.

presentations, specialist society displays, judges' seminar, the European Open Show and the FBAS Supreme Championship. Remarkably FBAS chairman



WILDFOWL AND WETLANDS TRUST

Children at Arundel, West Sussex, with the giant 12-foot dragonfly used in the launch of the 'Waterlands' campaign.

**Joe Nethersell:** "The accent of the whole weekend will be on information about fishkeeping, with plenty of opportunities to present those nagging questions to experts from the trade and hobby alike."

The full facilities of the centre are available to visitors staying for the weekend. Price is just £59 per adult, £37 for 11-16-year-olds, £25 for 6-10-year-olds, 2-5s are £10 and 2-year-olds and under are free. The price includes accommodation for Friday and Saturday nights, full English breakfast on Saturday and Sunday mornings, Saturday evening meal and Friday and Saturday entertainments.

For full details, contact **Colin Richards, Beechwood Cottage, Long Grove Wood Farm,**

**234 Chartridge Lane, Chesham, Bucks HP5 2SG. Tel: 0594 773094; Fax: 0494 772744.**

## Local Children Help to Launch 'Waterlands' Campaign

Children at Arundel, West Sussex, have provided their support to the launch of the 'Waterlands' campaign by **Wildfowl and Wetland Trust** (see **News Desk**, September 1993).

The children, aged 8-12 years, helped to build a 12-foot long dragonfly which was suspended from the ceiling, along with a huge water

droplet to which pledges to help wetlands were attached.

The Arundel campaign is part of a national scheme which aims to highlight the plight of wetlands and the fact that we cannot survive without them. "In the Sussex area we have several important wetlands, including Pagham Harbour, Chichester Harbour, Amberley Wild Brooks and the River Arun," explained **Joanne Carr**, publicity officer for the **Wildlife and Wetlands Trust** at their offices in Arundel. "The trust estimates that 80% of wetlands in England and Wales have been destroyed."

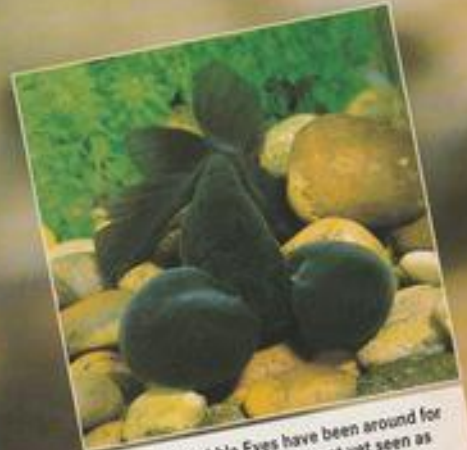
Families, farmers, schools and companies who are already taking wetland-friendly action have the chance to win a range of awards by entering the 'Waterlands Awards for Excellence'. A free pack explaining the importance of wetlands and what can be done to help save them, is available by sending a large envelope with a 50p stamp to: **The Wildfowl and Wetlands Trust, Slimbridge, Gloucestershire GL2 7BT.**

## Hampton '94 bookings

We have just received news that the **Royal Horticultural Society** is inviting applications for space at the prestigious **Hampton Court Palace Flower Show 1994**. If you would like to apply, please ring the **RHS Shows Department** for information on **071 630 7422**.



# SPOTLIGHT



All-black Bubble Eyes have been around for quite some time but are not yet seen as frequently as their golden counterparts.

MAX GIBBS — GOLDFISH BOWL, OXFORD

# Bubbling with Enthusiasm



STEPHEN SMITH

One of the more recent types of Bubble Eye, the Calico.

**Alex Stephenson** advises on a Fancy Goldfish that can reach emotions other fish are not capable of even beginning to touch.

Main photograph: Bill Tomey.

**O**f the many so-called coldwater fish kept by hobbyists, by far the most popular are Goldfish. This is not surprising, when you appreciate the vast assortment of shapes and colours which are available.

It is generally agreed there are well over 100 different varieties of Goldfish throughout the world. However, many of these are rare, and the chances of seeing them in your local aquatic shop are almost nil. This still leaves about a dozen or so types which are regularly available, with several more turning up occasionally.

Broadly speaking, the more exotic the variety, the more delicate the fish. I have often seen Fancy Goldfish recommended for beginners to "practice on" before going on to tropicals. In my view, this is entirely wrong.

There are many of the easier tropicals which are much more forgiving. In fact, I would suggest you don't try exotic Goldfish until you have at least some experience of general fishkeeping.

## Recent arrival

To illustrate what we mean by 'Exotic Goldfish', let's take a look at just one of these: the Bubble Eye.

In Goldfish genealogy, the Bubble Eye is a comparatively recent development. Said to be of Chinese origin, these fish are imported in quite large numbers and are usually easy to obtain.

Before rushing off to buy some, be aware, though, that the extreme appearance of this variety has been known to produce some extreme reactions among fishkeepers! Not all Fancy Goldfish can do this. It seems the Bubble Eye can incite emotions other fish can't hope to reach.

## BUBBLE EYE FACT FILE

- 1 The Bubble Eye is a fancy variety of the Common Goldfish (*Carassius auratus*).
- 2 Fins:
  - (i) Dorsal (back) — absent
  - (ii) Caudal (tail) — double
  - (iii) Anal (belly) — double
  - (iv) Pelvic (hip) — two, as in 'normal' Goldfish
  - (v) Pectoral (chest) — two, as in 'normal' Goldfish
- 3 Eyes have large fluid-filled sacs which are very delicate. If damaged, they will re-grow, but not to their original size. Damage of sacs can lead to infection.
- 4 Bubble Eyes are NOT suitable for ponds; they are strictly aquarium fish.

## Bubble Eye features

So what is all the fuss about? Well, the bubbles mainly; they're a bit like water bags. For those who are prepared to lose friends and wish to devote loving care on a real 'exotic', here is a brief description.

The Bubble Eye is (at least, as far as UK standards are concerned) a short, deep-bodied variety, without a dorsal (back) fin; the caudal fins (tailpiece) should be double and fully divided; likewise, the anal (belly) fins. Development of the bubbles on either side of the head, under each eye, should be even.

In earlier years, these bubbles were of medium size and fairly firm. More recently, however, they have become much larger and tend to wobble about quite a bit.

Colours for the metallic version are usually orange/gold, but others such as red

and white, and all-black do exist. As with most Goldfish types, a calico or nacreous option has also now been bred. Some of these show good colouring and are very striking fish.

## What to look for

It has to be said that Bubble Eyes are not the hardest of Goldfish. When choosing specimens, avoid anything that stands on its head for long periods. If showing or breeding is not anticipated, faults such as joined caudal fins, uneven backline, etc. are unimportant. In such cases, a strong, healthy fish which pleases you, is a good fish. Breeding stock or show specimens are something else.

An experienced Goldfish breeder will know which faults are of minor importance, and which are certain to be reproduced in the progeny. He or she will always choose physically strong stock.

One of the problems facing the British Goldfish fancier is the fact that our image of the ideal fish is rather different to the Oriental view. Bubble Eyes produced in the Far East tend to have much longer finnage and rather longer, slimmer bodies than those which are preferred by our Goldfish societies.

## Choosing good fish

Choosing fish for competition requires some knowledge of Show Standards. Armed with this knowledge, it is just possible to spot a real gem in your dealer's tanks. However, as with all Fancy Goldfish, the quality of specimens offered for sale can vary greatly. Small fish, serving the cheaper end of the market, are usually of indifferent grade, the better ones being retained and 'grown-on' by the breeders in order to obtain a better price. It is, after all, their livelihood.

Not all aquatic retailers deal in the more 'up-market' Goldfish. So, if you are a serious enthusiast, you really need to find a specialist dealer who can offer you something worthwhile.

Good-quality Goldfish, whatever the variety, are never cheap, and difficult types, where the number of good specimens obtained is very low, can therefore (understandably) command a high price. Bubble Eyes are definitely in this category.

Whatever you do, do not buy Fancy Goldfish unless you have already prepared suitable accommodation. Long fins, protruding eyes and large bubbles, are all easily damaged by sharp or protruding objects, so I'm afraid that a tankful of rocks, water wheels, and sunken chests just will not do.

# TOMORROW'S AQUARIST

BY Gina Sandford



## That time of year again!

Yes, I'm all too well aware that Christmas is just around the corner. I've been trying to come up with a few ideas for possible Christmas presents that you might like to receive or even give to a fellow fishkeeper. So, here is my early list:

### 1 Gift Tokens

Many shops now do these, and they save you the bother and expense of getting someone the wrong thing. It also means that well-meaning aunts and uncles don't buy you the wrong thing!

### 2 Books

Old favourites, but they are always worth having. I've picked three: *The Cichlid Year Books*, edited by Ad Konings. Distributed in the UK by **Animal House** or the **British Cichlid Association**, prices are: Vol I £17.95, Vols II and III £19.95 each. Each volume is complete in its own right. They have a series of short articles on different cichlids — not just Africans, but the South Americans as well — and cover biotopes (where the fish live), breeding, behavioural observations etc.

*The Book of the Marine Aquarium* by Nick Dakin, published by **Salamander**. Price £29.95. I like this book. It's easy to use, easy to understand and well illustrated. If you didn't keep marines before, you could well be tempted to do so after reading this.

### 3 Membership of an Aquatic Society.

This is probably the most useful present any budding aquarist could receive. A whole twelve months of being able to pick the brains of fellow club members, attending meetings, making use of a club library... the list goes on.

## Why me?

Why is there always a hole in the net I pick to catch my fish? I don't know how many times it's been mended or, indeed, how many nets I've thrown away as being irreparable, but it always happens. Whichever net I pick, is the one with a hole in it!

Why do I always have to evict the spiders from the fish house before Mike will go in to sort out the filters, when they are quite

happy catching the flies and mosquitoes that also inhabit the shed?



Why do I always get my sleeves wet when planting plants in the aquarium? It doesn't matter how far I roll them up — they still get wet. I swear that if I wore a sleeveless top, it wouldn't make any difference. I'd still get wet.

Why do the Tetra Tabs always spill over the floor as I remove the seal from the top of the tub? It takes ages to pick them all up again, plus, you find

some spiders under the tanks that have avoided eviction!



## U2 can experience something fishy

Have I climbed down from the heady heights of America yet? No! The momentum has been sustained by a couple more concerts over here. When you're standing, squashed, at the front of the crowd at Wembley, watching U2, the last thing you expect to see is fish — but there they were, swimming across the video screens in glorious colour — Swordtails, a Clown Loach, plus others!

Then, at Jean Michel Jarre's spectacular in Manchester, what happened? You've got it — fish! Fossil fish and what could only be described as a French Angel. These creatures get everywhere!

## Free Goldfish care guide

Interpet have just released a free guide called *Caring for your Goldfish*. Aimed at children (although I believe there are probably some adults who would benefit from perusing its pages), it gives the answers to many of the questions a first-time Goldfish keeper asks, such as: How often, and how much, do I feed the fish? When do I clean it out? Can I keep it in a bowl? And so on.

It also gives a basic guide as to what to look out for if your fish is sick. These basic guidelines will probably save the lives of many Goldfish in the

hands of well-meaning, but inexperienced, fishkeepers. In turn, it could lead to the new-comer, having achieved success with the goldfish, becoming addicted to the hobby.

Launched at the same time is an easy-to-use range of goldfish care products: **Interpet Gold — Tap Safe, Fish Safe and Disease Safe**.

With some 8.4 million goldfish in the UK, this little leaflet makes life better for many of them. Pick up a leaflet, free of charge, from your local petshop or Interpet stockist.

## Conservation and industry

Industry has a bad name as far as conservation is concerned. People are quick to slate companies for what they do to harm the environment, but slow to praise something positive.

When in Manchester, I stayed with a friend who works at a paper mill where a positive approach to conservation has been shown. This paper mill, in Darwen, reprocesses waste paper.

But, just as important from the conservation angle, all the land they own is either leased to a local farmer, or has been looked at with a view to

conserving the natural flora and fauna. They have a natural pond which supports numerous species of dragonflies and other minibeasties, as well as some wild ducks; and even the cooling water ponds have fish in them. Plus, there is a fishkeeper's dream come true in one pool — Daphnia. Lots and lots of it.

Walking around the grounds was certainly an eye-opener, in as much as it shows what can be done with a little thought, backed up by some effort.

# GROWING TIPS

BY BARRY R. JAMES

## Bog Plant or Marginal?

It occurred to me the other day that, in spite of all that is written on water gardening, there are certain aspects of planting a garden pool which still cause confusion in the minds of many of my customers.

One of these concerns is certainly the categories into which pool plants are placed for the purposes of marketing. Deep marginals, marginals, bog plants, oxygenators, floating plants, waterside and moisture-loving plants are the terms most frequently used.

The following diagram might help to clarify this point.

As can be seen, the only difference between bog and marginal is the depth of water, which is shallower in boggy areas, whereas marginals occupy varying depths.

Taller species will grow in deeper water than smaller ones, while certain plants such as *Sagittaria sagittifolia*, the Arrowhead, can grow completely submerged, have floating leaves, or grow as marginals with foliage and flowers completely emerged.

Waterside or moisture-loving

plants will not, in general, tolerate stagnant water around their roots. However, certain species such as *Oncoclea sensibilis*, the Sensitive Fern, and *Peltophyllum peltatum*, the Umbrella Plant, although needing to be planted in well drained soil, will creep down and actually grow as marginals. Bog Primulas are wrongly named and need moist, but well drained, soil to survive. They will succumb very quickly if planted in a boggy situation.

## Stargrass Tips

I had a display in the greenhouse which contained about forty 3in pots of Water Stargrass (*Heteranthera zosterifolia*). They were grown emerged and this summer flowered profusely, producing dozens of their pretty but insignificant blue flowers. Visitors never gave them so much as a passing glance. I therefore recently transferred them into the cascade aquarium display system. Immediately, they shot away, producing dense masses of pale-green linear foliage. They sold like hot cakes!

*Heteranthera* is a small genus of around fifteen species,



©BARRY JAMES

belonging to the family Pontederiaceae. They are endemic to Southern Africa and South America. Most are unsuited to aquarium culture, being of a creeping habit, frequenting the pond's edge. However, two species are excellent subjects for aquaria.

*Heteranthera dubia* syn. (*H. graminea*) is seldom seen these days. It is native to the USA, Mexico and Cuba. It grows under alkaline conditions and prospers in temperatures from 50-75°F (10-40°C).

Slightly more robust than *H. zosterifolia*, I grew it 20 years ago and had it for some years until I lost it in a tank move. The star-shaped flowers are yellow and lie flat on the water. The foliage is linear, normally bright green, but assumes delightful bronze tints in sunlight.

*Heteranthera zosterifolia* is native to Brazil and Bolivia. Emerged, the leaves are about an inch long, 1/16 in wide, with blunt tips. Submersed, the leaves elongate up to 2in in length. The stems reach a length of 15in.

It is easily propagated from

*Heteranthera* sp. — one of the Stargrasses.

stem cuttings. I have been getting very good results with the humus mixture I devised for growing Aroids, etc.

I first imported a few sacks of tropical leafmould from Malaysia. I then did a few trial mixtures using Coir fibre and peat and a fertiliser mix. The result, when mixed with laterite, produced better root and stem growth in Cryptocorynes, Anubias and Amazon Swordplants.

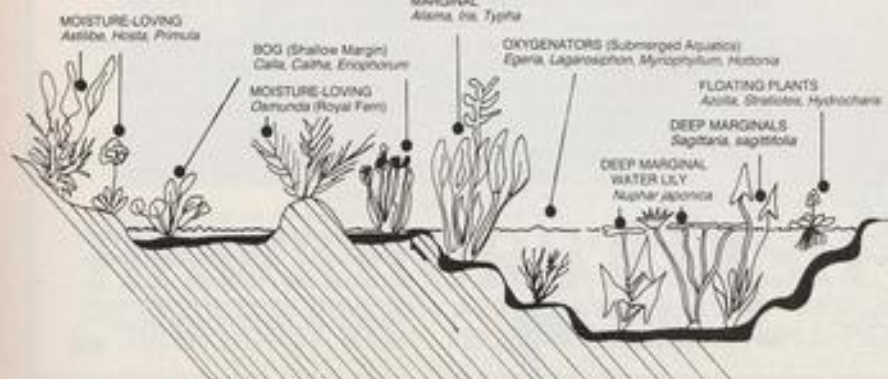
However, it is essential to use an undergravel heater with this mix. Sub-gravel filters should not, of course, be used with any substrate mix of this type.

## To pot... or not to

I get a lot of letters about the value of buying potted plants. Many aquarists complain that they are being charged high prices for potted plants which are just cuttings stuck in the pot without roots.

To my mind, the only advantage of buying potted plants is when they have been grown on in the pot in a nursery situation. Slow-growing specimens and other perennial plants, such as Cryptocorynes, *Echinodorus* (Swordplants) and fiddly dwarf plants such as HairGrass (*Eleocharis*) and Carpet Sword (*Lilaeopsis*) are best bought in pots.

Bunch plants in pots are a waste of money. It is better to buy potting kits and do your own. First, cut the stems back to clean tissue, remove the lower leaves and insert the cuttings in the rockwool. They will root in a few days.





# FISH THINKERS:

## The Early Years

**S**ince my bold (?) step in admitting in an *A & P* feature a little while ago that I talk telepathically to my fish, I have become something of a curiosity among the group of people that I know (or those who admit to knowing me). I have also come in for some criticism and mockery, though that, I expected.

But many people seem to think that this 'talent' to communicate with my fish is a unique gift... and also, that it is probably all in my mind. The latter is, of course, true, in that the mind is where all thoughts are transmitted from.

I had thought that I first became conscious of fish telepathy only recently with my Oscar and *Polyporus* experiments, but thinking about it, I realised that it goes back very much further than that.

### Early memories

I recall that, as a child of about five, I came home from school one day and my mother said to me, "There's something on top of the fridge for you from Grandma and Grandad". This was an exciting prospect because, as we all know, anything bestowed upon a grandchild by doting grandparents was sure to please. So what was it?

I was brimming with excitement and anticipation. My grandparents had been blackberry picking along the banks of the Manchester Ship Canal and that should have afforded me some clues. I carefully reached up to the fridge and there was a small round margarine tub filled with — no, not blackberries — but water.

Now, I should explain that this was at a time when my fishkeeping activities were confined to keeping a water flea in a yogurt carton of water. So, if you can imagine, this margarine tub was like acquiring a four-foot aquarium to add to an existing two-foot tank. The excitement

**Jason Endfield reveals a second chapter of fish telepathy extending back to his earliest days as a fishkeeper, and urges us all to 'commune with Nature'.**

grew as I looked in and saw movement.

But these were not water fleas, these were fish! It was such a thrilling discovery that I nearly dropped the whole thing onto the kitchen floor.

There were about five of them, including fry of some unknown species. They remained there for a few days, receiving little food, but a certain amount of well-intentioned, though ignorant, attention.

But all was not well. I felt sad for these young fish, destined to live a very short life, in a very small margarine tub, in very brown canal water that was growing browner.

The question is, why did I feel sad? A five-year-old surely isn't capable of understanding the scientific problems of maintaining fish in such conditions. Yet, I did feel sad for them. Indeed, I felt sad for them while the adults around me largely remained unaware of their plight.

Actually, it's interesting to note that the growing 'green' movement that we are witnessing today has a remarkably high proportion of young members; we would do well to listen to them.

Anyway, as I was saying, I was aware of the need to take action over the matter of these particular little fish, so I decided that the next weekend I would take the fish with me and give them back their freedom and a chance to experience the wonders of life for themselves, anglers permitting...

For the journey, a perforated lid was

placed on the margarine tub and we arrived at the Manchester Ship Canal on a sunny autumn afternoon. All five of the little fish had somehow survived nearly a week of hell, apparently unscathed.

Whether my grandparents were hurt or not by my rejection of their thoughtful present, I'm not sure, but I think they understood my motives, and, anyway, their gift had already watered the fishkeeping seed that was, by now, firmly planted in my mind. We, all three of us, crouched around as I carefully tipped the contents of the margarine tub into a quiet stretch of the canal.

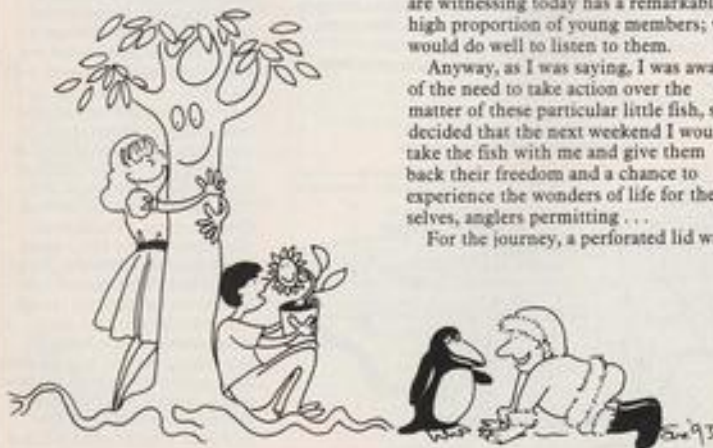
### Welcome relief

We could barely see the fish swim away, but somehow we could 'feel' their freedom; I did certainly — a tremendous sense of relief came over me and I smiled a big smile; it was like someone loosening a big chain around me. I really felt it and I believe it's something we've all experienced — like the feeling one gets when releasing a butterfly from a spider's web. And that, as I see it, is being 'on the same wavelength' as nature.

The sadness I felt when I saw the little fish in the tub, and the great relief as they were released into the canal again, those feelings are, I believe, an effect of direct communication with the fish. I see no other explanation. I felt the fear, then the relief, that the fish were experiencing.

So, there we are. Many call me crazy (though I'm not), and I'm glad that I haven't lost the ability to 'feel' for nature — which is something that many people seem reluctant or unable to do... perhaps, they've just forgotten how. It is something that we, as a species, need to experience, and if you have forgotten how being at one with nature feels, then please rediscover it for yourself.

Lots of people are doing just that: some go out and hug trees, many talk to their plants, a few trek to Antarctica to commune with penguins... all of which make mere communicating telepathically with fish seem rather tame...





# FROGS AND FRIENDS



by JULIAN SIMS

## Mutant freshwater turtles?

At the end of a recent weather report on ITV, Siân Lloyd stated that visitors to the Mediterranean region of southern Europe were being bitten by turtles which had been released with the passing of the 'Teenage Mutant Ninja Turtle' craze.

At the time of their popularity, I highlighted the potential problems involved with the impulse purchase of hatchling Red-eared Sliders (*Trachemys scripta elegans*) in the December 1990 edition of **Herpetology Matters**.

Not surprisingly, the warm climatic conditions of southern Europe have favoured these aquatic reptiles, and those unwanted animals which have been irresponsibly released into the wild have grown to maturity.

However, I find it hard to believe that these freshwater reptiles have invaded the saline Mediterranean Sea, where they bite and torment swimmers! Time to separate fact from fiction.

With the intention of sorting out this apocryphal tale, I should be very pleased to hear from A & P readers who visited southern Europe this past summer and who saw (or were bitten by) free-ranging Red-eared Sliders.

## Reptiles: the next generation

There are, basically, two ways by which female reptiles form the next generation, and both methods require a good supply of calcium.

**[1] Oviparous** females lay eggs in which the embryo has not started to develop, or is only just beginning to form. This method is predominant among alligators, crocodiles, tortoises and turtles (freshwater and marine). Many species of lizard and snake also lay eggs.

**[2] Ovoviviparous** animals produce an embryo or embryos which develop **inside** the female. However, they remain separated from her through most, if not all, of their development, by egg membranes. This method occurs in some species of snake and lizard.

With the first method, the outer shell of the egg, and the internal yolk which nourishes the developing embryo, both contain a high proportion of calcium. With the second method, the developing embryo also derives nourishment from a yolk — NOT

directly from the mother. Therefore, in both methods, the female reptile needs a good supply of calcium from her diet to make each yolk mass.

The number of eggs or offspring produced by a female reptile at any one time is variable and differs between species. For example, quite a lot of variety occurs among the egg-laying members of the snake family Boidae. Female Burmese Pythons (*Python molurus bivittatus*) produce up to 100 eggs at a time, whereas Children's Pythons (*Liasis childreni*) from Australia lay much smaller clutches, usually only containing from eight to 10 eggs.

Among the livebearing members of the Boidae, there is also a great deal of variation in the number of offspring produced at a time. A female Boa constrictor can release between 20 and 50 young snakes, whereas a female Rosy Boa (*Lichanura trivirgata*) produces only from four to 10 baby snakes at a time.

Other livebearing reptiles also show great variation in the number of offspring they produce. Female Solomon Islands Skinks (*Corucia zebrata*), which can grow to the substantial length of about 70cm (27½in), give birth to only ONE very large offspring at a time. By contrast, female Eastern Garter Snakes (*Thamnophis sirtalis*) from North America may release more than 60 baby snakes at a time.



Egg-laying is the predominant method of reproduction in reptiles.

Are these really 'mutant' freshwater turtles out to attack tourists in southern Europe?

**Herp Fact/24-Hour Folklore**

Lizards belonging to the genus *Phrynosoma* are commonly known as spiny-tailed lizards. They are found in the southwestern United States and Mexico. They are known for their ability to absorb water through their skin. Most are nocturnal.

This nocturnal habit has resulted in the development of adaptation and folklore among many of the human inhabitants of the area.

Some of the local residents believe that if one of these lizards jumps into a person's eye, they will see for 24 hours. Others are convinced that if someone is bitten, then the person will die within a day.

For those reasons, the lizard is known in the Caribbean region as 'TWENTY-FOUR HOUR' or 'ONE DAY'.

Positive reports are welcome by humans.



## FASCINATING FISH FACTS SEX-CHANGE SPECIALISTS



This adult male Lightning or Yellow-cheek Wrasse (*Halichoeres cyanocephalus*) was once a female.

In Clownfish, all juveniles/adolescents in a group develop into young males, but one — the largest or most aggressive — then becomes a female. Should this female die, or be removed in some way, the next male in line changes sex (sometimes in as little as a few hours) and becomes a female . . . and so on. Such fish are known as protandrous hermaphrodites.

In many Wrasses and Groupers, similar changes occur . . . but the other way round, i.e. the sequence is juvenile/adolescent female → male. Such fish are known as protogynous hermaphrodites.

Remember the enormous Napoleon Wrasse that took hard-boiled eggs from the diver's hand in BBC TV's *Reef Watch*? Well, difficult though it may seem to accept, that massive, butch male wasn't always what he is today — he was once a female.

As far as Sea Perches are concerned, some can be male and female at one and the same time — being even capable of fertilising their own eggs. How's that for adaptability? Such fish — apart from being rather exceptional — are known as functional hermaphrodites.

John Dawes

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# Keeping and Breeding:

Mary Bailey shares her tips and thoughts on this beautiful dwarf South American jewel.

Photographs by the author.

## THE BLUE APISTO

Many aquarists are deterred from keeping cichlids by their size, their territoriality, their destructiveness, and other bad habits which, to some of us, are all part of their charm. But there are some species which can be kept in a very small tank, which would have to labour mightily to uproot plants, and which couldn't smash a heater even after a Charles Atlas bodybuilding course!

These miniature species, the true dwarf cichlids, can be kept and bred in an 18 x 10 x 10in (45 x 25 x 25cm) tank of their own, or add extra interest to a peaceful community. I refer to the South American Apistogrammas. One of my favourites from this genus is the Blue Apistogramma, *Apistogramma trifasciata*, which at present seems to be making a welcome re-appearance in the hobby.

### Basic statistics

My books tell me that this species can attain 6cm (2.5in) total length in males, but I have never seen one top 5cm (2in); females are appreciably smaller, perhaps making  $\frac{2}{3}$  of the length of the male. Breeding is possible (and probable) at even smaller sizes, and my current pair surprised me by clear signs of breeding when the female measured a mere 2cm (0.8in) and actually producing fry a mere three weeks (and infinitesimal amount of growth) later.

Although the species is so small and peaceful towards other fishes, it must be said that males are very intolerant of each other, and even in quite a large tank will fight, often to the death. This is typical of many Apistos, so the answer is simply not to try to keep males together.

### Little beauty

*A. trifasciata* is not only small and peaceful, but it is also a very beautiful little fish. There are several slight colour variations, depending on geographical origin (see below), but the basic colour scheme is an iridescent, almost turquoise, blue for males, and a golden yellow for females.

The head area in males may be a greyish or yellowish colour, particularly if the fish is subdued for some reason, but when in the mood to display, whether to the female or my camera (I am not sure if my male was simply showing off, or trying to see me off!), the blue tones predominate and take on a glorious iridescence.

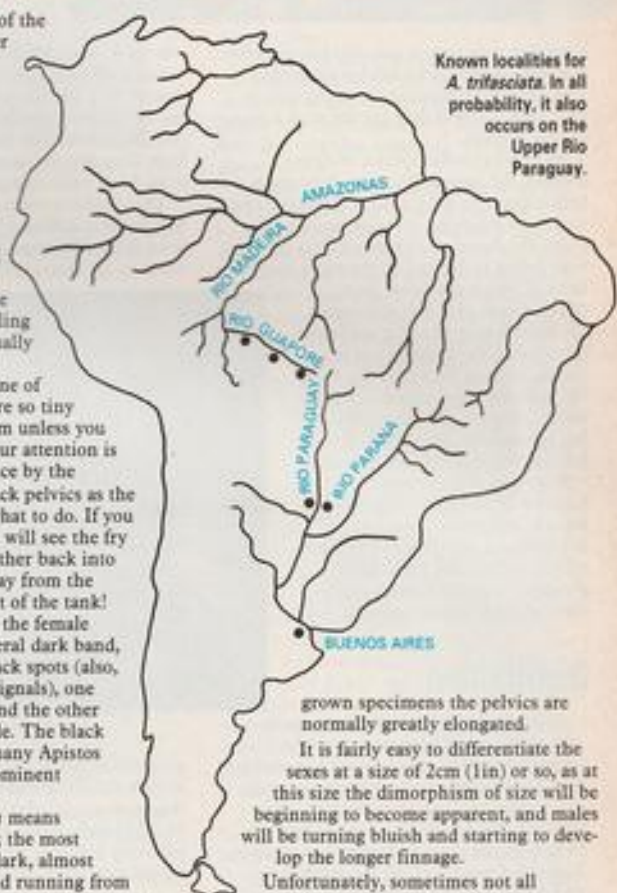
Likewise, the gold of the female becomes bolder when she is leading fry, and at this time her pelvic fins turn a sooty black. This is a feature of many *Apistogramma*.

Some years ago, a series of interesting laboratory experiments with cardboard models demonstrated that the colour scheme is important in signalling to the fry. This is actually quite apparent to the aquarist who breeds one of these fish — the fry are so tiny that you don't see them unless you look very hard and your attention is drawn to their existence by the twitching of those black pelvics as the mother tells her fry what to do. If you then peer closely, you will see the fry themselves follow mother back into the breeding cave, away from the nasty monster in front of the tank!

During brood care, the female also loses her mid-lateral dark band, retaining only two black spots (also, probably, important signals), one on the central flank and the other on the caudal peduncle. The black eye-stripe typical of many Apistos also becomes very prominent at this time.

The name *trifasciata* means "having three bands"; the most obvious of these is a dark, almost black, mid-lateral band running from the snout, through the eye, to the caudal peduncle, while less obvious is a fainter band along the back at the base of the dorsal. These two bands are seen in many Apistos, but the third band in *trifasciata* is, as far as I know, unique — though there may be other undiscovered species with this distinctive character. It is a dark streak running from the pectoral insertion diagonally backwards and downwards to the beginning of the anal fin, and it is, in my experience, always visible to some extent, even in maternal females.

In shape this is one of the slender, elongate species, somewhat similar to *A. bitaenata*, the Two-lined Dwarf Cichlid, and *A. cacaoides*, the Cockatoo Dwarf Cichlid, in general outline, but with a more rounded tail in males. As in these species, males tend to have more elongated dorsal and anal fins than females, and in full-



grown specimens the pelvics are normally greatly elongated.

It is fairly easy to differentiate the sexes at a size of 2cm (1in) or so, as at this size the dimorphism of size will be beginning to become apparent, and males will be turning bluish and starting to develop the longer finnage.

Unfortunately, sometimes not all males differentiate out at this size; some retain the appearance of females as long as there is a 'superior' male in the tank. This is probably a defence mechanism, as taking on full male characters would be extremely provocative and render the weaker male liable to a vigorous attack. Such behaviour is known from many types of cichlids in captivity, where territorial space is limited.

In some *Apistogrammas*, however, there is a most interesting phenomenon, the existence of 'sneak males'. These are males which, in the natural habitat, retain the appearance of females and live in, or on the periphery of, the territory of a fully developed male with several females (a 'harem'). They thus secure themselves from attack by the territory holder, achieve a degree of protection by him, and sneak in to fertilise his females at the first oppor-



Tail-beating in Apistogrammas (in this case by a Two-lined male) can express either extreme dislike . . . or extreme passion!

tunity! *A. trifasciata* is one of the species for which such behaviour has been reported. The discerning aquarist should be able to spot such males as they are not such a pure gold as females.

As in many other species of *Apistogramma*, the lappets (the tips of the membranes between the fin rays) of the anterior dorsal are extended in males, and in *trifasciata*, the degree of this elongation has been found to depend on the water conditions in which the fishes were raised. Given very soft acid water, the lappets may extend a centimetre or more above the tips of the spines, curving back over the fin. If the male has been reared in harder water, however, the lappets are far less spectacular. My male is about halfway between the two extremes.

Provision of the correct (soft and acid) water during rearing also leads to enhanced colour, so although it is possible to breed this species in hard neutral/slightly alkaline water, the correct conditions produce a more splendid fish.

## Distribution

Some Apistogrammas are apparently very restricted in their natural range (though it may be that it is our knowledge that is restricted), being known from only one or two small pools or streams somewhere in the Amazonian back of beyond. Others are far more widespread: *A. agassizi*, Agassiz's Dwarf Cichlid, for example, is found all along the main stream of the Amazon.

*A. trifasciata* goes one further, being found in two river systems, the southward-flowing Rio Paraguay which meets the sea at Buenos Aires in Argentina, and the Rio Guapore, a tributary of the Rio Madeira which, in turn, is an affluent of the Amazon. It is thus the species with the widest known distribution.

The two river systems are separated by a major watershed, and the implication is that this is an old species, evolved before the geological activity which created the river systems we see today.

It should not come as a surprise to learn that there are several different colour types from different parts of the natural range; what is more surprising is that the two totally isolated populations in the two systems have remained so similar as to be,

even now, considered a single species.

Some scientists have described subspecies (*A. t. horridschultzi*, *A. t. maculiventris*) but the latest thinking on the subject is that these do not, in fact, differ sufficiently from the type specimen (Holotype) to be considered valid separate taxa.

The extensive range of this species may well include different biotopes, but reports from the wild suggest that it prefers calm water up to 50cm (c 20in) deep, with dense



A well-coloured male.

plant cover; water chemistry was measured as very soft, with a pH of about 6, while temperature varied from 23-25°C (c 73-77°F) early in the morning, to considerably higher at midday as the preferred waters were often exposed to full sun.

## Aquarium care

The above should give us some useful clues to the ideal set-up for these fishes, but I am pleased to say that they are quite happy to live and breed at about 25°C, so it is not necessary to fiddle with the temperature in order to achieve breeding success. Nor is it necessary to have vegetation so thick that the fishes are rarely, if ever, seen. As already mentioned, however, correct water chemistry is important, albeit not essential.

I have found that my 'standard Apisto set-up' works very well for this species. This consists of an optional backdrop of dense plants, with more open area in front, with small flowerpots for hiding places/breeding caves. The substrate is fine hardness-free gravel, of a grain size small enough for the female to be able to dig; this is a most important feature, as we will see later. Filtration is by air driven under-gravel with a very gentle turnover rate.

The caves are arranged so as to have only a small opening, and plant (real or plastic) is positioned close to each entrance; this serves as a nursery area for the fry. I have found that, given a choice, female Apistos will pick a cave with such a plant in preference to one without.

Maintenance is minimal, with small water changes at about fortnightly intervals. Plant detritus is allowed to accumulate; it may be unsightly, but it is what happens in nature, and provides a source of nutriment for the fry, which saves an awful lot of fiddling around trying to culture infusorians!

## Territorial provision

If several females are to be kept, then each should have a territory about 30cm (12in) across, with a cave at its centre; a pair can be kept in a 45cm (18in) or even a



A female Blue Apisto guarding four-week-old fry which, even at this stage, are so tiny as to disappear into the background!



Male Blue Apistogramma — not at all sure of the camera. Note the dorsal lappets, very long pelvic fins and diagonal stripe on the belly (see text for further details).

38cm (15in) tank. When introduced, they will normally explore and quickly settle in, with a certain amount of territorial behaviour between individuals (male to female, female to male, female to female).

This may involve frontal threat, or 'tail-beating', where one fish (usually the male) positions itself in front of the other and delivers a hefty beat of its tail to the water. The recipient of this display is visibly buffeted by the shock-wave. This is the characteristic *Apistogramma* method of expressing both extreme dislike and extreme passion!

Normally the fishes will sort themselves out amicably within a day or two, with the only disharmony being the occasional threat display when two females meet on the boundary between their territories.

## Breeding

The next stage is to bring them into breeding condition, and here diet is very important. They will take a certain amount of flake and prepared foods, such as beef-heart, but one has only to compare their picky appetites for this type of food with the relish for live or frozen pond foods, or finely chopped earthworm, to realise what is best for them, both physically and psychologically.

Females are small enough to be interested in micro-worm, which saves it going to waste if you have no fry but want to keep a culture on the go, just in case.

For reasons unknown to me, my fishes almost always seem to spawn when I'm not watching (annoying when you are a keen observer and photographer!), usually first thing in the morning while I'm feeding the more vocal members of the menagerie and trying to bring myself round with coffee. If I alter my routine to catch them in the act, they go all coy and don't spawn at all, so I live with the frustration.

With my Blue Apistos, as with almost every other Apisto I've bred, the first sign that spawning has occurred is a little pile of gravel half (sometimes totally) blocking the entrance to the female's cave. This is

the spoil from a small pit dug to catch the fry when they hatch and drop from the ceiling of the cave (where the eggs are laid), and it is positioned to reduce the entrance size and keep predators out. It also usually excludes the male, who has to resort, once again, to tail-beating to fan his sperm into the cave so that the eggs are fertilised.



All Apisto fry are tiny (these are *A. nijsseni* being reared away from a fry-eating mother).

Females often have to dig themselves out again when the fry are free-swimming! It is therefore vital that the gravel is fine enough for this digging to be feasible, otherwise the female may eat the eggs, instead of tending them.

## Fry rearing

About eight days after spawning, the female will re-appear, now with those jet-black twitching pelvic fins that tell you to look for fry. These are very small, only a couple of millimetres long, and normally visible only when they move to follow mother. A brood of 30-40 is a good size, though up to 60 or so may be produced by a large female.

Initially, they will feed among the leaves of the 'nursery plant' and in the accumulated rubbish on the bottom by the cave

entrance. After a few days, the female will start to take them for excursions to other rubbish heaps, but they are normally taken back to the safety of the breeding cave at dusk.

Blue Apistogramma females are very good mothers who will tend their fry for weeks on end; males do not normally play any part in this. It can happen that the continuing proximity of a female which shows no interest in spawning may result in hostility towards her, especially in a very small tank with no other females to distract him.

This can be circumvented by removing the male, or by removing the fry after about two weeks. Given a good diet, the female will ripen again after about 7-10 days and a further spawning will then take place.

I firmly believe it is important to let the fry be reared by the female for at least a couple of weeks, as fry reared away from their mother (whether artificially hatched or removed as soon as free-swimming) subsequently seem to lack the correct brood-care instincts and frequently eat their eggs.

It must also be remembered that a female would normally produce only one or two broods in a breeding season, and to expect her to keep on breeding — although she may do so under optimum conditions — is to stress her unnecessarily and probably shorten her life. So you may wish to remove the male instead, after the second brood has hatched.

On one such occasion, I was horrified to find the female merrily eating some of her fry after the disturbance of my removing the male. My chances of removing the rest, even with a pipette, seemed minimal, so I decided to hope she would stop of her own accord. As I watched, I realised what she was actually doing: she was eating only those who had ignored her signal to sit on the bottom during the disturbance, and the tight little shoal of obedient fry were left untouched. An interesting case of survival of the fittest!

The fry are slow-growing, even once they become large enough to take newly hatched brine shrimp and micro-worm at an age of about two weeks (after becoming free-swimming). It will normally, even on a diet rich in live foods, take them at least six months to reach 2cm (1in) in length — but that is not really bad going when you consider they are then almost large enough to breed themselves.

As you will probably have noticed, I am quite a fan of this little fish. I am sure you too will find them an interesting and rewarding addition to your aquarium if you decide to try them.

## CICHLID INFO

For membership details of the British Cichlid Association contact Howard Barnfather, 100 Keighley Road, Skipton, North Yorkshire BD23 2RA. Tel: 0756 794980.

# WRITEBACK

## Welsh show woe

Having seen various advertisements for the recent Welsh Open Show, run by C.N.A.A. (Cymru National Aquarists Association), we travelled the 60 miles from our home in Bristol to Newport, paid £6.50 in bridge tolls, £2 to park and £1 each to enter the show.

This was on the Saturday (the show was advertised as a two-day event). Imagine our disappointment when, having arrived at the venue and paid to go in, we were told that the show proper was not until Sunday.

Why advertise a two-day event when the only demonstration on the first day was a man eating fish and chips while making glass tanks? Further, many of the companies who advertised in the show catalogue never bothered to have a stall at the event, not even a shop that is only two miles down the road from the show venue.

We did not return on Sunday.

**M Dewfall**  
Bristol

## C.N.A.A. comments

We wish to apologise to M Dewfall and, indeed, anybody else who was misled about the facts regarding the Open Show.

We had, in fact, already recognised our mistake in not emphasising that the show itself would be on the Sunday, but telephone numbers were printed on the advertisements and details could have been sought in advance.

As well as a tank-making demonstration on the Saturday, aquarist society members had set up a number of display tanks, while fishkeeping equipment from days gone by was also on show. Dr David Ford was on hand with the 'Aquarian' Advisory Service stand and he also gave lectures throughout the weekend on 'Fishkeeping Around the World'. In addition, Shaun Yallup of Ocean Aquatics was in attendance, supplying lectures on the art of growing aquarium plants.

The shops referred to in M Dewfall's letter were all invited to the show, as were many others, but they declined, opting instead to support the event with advertisements and sponsorship. Top Top Aquatics did actually open

## BIOPLAST LETTER OF THE MONTH

### Natural fish – not runts

I write with reference to your photograph of Short-Bodied Kissing Gouramis as seen at Aquarama '93 in Singapore (A & P, September '93, page 25).

These fish remind me of 'Parrot Cichlids', mutants which are offered for sale by 'businessmen'. In my opinion, these breeders are certainly not aquarists.

Hobbyists should be encouraged to breed natural species, and actively discouraged from breeding hybrids, especially forms that can be called 'runts'.

Promotion of endangered species is not only something I believe in, it is something I actually practice. For example, my son Gavin and I have bred the livebearer *Phallichthys icto* and given away the fry to other aquarists in our club (Solway



JOHN DAVIES

AS) to continue the line.

These are the kinds of species you should photograph and publish, rather than hybrids or runts.

**John Cowan, Hon Sec,**  
Solway AS, Dumfries,  
Scotland

The 'offending' Short-Bodied Kissing Gouramis featured in September's issue of A & P.

Thank you, John, for your forthright views. I wonder what other readers feel about short-bodied fish and other fancy varieties. Drop us a line. If your letter is selected as the BioPlast Letter of the Month, you will receive a minimum of £30 worth of top-quality BioPlast products from BioPlast (UK) Ltd (Tel: 0535 630230).

on the Sunday, especially for the show. As M Dewfall points out, this shop is only two miles away.

We do appreciate that mistakes were made, but we are, after all, only hobbyists ourselves, not professional organisers. Many meetings were attended by the committee at various venues in Wales, and much time and many miles were given freely by all, for the love of our hobby.

On a brighter note, we have received a lot of praise for the weekend, which was put together with painstaking effort, with no guidance to follow, by a committee working together for the first time.

For and on behalf of the  
C.N.A.A. Show Committee  
**K Durrant (Mrs)**  
Show Secretary

## 'Waspish' SAF thanks

We, the members of Washington Aquarist Society and Pondkeepers (W.A.S.P.), would

like to thank the organisers of SAF '93, and all other societies who exhibited at the Festival, for helping us after our accident on the M74 en route to Motherwell.

No one was injured in the accident – other than our Dragon(!) – and a good time was had by all who attended SAF.

**M A Jacques W.A.S.P.**



DAVID FORD

**Bruised . . . but happy to be at SAF.** This is Washington's Dragon, complete with Scottish 'bandages' – scarves and ribbons – to hide the scars sustained on the way to the show. (See also SAF's 21st 'Friendly' Show elsewhere in this issue).

# NEW FIGHTER

## FROM BORNEO



Pair of *Betta dimidiata* (male above).

**Steve Jones** introduces a new, delightful, nosy(!) and peaceful relative of the Siamese Fighting Fish. Photographs by the author.

Last year a group of Labryinthfish fans from the Yorkshire section of the Anabantoid Association of Great Britain visited Germany for one of the joint British/German Anabantoid shows that are becoming a fixture in the 'Labryinth-fishkeeping calendar.

While there, we found some very unusual Bettas (Fighting Fishes) measuring only some 3cm (1.2in) in standard length; this is the length from the snout of the fish to the base of the caudal (tail) fin. The dealer had named them *Parosphromenus deisoneri*, i.e. Liqorice Gouramis, but we knew that they were certainly not this. We therefore obtained 20 specimens between us and brought them home. We were very pleased when they all survived the long mini-bus and ferry trip home unscathed.

Since the dealer had been keeping his fish in brown water, we assumed that soft acid water conditions would suit this species. This supposition has, in fact, turned out to be correct.

We now know the true identity of this Fighter; it is *Betta dimidiata* from Borneo. It is a peaceful and beautiful *Betta* which is very curious (nosy!) and does not appear to be as shy as some other Bettas.

Both males and females are slim-bodied fish, the males possessing elongated fins.

The normal body colour is a rusty brown

with, sometimes a strip, sometimes a blotch, one changing to the other with great frequency.

## Courtship coloration

To our delight, soon after we started feeding our fish *Daphnia* and bloodworm, the females fattened up with eggs and the males began their courtship displays.

Males have a large red throat pouch which they can extend at this time, giving them the appearance of being 'all head'. During courtship, their bodies also become a lovely chestnut red/brown colour and each scale develops a bright blue dot. There are also blue scales on the operculum (gill cover).

The caudal and dorsal fins become patterned and outlined in white, while the anals and pelvics (ventrals) have bright blue edges to them.

Finally, a bright red ring develops around

the eye, helping make courting males particularly colourful when compared to the females, which remain very drab.

## Spawning

We discovered that *B. dimidiata* is a community spawner.

We placed our fish in a 'species' tank measuring 24 x 12 x 12in (60 x 30 x 30cm), with the temperature set at 25°C (77°F). Planting was sparse, but floating tubes were provided (as for other Anabantoids), as well as other hiding places.

Our Fighters did not seem bothered about other fish once spawning had begun. They spawned at the bottom of the tank, in and around a plant pot laid on its side.

In the first pair that spawned, the female kept picking up the eggs in her mouth and repeatedly spitting them out in front of the male until he had taken them all into his mouth. She actually seemed reluctant to let him catch the eggs, not giving him a lot of time before she, herself, re-caught the eggs she had just spat out, and once more re-spawned them out at him.

The female's role was over once spawning had been completed. In fact, she was actively kept away by a smaller male who seemed to us to have taken on the task of protecting the brooding male.

He would keep all other fish away by flaring out his gill covers now and again while, at the same time, maintaining very close contact with the brooder.

So, even if the female had wanted to guard her mate — as happens in some other Anabantoids — she was not allowed to by the small protective male.

## Rearing the fry

Going by our experience with the Painted Fighter (*Betta picta*), we expected the incubation period to last between 11 and 14

Spawning underway. Note that the male (the larger fish) is already beginning to show the brood pouch.





days. Therefore, on the eleventh day, we removed the brooding male to a smaller tank. A few hours later, he spat out 25 fry.

These fry were about the same size as those of *B. picta* (around 4mm — c 0.2in) and we were able to feed them on newly hatched brine shrimp and microworms.

By the time they were two months old, they had grown to around 2cm (0.8in); at four months they were 3.5cm (1.4in) long. The first batch of fry are about six months old at the time of writing. The males are now approximately 5cm (2in) long and the females 3.5cm (1.4in).

A subsequent spawning from this same male yielded 50 fry after 12 days' incubation.

### 'Comparative' spawning

A fellow member of our group, who had kept a single pair of fish, found that they behaved quite differently during and after spawning.

He kept them in an 18 x 9 x 9in (c 45 x 23 x 23cm) tank with floating Crystalwort (*Riccia*) and a single cave provided for cover. The lower half of the tank was blanketed with broad-leaved plants, but provided 'open' spaces below the leaves. The temperature was kept between around 24 and 27°C (c 76-80°F).

Spawning took place at the rear of the tank in the open, but under the shade of the broad-leaved plants.

### Protective female

The female played a dominant role throughout the spawning, even protecting the male from the pair's own reflection! She took things to the point of tormenting the male by spitting out eggs for him to collect, although his mouth was completely full and incapable of accommodating any more eggs. These surplus eggs disappeared later so, presumably, the female ate them.

This female never left the male's side, so she was removed after nine days, just in case she attacked the fry when they emerged.

After 11 days, the male was actively swimming at the surface; this is typical behaviour in mouthbrooders and generally

indicates that the release of fry is imminent. Later that day he did, indeed, release 30-40 babies.

### DIMIDIATA FACT FILE

1. *Betta dimidiata* was first discovered by Tyson R Roberts in 1976. Some specimens collected then were presented to the Zoological Museum in Java.
2. Tyson R Roberts described and named the species *Betta dimidiata* during his next expedition in 1989. He described the fish as having very elongated fins and intense coloration.
3. The type locality is forested area in Kapuas (Borneo).
4. It is believed that the species is likely to become endangered if too many specimens are taken from the wild.
5. Sizes quoted for *B. dimidiata* by the Anabantoid Association of Great Britain are: 7cm (2.8in) for males and 5.5cm (2.2in) for females.

### Reference

Donosco-Buchner, Robert (1993). Ein Zwerg unter den Maulbrütenden Kampffischen. *Der Makropode* pp 30-32 March/April.

### USEFUL ADDRESSES

1. Anabantoid Association of Great Britain (A.A.G.B.),  
Tim Groom (Secretary),  
12 Pinefield Road,  
Barnby Dun,  
Doncaster,  
Yorkshire.
2. Europäischer Anabantoid Club (E.A.C.),  
Heinz Saddey (Chairman),  
Düsseldorfer Strasse 21,  
6090 Russelsheim,  
Germany.

Male exhibiting the red brood pouch. Note the ventral region of the second (protective) male just visible above the brooding male (see text for details).



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# SEAVIEW

BY GORDON KAY

## Tank rules

When starting a marine aquarium, give as much thought to the actual container — the tank — as you do to any other piece of equipment. Unless you have an unlimited money supply and can afford to change your aquarium whenever the whim takes you, your tank will be with you for a long time.

First and foremost, you should buy the largest aquarium that you can (a) afford, and (b) site easily in the space you have available. There are several reasons for this, chief among these being the fact that it is easier to maintain water quality in a large tank, as changes take place far more slowly than in a small one.

Also important is the shape and design of the aquarium. There are now hexagonal, octagonal, triangular and trapezoidal designs available; but although these may look attractive, they could well have inherent flaws in relation to your requirements. For instance, a tall slim aquarium may hold the same amount of water as a long shallow one with the same dimensions, BUT the surface/volume area will be poor by comparison, so heavy aeration will be necessary.

Also, if you're planning to keep invertebrates, punching sufficient light down to these will create problems and will be far more costly in a deep aquarium.

Some weird shapes also suffer from distortion because the panels are angled in such a way that you can never get a true picture of the animals in the aquarium. So, the moral is, think long and hard before parting with your cash.

## Pregnant release

On the subject of Public Aquaria, we recently received a news bulletin from Nausicaä, a public marine aquarium in Boulogne, France.

Ten 'pregnant' Conger Eels from Nausicaä have been released into the Mediterranean near Toulon. Members of the aquarium's staff went south with the eels, which had been in captivity at Boulogne for three years.



Conger release underway.

They had been housed in conditions which reflected their natural environment — an aquarium containing rusting pipes and a shipwreck-like infrastructure, in an attempt by Nausicaä to show how underwater life can adapt to man.

It is hoped that the released Congers will boost the population in their natural habitat by producing between three and eight million eggs each.

Good stuff this! I think that places like Nausicaä should be encouraged. So, next time you're driving over to France, take time out to have a look. You'll find Nausicaä on Boulogne's sea front.

## Knock-out experience

Probably in keeping with some of you, I've never thought very much of public seawater exhibits in Britain. However, people have long been telling me how good the Sealife Centres — which are dotted all over the place — are.

Probably because of apathy, I

## SNIPPETS!

1

80,000 cubic miles of seawater evaporate every year. This is carried inland as clouds to fall again as rain and snow.

2

Next time you're on the beach, pick up a handful of sand. Chances are you'll be holding over 250 million grains.

3

We've all seen Jellyfish washed up on the beach, but did you know that the largest ever recorded was 39 metres long? That's longer than three tennis courts!!!

4

Next time you're clambering over rocks to look into rock pools, just consider this. All those limpets each have almost 2,000 teeth.

5

The longest ever recorded Bootlace Worm was 55 metres long. I've no idea how many tennis courts that's longer than.

6

Over 2,000,000,000,000 tonnes of new Phytoplankton grows in the sea every year. Is that 2 zillion or 2 trillion? I never was very good at sums!

had never bothered to go and see for myself. Until, that is, last August Bank Holiday, when I went to Weymouth to see the first Sealife Centre to be opened in England.

I have to say that I was knocked out! The centre is spread over six acres and has exhibits of all the differing marine habitats around our shores, each housed in its own building.

Everything I saw was in superb condition and thoughtfully housed, with attention being paid to both the animals' wellbeing and their most effective presentation. If the amount of excited children — AND their parents — was any indication, then that attention has paid dividends.

As you may know, I've always thought that the future of our seas is in the hands of our children, and the Sealife Centres obviously see things the same way. The kids are encouraged to touch animals, where appropriate, to look closely and, above all, ask questions.

Wherever you turn, there is a member of staff on hand to answer those questions and to point out anything of interest. Learning is always easier when it's fun, and the talks and feeding displays are stimulating and thought-provoking. The centres even provide help for teachers (and parents) by providing Resource Packs and Worksheets



WEYMOUTH SEALIFE CENTRE

to suit specific age groups, preliminary visits for teachers and even study project ideas. BRILLIANT!

The Sealife Centres have gone a long way towards changing my views about public aquaria in Britain and, I'm sure, would do the same for you.

Knock-out experience for a young visitor to Weymouth's Sealife Centre

## AND FINALLY

We all know that seaweed is used as food and fertiliser, as well as in things that women plaster over

their faces, but did you know that it's also used in the manufacture of beer and ice cream?

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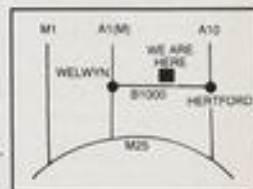
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# COLDWATER JOTTINGS



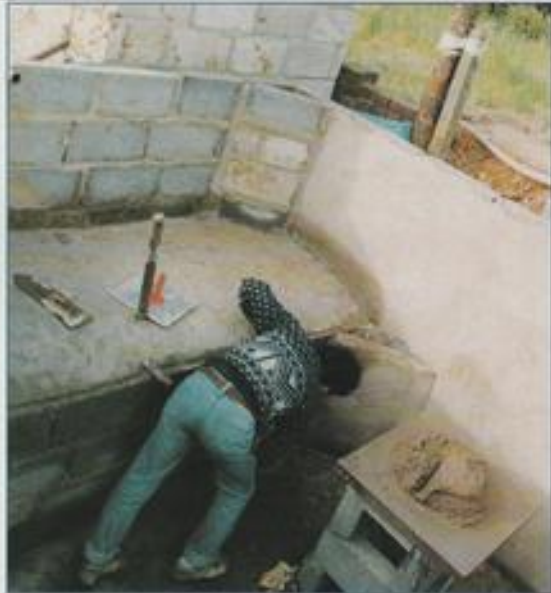
## From Dream to Eternity!

*If it takes two countries 200 years to build a Channel tunnel, how long would it take Stephen Smith to build a Koi pond...?*

This was not exactly the challenge thrown down to me when, two-and-a-half years ago, I commenced a major project to build a Koi pond from scratch, but the comment from friend and correspondent **Alex Stephenson**, who began to wonder if I would ever get around to finishing it, I must say that I had similar qualms, the project almost, at one stage, becoming one which I was beginning to wish I had never started!

Today, my qualms are over, albeit with a much-reduced bank balance, but soothed somewhat by the knowledge that, at least, the expenditure had been spread over the two-and-a-half year period. The Koi pond is complete. The dream, at last, has become a reality, and all the theory is working in practice, providing accommodation to 20-odd champion Koi (they are my champions, anyway!).

But why...? Well, apart from having hankered for a Koi pond for years, the main intention of this project was to approach building a Koi



pool from scratch, and to encounter (and solve) all the problems which arise, despite all the planning in the world.

Perhaps it was spurred on partly by all those glossy books and

magazine articles about how you can build a pond the size of your garden in less than a week and, my goodness, doesn't everything run smoothly, especially when the hobbyist is a fully-qualified bricklayer, civil engineer, plasterer, etc... I'm not, and did I have problems!

Our editor thought my project might make an article. John, it'll make a book! But, to start with, how about a mini-series? Look out for it some time over the next two-and-half years.

The halfway stage in the Koi-pool project, as render is applied to the structure. Only(!) eighteen months later, and the project is complete. (See: From Dream to Eternity.)

## Future 'Jotter'?

Ten year old **Jake Cowing**, from Sutton Coldfield in the West Midlands, has written to me with a very welcome letter which brightened up a rainy Thursday morning. Thank you, Jake, for your kind comments. Jake writes that he keeps coldwater and tropical aquarium fish. He has a pond as well, which accommodates a Comet, a Goldfish, a Ghost Koi, four Golden Orfe and three Rudd.

Jake has, evidently, been following the debate within **Coldwater Jottings** about 'unusual' Fancy Goldfish. He has recently bought a very nice red-and-white Oranda for his coldwater aquarium ('from Finland Aquatics — a brilliant place to go which I'd recommend to anyone,' adds Jake). 'Although I am not a follower of the gruesome varieties of Goldfish, I love Orandas. Mine is a lovely fish and knew within a few hours which corner of the tank to go for food.'

You are never too young to be a good fishkeeper, or even a **Coldwater Jotter**, as Jake has proven. So, whatever your age, do drop me a line about your own interest in coldwater fishkeeping. c/o **Coldwater Jottings, Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.**

## SOAPBOX Poor show

Why, oh why, do some people never learn that poor fish equals poor business — for everybody?

A visit during the summer to a reasonably large aquatic establishment, turned into a grave disappointment when I encountered the coldwater section. I have never seen such a sad-looking lot of Koi.

Normally eager to greet one's approach to the ponds with gaping mouths, they had turned into sad-looking specimens, sluggishly hugging the bottom of the pool which, itself, did nothing for the olfactory senses of this disappointed Jotter.

To cap it all, just about the most expensively-priced fish in the shop (at four figures, no less) had the largest hole-in-the-body I had ever seen. If you can sense that I was appalled, it is because I was, and I still am. Perhaps the

retailer concerned, if he is reading this, is also appalled that I should be giving these circumstances column inches. You are not being named, sir, but where the cap fits...

Those who may never have kept a fish in their lives, can — quite wrongly — end up with the impression that retailers perhaps don't really care about the animals they sell. And that would be a false impression, because the vast majority of retailers do care... and deeply... about their fish and their business, and are proud of the fish they display.

If, as a new customer, you are having second thoughts about entering or remaining in the hobby — having perhaps encountered a similar experience — please, have a 'third' thought. Shop around, and only purchase from a responsible retailer (the vast majority are precisely this) whose professionalism and livestock you can depend on.

## Photo-jotting 'Non-standard' Tri-tail

Although the 'purists' might prefer that only fish which conform to certain 'standards' are kept and bred, there is no reason at all why 'non-standard' fish should hold any less attraction. I was proud to add this

magnificent 'non-standard' Tri-tail to my collection recently, not least because of its colouring, which is reminiscent of a Jikin, and it even has twin anal fins...!





# CODE OF CONDUCT: THE WAY AHEAD

## PART 3

### Safe Handling

A & P editor John Dawes takes a look at OFI (UK)'s approach to the handling and transportation of livestock and discovers that 'welfare' tops the list of priorities.

Photographs by the author.

Over the years, I have visited numerous fish exporters and importers in many countries. Despite inevitable and understandable national and cultural differences, one thing that has repeatedly struck me is that all the good operators have certain fundamental characteristics in common. Procedure details may vary, but the overall aims and results are virtually identical anywhere you go.

## AIMS AND OUTCOMES

One of the top shared aims is to ensure that the handling of fish is done in such a way that stress (which is unavoidable) is kept to a minimum.

Things happen very quickly when fish are being handled by real professionals and, unless you know what to look for, you could

easily miss some of the stress-minimising techniques employed.

But they are there nonetheless, from the holding of fish in acclimatisation quarters once they have arrived at exporters' premises, either from breeders' establishments or the exporters' own rearing ponds, to the use of conditioned packing water of the same quality, to the provision of properly insulated packing boxes, to the eventual unpacking of fish in appropriately kitted out rooms either under reduced or red lighting, to the measured mixing of bag and holding tank water prior to debagging, to minimum physical handling of specimens, efficient netting and so on.

The combined effects of these procedures mean that such new arrivals will, for example, tend to settle down quickly, start feeding almost immediately and show little if any obvious signs of either physical or

physiological stress. Mortalities will therefore, generally, be low or non-existent, and everyone will end up happy... at least, most of the time.

## OFI (UK) GUIDELINES

In its continuing efforts to establish and maintain high standards throughout the aquatic industry OFI (UK) — in its **Code of Conduct** — sets out handling guidelines for exporters, importers, the carriers themselves (usually airlines), plus any others involved in the transportation of fish from breeding establishment to retail outlet.

By outlining these guidelines, the organisation does not only pin its colours firmly to the 'fish welfare' mast, but it also states in an unequivocal way, just how stringent its requirements are, and what minimum standards any prospective members will have to adhere to.

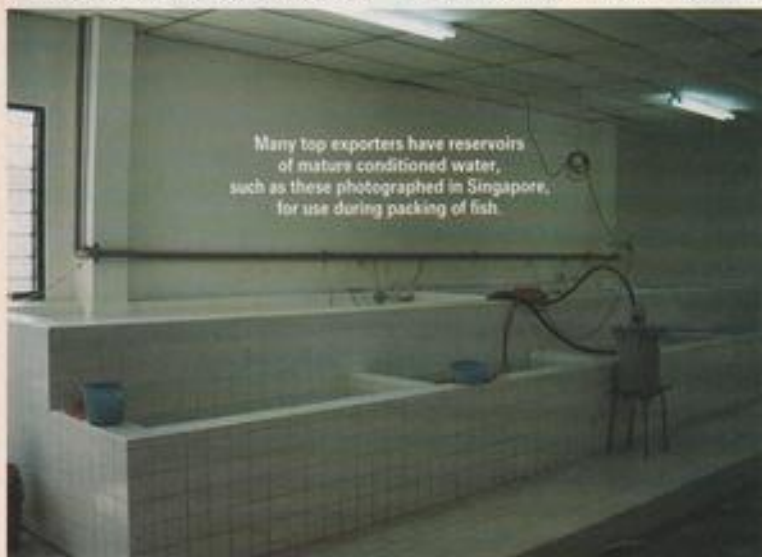
## SELECTED HIGHLIGHTS

The import/export section of the **Code of Conduct** deals with its subject matter under five sub-headings: Packing (Import and Export), Carrying, General Responsibilities, Unpacking, and Sale and Movement of Livestock.

Space dictates that I cannot do full justice to the complete text here, but a few selected items will, at least, allow me to provide a 'flavour' of the overall tone of the document. The italicised text represents direct quotes from the original guidelines.

## Packing

Under the Packing section, the opening statement says that *living animals must have priority over all other freight and should be transported by the most expeditious means*. In addition, all livestock needs to be packed,



Many top exporters have reservoirs of mature conditioned water, such as these photographed in Singapore, for use during packing of fish.



A batch of Eight-banded Butterflies (*Chaetodon octofasciatus*) undergoing acclimatisation prior to export.

not just in line with current I.A.T.A. Live Animal Regulations, but also in such a way that it takes account of the behavioural characteristics of the species concerned.

The use of chemicals, such as buffers and antibiotics, should be restricted, and employed only when necessary, and then only in accordance with good husbandry and veterinary practice.

With regard to wild-caught specimens, OFI (UK)'s requirement is that these should have been collected using legal, ethical means which do not damage the ecosystem.

## Carrying

The guidelines for carriers and agents include the advice that they should not accept a consignment of livestock for which no documentary evidence of an order is available. If they do accept a shipment, however, all the stipulated regulations must be followed, especially with regard to the rapid discharge of the cargo.

Sometimes, shipments need to be opened and examined prior to delivery, e.g. at Customs. Should this be necessary, it is required that the operation must take place in a room where the ambient temperature is within the range stated on the label. The operation must also be carried out in dimmed or red light.

## Responsibilities

These are wide-ranging and include, for example, a requirement for importers to accept primary responsibility for any consignment ordered... under all circumstances.

Further, transport boxes and/or packages should not be opened until they arrive at their destination, the only exception being when the survival of the livestock is threatened.

OFI (UK) also requires that all CITES EC Wildlife and Plant Health regulations are followed by its members.

## Unpacking

When it comes to unpacking, it is stated that suitably trained and/or experienced staff should be available during unpacking, that fish should be unpacked in dim conditions and that

livestock should not be exposed to strong natural or artificial light.

Should any stocks show overt signs of distress, injury or disease, these should be treated as appropriate. In order to do so, this may well require the affected individuals or populations to be isolated and livestock that is thus treated should not be sold.

All newly imported livestock (either via direct import or through a consolidator) should be separated from previously held stock... for a minimum of 48 hours or until a normal behavioural and feeding pattern has been re-established.

Under the Sale and Movement category, OFI (UK) informs its members that the provisions of Fish Health and Conservation legislation must be adhered to.

## Sale of stock

Following the all-clear after a visual examination, all stocks sold must be in good health as far as can be reasonably determined without veterinary inspection.

If fish or other stocks are being moved from, say, an importer's premises to a retail outlet, they should be packed to survive at least 150% of the anticipated journey time. Following the general approach adopted with regard to customer/retailer complaints (which I discussed in Part 2 published in May), wholesalers and importers are urged to deal with any retailer's complaints promptly, courteously and sympathetically, with OFI (UK) offering a conciliation service in the event of a dispute not being resolved satisfactorily.

## FURTHER DETAILS

Although I have, of necessity, been highly selective in the items which I have briefly discussed above, I have made every attempt to outline them in a balanced, 'representative' manner. The full text of these guidelines, as well as the Code of Conduct in its entirety, can be consulted by contacting:

Keith Davenport,  
Chief Executive — OFI (UK),  
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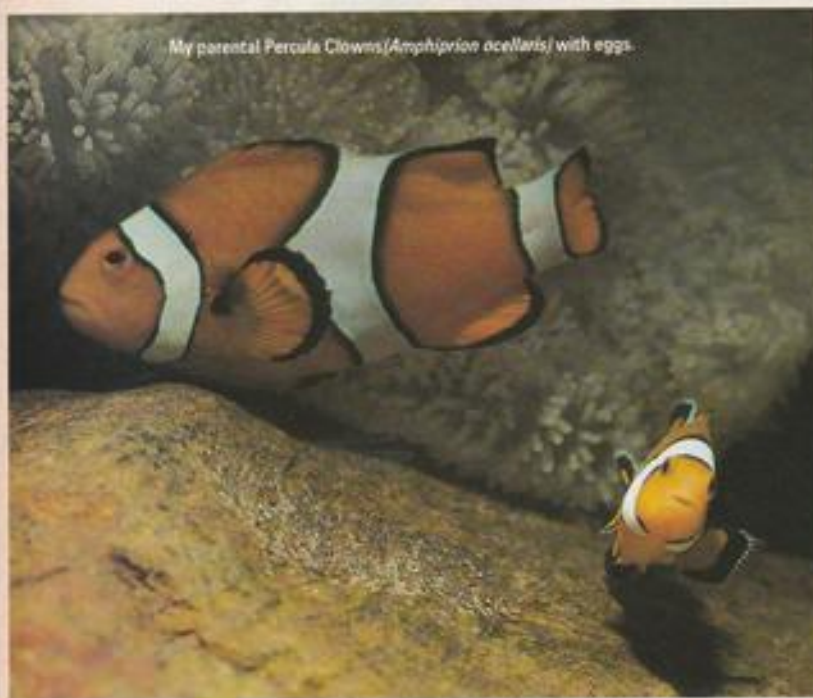


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# Breeding and Rearing: CLOWNS

**Dr Robert Goldstein**  
offers his recipe for success with  
these beautiful and popular marines.  
*Photographs by the author.*



**S**ome years ago, I described the aquarium problems and the commercial methods of breeding and raising marine Clownfish. That article reviewed the then current methods of the United States National Marine Fisheries Service's larval fish laboratory at Beaufort, North Carolina, Martin (Skip) Moe's methods used several years ago in the Florida Keys, scientific literature and personal experiences with breeding pairs of Percula (*Amphiprion ocellaris*) and Tomato (*A. frenatus*) Clowns.

## Repeated failures

The two American hatcheries producing marine Clownfish for commerce are in coastal locations and, presumably, make use of natural seawater.

Aquarists, typically, do not have natural,

flow-through seawater. They frequently report spawnings but, in reviewing hundreds of local society bulletins, I found no reports of successfully raising fry. Rather, the articles invariably reported all fry dying at 24 to 72 hours after hatching. This 100% mortality by 72 hours has frustrated and retarded growth of one of the marine aquarium hobby's most important potential areas of growth.

Failure to raise fry has been attributed to lack of small foods such as *Brachionus plicatilis* rotifers or wild plankton, a chemical deficiency in synthetic seawater, or even fry-emitted toxic growth inhibitors. My own failures continued during more than three years of testing different methods and hypotheses.

Forrest Young at one time worked at a marine hatchery, and informed me that production was always conducted in 250-gallon and larger containers because ade-

quate survival was not possible in small tanks. I later discussed this problem with Martin Moe, who further suggested I incorporate large amounts of shrimp (a crustacean) in the parental fish mash food to enhance larval fish survival.

After testing those recommendations, and others, I'm exceedingly pleased to finally report success in my home aquarium system, and even more pleased to describe a method that any beginner can use.

In this article, I describe what has worked, what has been killing the fry all along, and what may not be critical. In short, here's a recipe for cooking up a batch of Clownfish.

## Breeding set-up

The Clownfish breeding system requires a tank at least 16in (c 40cm) in height; a 20-US gallon (75-litre) high tank is adequate.

Start with several small fish. The fastest growing individual will mature as a female, the next largest will be a male, and the remainder will be 'sexless' until one of the pair is removed.

Provide a minimum photoperiod of 12 hours of light, although I've found 24 hours continuous light neither inhibits breeding nor causes blindness.

Feed the parents a diet rich in shrimp, but also including plant materials and fish.

Provide a largely vertical spawning surface such as a flowerpot or rock leaning against the side of the tank. An under-gravel filter is sufficient, but a powerhead is better. Hermit crabs are useful scavengers, but are not required; neither is an anemone.

If your Clowns go through scraping but don't spawn, replace the male with another small fish. The pair will first spawn when they are ready, and regularly thereafter. My Tomato Clownfish have been spawning every few weeks for more than three years, with but one interruption.

The orange, adhesive eggs darken at about two days, eye up about halfway through incubation, and hatch in seven to 12 days at 76-82°F (c 24-28°C). Because the eggs do not hatch in bright light, the tank must be darkened on the hatching date, preferably all night. I have observed hatching start in very dim twilight.

## Fry rearing

In my first major success, I filled a bare 70-US gallon (265-litre) tank three-quarters full with Forty Fathoms Marine Mix to a specific gravity of 1.020. A submersible heater kept the water at 80°F (27°C).

I half-filled a quart jar with a commercial volcanic rock advertised to absorb nitrogen and nitrate, and inserted an air-stone inside the jar for circulation over the rock and for light aeration. There was no filtration and no artificial light above the tank or burning anywhere in the room. The tank received indirect natural daylight (not sunlight) from the side.



Tomato Clown (*Amphiprion frenatus*)  
10-day egg ready to hatch.

When the eggs were well-eyed, I removed the spawning rock from the parental tank and placed it face-down on the jar in the 70-gallon rearing tank so that the airstream played over the eggs. This was a test of large tank size and the new shrimp-rich diet affecting survival.

As expected, the fry hatched out over two nights. The fry swam normally, not corkscrewing, indicating that the new parental diet was an improvement on my past attempts. The number of fry hatched was small, restricted to those eggs within the direct airstream.

At hatching, the tank was saturated with newly-hatched brine shrimp. Based on previous experiences, I knew that newly-hatched Tomato Clownfish fry vary in size, many large enough to bypass rotifers or plankton. I estimated the appropriate brine shrimp density by looking through the side of the tank toward the window, making certain the shrimp were sufficiently dense for the fry to find, but not so dense as to use up the oxygen or foul the tank.

## Light reaction

The fry survived past the critical third day, then through the first week. At this time, I saw the fry swimming head-up, tail-down, back to the window light, and quite clearly orienting parallel to and 'beneath' the light source. I'd seen fish swim toward or away from light before, but never head-up, tail-down, and belly away from the light. This behaviour was dramatically evident during the planktonic stage, but broke down when benthic (bottom) orientation occurred, with banding and metamorphosis a few days later.

I wondered if light was the critical factor for survival. The unusual sensitivity of Clownfish eggs and fry to light suggests that light might, under unnatural conditions, be lethal. Consider the following examples of light sensitivity.

First, Clownfish eggs won't hatch in continuous light, but require at least two hours of near darkness (twilight or night) for hatching, and die without hatching if the lights remain burning.

Second, the fry orient much more dramatically to light than other fishes,

swimming like yo-yos when the light is from the side.

The eggs and fry of other fishes are actually known to be light sensitive. For example, Lyretail Killifish (*Aphyosemion australe*) and Neon Tetra (*Paracheirodon innesi*) eggs are killed by ordinary room levels of light, and some newly-hatched tetra fry require darkness for the first week of life. In the case of Clownfish, it appears that light sensitivity does not end with successful hatching, but extends probably to the next 72 hours.

I used no artificial light after hatching. The fry continued to grow, and rapidly attained an average size of half an inch. According to Moe's handbook, a half-inch is the right size at which to transfer the young to smaller quarters with undergravel filtration and wean them onto adult food for faster growth.

## Panic reaction

That led me to the next discovery of 'things-that-can-go-wrong'. In chasing the juveniles with a nylon dip net, several went into 'panic shock', a phenomenon wherein



Breeding pair of Tomato Clowns.

they vibrate rapidly, then stiffen, with gill plates expanded, the gill arches immobile and not ventilating. This reaction is common in primitive fishes, in brackish and oceanic fishes at marginally acceptable low salinity, and in many other fishes in polluted water.

Artificial  
incubation  
of Tomato  
Clownfish  
eggs.



Most of the panic-shocked fish recovered, but a few did not, apparently remaining oxygen-depleted just a little too long. The coarse nylon net was also unnecessarily rough on them.

I finally got the fish transferred, with 17 survivors and four dead. The new (but aged and algal-carpeted) tank was fitted with an undergravel filter and powerhead, plus an



Tomato Clownfish juveniles that died of  
shock during transfer from  
the hatching tank.



outside power filter for carbon-cleansing of the water, and illuminated 24 hours a day (same as the parents). The power filter pad was slightly raised in order to provide carbon adsorption and current without trapping the brine shrimp.

In their new quarters, the fish were fed live baby brine shrimp, powdered flake food, and a mash of shrimp, amberjack (fish) meat, spinach and gelatin. The power filter was removed after a week, and the juveniles continued to thrive.

## Survival tests

What worked? Which aspects were critical and which unimportant? I proceeded to test two brands of salt which I had, plus the effects of tank size.

In the same room, opposite the 70-gallon tank and near another window, I set up two 29-gallon (110-litre) tanks, one with Instant Ocean and the other with Forty Fathoms salt mixes, both at a higher specific gravity of 1.025-1.028. Each tank contained a jar with volcanic rock and an airstone.

Both tanks were 'seeded' with debris from the bottom of the 70-gallon tank and given two weeks or more to stabilise in hopes that a nitrogen-metabolising bacterial flora would establish on the glass.

The first test batch of eggs was placed in the Forty Fathoms tank about three days before hatching, and the tank flooded with live baby brine shrimp. While inspecting the incubating eggs one morning, I saw low sunlight playing directly on the eggs from the adjacent window. Would it kill the eggs? Would it kill the fry?

On the morning after hatching, the bottom of the tank was littered with dead fry. The few survivors were dead in 12 hours. In this case, sunlight exposure did not kill the eggs and did not prevent hatching in the dark, but eliminated viability of the fry. Although the test of salt brand and tank size was invalidated, the results clearly demonstrated a delayed lethal effect of light that manifested after another light-dark-mediated response.

The next batch of eggs was placed in the 29-gallon tank containing Instant Ocean.



Juvenile at about 9 days.

The window curtain was drawn to exclude sunlight and the tank flooded with live baby brine shrimp.

Hatching was normal, with about 13 fry surviving through (at this writing) fourteen days, and growing rapidly. The fry assumed a benthic (bottom) orientation and became black with a white nape band on the eighth day.

This test resulted in three important conclusions. First, elimination of bright light eliminates the phenomenon of 100% mortality by 72 hours. Second, Forty Fathoms and Instant Ocean both support fry survival. Third, there was no significant difference between the numbers of fry

## TIPS FOR HATCHING CLOWN EGGS AND REARING FRY

1. Provide large tank — 70 US gallons (265 litres) minimum
2. Specific Gravity — 1.020
3. Temperature — 80°F (27°C)
4. Aerate eggs from 'eyed-up' stage onwards (see text for details)
5. No filtration and no lights!
6. After hatching, saturate tank with newly-hatched brine shrimp
7. Do not use artificial lights



A juvenile Percula (*Amphiprion ocellatus*) the first species of Clownfish I raised... but I only raised two specimens.

surviving in the 70-gallon versus the 29-gallon tanks.

What remains to be tested is which other salt brands work; whether specific gravity is important or not; whether the nitrogen-removing rock is necessary or not, or if bacteria on the glass are sufficient; whether or not tank size, at some point, is proportional to per cent survival; how long light sensitivity lasts post-hatching; what intensity, photoperiod, and spectra are lethal; if other Clownfish species have similar sensitivities and percentages of survival on baby brine shrimp; if light-avoidance will provide success with other kinds of marine fishes; and whether or not a wild plankton supplement will increase the percentage of survivors.

I now look forward to all these challenges...

## RECOMMENDED CLOWN BREEDING SET-UP

1. 20-US gallon (75-litre) tank — minimum
2. Depth — at least 16in (c 40cm)
3. Photoperiod — 12 hours minimum
4. Feed parents diet rich in shrimp, but also containing a vegetable component and fish mash
5. Provide a vertical spawning surface
6. Undergravel filtration is adequate, but power filtration is better
7. Keep temperature between 76-82°F (c 24-28°C)

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Hi everyone. I trust that you all have had terrific holidays, and are now raring to get back to piscine matters. For the first time in many years, we've had to miss the family holiday due to being tied to the hospital's strings. Ah well.

While we're on the subject of 'me', I'd better explain something immediately. In the past I have had to face many health battles, and in general, winning most of them. Both John and Vivian Dawes have to take a lot of credit for this because no matter what, both of them have stood firmly beside me. Without their personal kindness and huge support ... well, things may have turned out a little differently.

However, I now have to handle my biggest battle yet: I am awaiting a bone marrow transplant. This could happen tomorrow, next month or even next year. Whatever, when I do receive that phone call, then **Helping Hand** may experience a few hiccups.

Don't worry, though. When I think of all the places where I have written this column: in the early hours of the morning, sat on a hospital toilet, and, once, even keeping the anaesthetist waiting in the operating theatre while I finished a paragraph(!) it is my intention **NOT** to miss a single deadline.

## Lace Gourami lowdown

As promised last time, here are some tips on keeping Pearl or Lace Gouramis — the ideal fish for a disabled aquarist's biosphere.

One of the most beautiful of all freshwater tropicals, the Lace Gourami — together with its close associates, Three-Spot and Dwarf Gouramis — are very tolerant of water conditions. They all make perfect community species — (but see **FISH & TIPS** later) — which enhance the beauty of almost any aquatic biosphere.

All three prefer a peaceful environment, that is, one without raging torrents of an air/water admixture, such as that produced by the output of various power-heads or filters.

The Lace Gourami grows to around four-and-a-half inches (c 11-12 cm) at maturity, although it can be bred long before it reaches this size. I have bred Lace Gouramis at around two-and-a-half inches long. Having bought them from a retailer, it usually takes me around seven months to bring them to this size.

*Trichogaster leeri* is a

# HELPING HAND



BY  
KEVIN  
FOX

Lace Gourami taking  
in air at the  
water surface.  
See: Lace Gourami  
Low-Down and  
Fish & Tips.



bubble-nest species, hence the need for relatively quiet surface water. There is no mistaking when the male is ready to breed: its throat deepens to a rich ruby-red colour. Two males and three-to-four females is an ideal combination. However, if your aquarium cannot hold this number of fish, then one male and two females will set the stage nicely for breeding.

Like many other species Pearl/Lace Gouramis will eat anything which comes their way. A good flake which contains a high vegetable content can form the basis of the diet, but just like with any fish, it is not a good idea to feed them flake alone. Live food should therefore be given on a regular basis, especially if you want your fish to grow to their full potential. Gouramis will feed at all levels, although they mostly like to take their food off the surface.

## Filter tip needed

I have been thinking a bit (yeah, I know, what with?) about filter systems. Now I know what systems I prefer, and you know which systems you prefer. But, suppose a disabled aquarist were to approach you, and ask your advice on a suitable filter system for someone who cannot bend his or her back at all. What would your answer be?

Write to me and let me know. There will be a little something for the person who comes up with the most innovative (and practical) design, bearing in mind the person's disability. I look forward to hearing from you.

## N.A.D.A.

First of all a message for **Rob**, from Hull: I crashed my database and lost your address/telephone, etc. Please ring me again, and this time, I promise to write everything down!

Now that Phase 1 of N.A.D.A. the National Association of Disabled Aquarists (see September's

## MAILBAG Aquatics for the disabled

I received a very interesting letter/article from **Paul Szymanski**, extolling the virtues of fishkeeping for the disabled and emphasising the need to make this more widely appreciated. This is, of course, what we are trying to do through **Helping Hand**, so please keep those letters coming. In fact, Paul, much of what you say could have been taken directly from my own fishkeeping book. Not that it has, I hasten to add.

**Helping Hand** is underway. I am instigating Phase 2, where I collect all of the resource facilities for N.A.D.A.

Phase 3 involves the making of a video. The idea of the video is to demonstrate the hardware and software of fishkeeping to groups of social workers, occupational therapists and disabled people, thus generating an initial interest and enthusiasm for the subject, which the professionals can then disseminate among their clients.

I'll say it once more so no-one can be in any doubt: although the title would lead you to believe that N.A.D.A. will only accept disabled aquarists, this is most definitely NOT the case. Membership of the group will be open to everyone! Disabled people do not discriminate! That's why I do not restrict my competitions to disabled aquarists only. Fishkeeping is a great leveller. We're all still keepers of fish, whether we are able-bodied or disabled.

## Comp update

I have also received a huge envelope from the 'office' containing the answers to the competition I set last time. What a wonderfully knowledgeable lot you are out there. Obviously, reading *Aquarist and Pondkeeper*

regularly has paid off very well indeed. Everybody so far has the correct answer to my question: What is the scientific name of the Pearl Gourami? The correct answer: *Trichogaster levi*.

Apart from the first prize of the **Hagen Bio-Life Model 55** filtration system, there will also be a little something for second and third places, plus a bonus prize for the wakkie! 'Off-the-Wall' card received. You should know my sense of humour by now!

Since what I have received so far is the first batch of responses, I will wait until all those readers who trickle back from their late holidays will have had a chance to send their answers in before I announce the winner or winners.

## Fish & Tips

Having the auxiliary breathing equipment known as the labyrinth, Gouramis make frequent trips to the surface to breathe aerobically (grab a bubble of air). Anything which prevents them from doing this will naturally harm the fish's health.

One of the most common problems — especially in hard-water areas — is surface scum. This is noticeable when you lift the

**Upcoming HH visit**

There is a new Koi farm in the next village to me. The chap in charge has only just opened for business, and I have already made plans to go and have a good nose. I'll let you know more about what happens later.

I know that I have been neglecting disabled pondkeepers, but I hope to put that right quite soon. I have a contact with a company of landscape gardeners, who also plan and install garden ponds. So, hopefully, once I've had a chat to the right people, I'll have some useful information and tips to pass-on — straight from the horses (fish's?) mouth.

aquarium lid so that the lighting hits the surface at an angle.

If there's scum you can see it as a shiny, rainbow-coloured 'topping' covering the water. The Gourami has to make a 'hole' in this surface scum to get to the air above, as the 'scum' restricts the interchange of gases, such as oxygen and carbon dioxide.

To remove the scum, tear off a sheet of paper kitchen towel and lay it very gently on the water surface. Before the back of the sheet becomes wet, gently pull the towel along the surface of the water, moving towards either the left or right-hand side-wall.

At the side-wall, do not stop pulling the towel, simply pull it up the wall until it's free of the aquarium. A quick wipe of the side will restore your aquarium to its pristine condition and the surface scum will have been lifted off.

## Last word

There you go. All of the winners/prizes for the Lace Gourami competition will appear in the January issue of *Aquarist and Pondkeeper*, as well as a 'Pond-Plodder's' guide.

Until then, have a very merry Christmas and all the health, wealth and happiness in the world to you and your family. Happy fishkeeping!

  
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## FASCINATING FISH FACTS

### DENTIST'S DREAM FISH



Even a small Black Piranha like this one has a fearsome set of teeth.

Voracious predators, vicious killers — call them what you will, the Piranha (like the shark) is usually quite wrongly accused of a mean, murderous streak, always on the lookout for some unwary human to chop up. True, they do kill... but there's usually a reason.

Anyway, chomping through tough gristle and bone is not really the best recipe for a healthy set of teeth. Sooner or later, a tooth will get damaged or snap. When this happens, a Piranha responds by gradually replacing all the teeth on the side of the jaw in question.

This makes sense, of course, since a predator that depends for its survival on cutting up other fish (these form the usual diet for most Piranha, most of the time) needs to have its weapons in the best possible condition.

Incidentally, despite their overrated viciousness, a shoal of hungry Piranha can dispose of an animal the size of a medium-sized dog in under a minute!

John Dawes

**BORNEO**

# FISH COLLECTING IN THE BELALONG

**Dr Peter Burgess** samples the torrents and the fishes of a north Bornean river.

*All photographs taken by the author in the Batu Apoi rainforest.*

**M**ention Borneo to most people and they will probably conjure up images of impenetrable jungle, head-hunting tribes and orang-utan apes. Although partly true (I am assured that head-hunting is no longer practised!), it is nowadays important to perceive Borneo as a precious wildlife habitat which should be protected at all cost from man's destructive activities.

As far as the aquarist is concerned, Borneo is *paradise*, being the home of several popular freshwater aquarium fishes, many having first been described in the 1850s by the famous ichthyologist, Pieter Bleeker.

## Rainforest streams

The tropical Bornean landscape harbours a diversity of aquatic habitats, including mangrove swamps, freshwater pools, small forest streams and large rivers such as the Kapuas and Mahakam. Each habitat contains a distinct community of fishes, aquatic plants and other life. Fresh water is abundant, for the wet climate sustains a network of streams, some flowing for long distances under the shade of large rainforest trees.

The fish fauna in these streams may be quite rich, with over 50 species recorded from a single locality, including aquarium favourites such as rasboras, loaches, spiny eels, fighters and gouramis.

Borneo's fishes have also exploited habitats created by man, including freshwater ponds and rice paddies. Even small roadside ditches may harbour fish, notably anabantoids, which are superbly adapted to poorly oxygenated water, thanks to their specialised air-breathing 'labyrinth' organs.

A very different type of fish community thrives within Borneo's swift-flowing Belalong and Temburong rivers which run through the northern hilly terrains. Recently, I had the wonderful opportunity to study Belalong's fishes when I joined an expedition to the Batu Apoi forest in Brunei.

My trip was part of a collaborative venture between the Royal Geographical Society and the University of Brunei Darussalam. The previous year, these two institutions had constructed a permanent field centre situated right beside the Belalong river, deep within unexplored rainforest. A complex of stilted wooden long-houses provide domestic quarters and laboratories, all nestled under the dark rainforest canopy and, literally, within a stone's throw of the river. This has to be an aquarist's dream — provided, that is, the aquarist doesn't mind sharing camp with spiders, poisonous snakes, leeches and armies of gigantic ants!

## Variable river

During dry weather, the stretch of river beside the field centre is waist deep and clear, but, following heavy rain, the waters rise rapidly by several feet and become milky brown in colour as a result of suspended solids which have washed off from the land.

The river bed consists mostly of small stones and sand, with a scattering of submerged tree stumps and rotting leaves, but aquatic plants are nowhere to be seen. It seems an unlikely habitat for fishes which use plants in which to scatter their eggs or construct their nests. So, I wondered, what sorts of fishes inhabit the Belalong?

## Adaptable fishes

Within a few hours collecting, the nets had yielded eight or nine different species of cyprinids (carp-like fishes), evidently the major group of fishes inhabiting these waters, plus a few *Gambusia* suckerfish and the occasional spiny eel. But collecting in late evening, further species were observed, particularly *Clarias* catfishes which formed small congregations within the deeper waters.



① The Iban Indians are experts with the cast net. These awesome whirlpools yielded many specimens of suckerfish.

② Spiny Eel (*Mastacembelus*) in its natural habitat.

③ An unidentified *Rasbora* species.

④ Ventral surface of the Borneo Suckerfish. Note the broad, thick lips and splayed fins which form the suction cup.

⑤ The Belalong river, literally a stone's throw from the rainforest field study centre.

⑥ *Nematabramis* sp. was caught in large numbers by seine net.

⑦ The barb, *Puntius collingwoodii*, is similar in shape and coloration to the popular Tinfoil.

⑧ Unidentified loach-like cyprinid. Note the well-formed mouth, similar to the Sucking Loach (*Gyrinocheilus*).

⑨ The traditional Iban longboat fitted with an outboard motor. This craft provides the only practical means of travelling large distances through the rainforest.

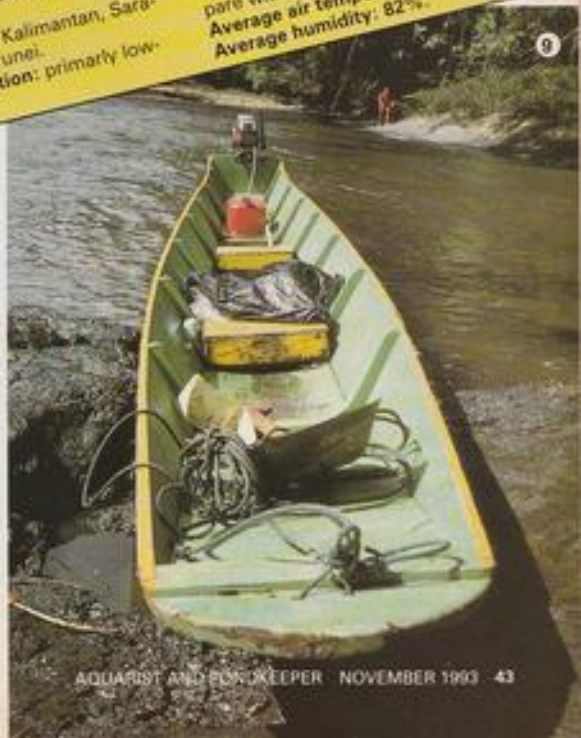


**Borneo Fact File**

**The Island of Borneo: —**  
**Location:** Equatorial South East Asia.  
**Dimensions:** 830 miles long; 600 miles wide.  
**Land mass:** 292,220 square miles (compare with Great Britain: 88,730 square miles).  
**Political divisions:** Kalimantan, Sarawak, Sabah and Brunei.  
**Dominant vegetation:** primarily low-land rainforest.

**Significant fauna:** Orang-utan, Gibbon, Proboscis Monkey, Sun Bear, Giant Otter, Crocodile, Hornbill.

**Brunei: —**  
**Average annual rainfall:** 100in (compare with London: 23in).  
**Average air temperature:** 28° C.  
**Average humidity:** 82%.



Wading in the Belalong at night proved to be an eerie experience, but was necessary in order to collect nocturnal fishes. Once darkness had fallen, small gobies would appear from their daytime hiding places and rest motionless among stones and submerged twigs. The torch beam did not disturb them, and, by remaining frozen, their excellent camouflage made them extremely difficult to detect. But once sighted, the gobies were easily scooped into the net and brought back to the laboratory aquarium for observation.

Belalong's fishes have adapted in various ways to life in a swift-flowing river, some preferring to stay in open waters, others taking refuge among submerged rocks, tree stumps and sunken leaves. Living in these rivers has its dangers, for the fish must avoid numerous predators, particularly birds, giant otters and snakes, as well as the catfishes and eels which patrol the river in search of unsuspecting prey.

Lizards also enjoy a fishy meal, as I found out one afternoon while observing large numbers of *Paracrossokeilus* loaches which had congregated close to the bank. Presumably, the fish were engrossed in spawning, for they were frantically splashing in the shallows, oblivious to the presence of a huge monitor lizard which had waded in to enjoy this easy bounty.

## Fishes in fast waters

The ability to withstand strong water currents is important for open-water species, and it is no wonder that slow-moving fishes such as the graceful gouramis were nowhere to be seen, for they would constantly get washed downriver. One suitable adaptation is to possess a streamlined body combined with strong muscles for swimming, and these features are found in the elongate rasboras which frequent the mid- and surface waters.

These fish, relatives of the popular Harlequin, are excellent swimmers, capable of darting upstream at an impressive speed. I recall one morning spending several back-breaking hours trying to catch rasboras with the aid of two hand nets, but they were too fast. Finally, I gave up, exhausted, very hot and without a single specimen! The cast net subsequently proved more effective, especially in the skilful hands of the Iban tribesman who succeeded in collecting rasboras at almost every attempt.

Not all the fishes were as agile as the rasboras, some preferring the shallow waters near the river bank where currents are less powerful. These areas make ideal nursery grounds for tiny fry, mostly cyprinids, where they avoid larger fishes which might otherwise prey on them.

## The Borneo sucker

Top prize for the best adapted fish must surely go to the Borneo Suckerfish. This strange creature spends its time on the surface of rocks and stones. Here, it presu-

mably feeds on algae and other organic matter which forms a thin, slimy coat over the substratum.

While photographing these fishes, I realised just how difficult it was to dislodge them from the aquarium glass. The whole of the sucker's lower body surface, including pectoral and pelvic fins, is modified to form the suction cup.

Several genera of suckerfishes exist. However, those occurring within the Belalong, known as *Gastromyzon*, are perhaps the most bizarre of all. These fish possess extraordinarily wide, swollen lips which assist in the suction process. It was no wonder that they formed the main catch within the whirlpools and torrents of the rapids — a harsh environment which few other species could endure.

Sadly, the future of Borneo's rainforests is in jeopardy. Demands for tropical timbers have already resulted in extensive deforestation which could eventually destroy the island's plants and animals, as well as the fishes that once fascinated Bleeker some 150 years ago.

There is, however, some good news: the Brunei government has declared the Batu Apoi rainforest a National Park, and the field centre is a permanent rainforest laboratory. The future for Belalong's fishes now seems assured for generations. So let's hear three cheers for Brunei!

### Getting there

Borneo lies virtually on the opposite side of the globe to the United Kingdom, which means a tiresome 18 hour flight of some 7,000 miles between London and Brunei. As the Jumbo descends near Brunei's capital, Bandar Seri Begawan, a large river is seen meandering through lush green vegetation: few countries can boast having primary rainforest so close to their capital city.

From the airport, a short road journey leads to the Brunei river, where speedboats, known as "water taxis", hurl you through corridors of mangrove-fringed waters, to the small town of Bangar. A further road journey ends at a small riverside community of Iban tribespeople, on the outskirts of virgin rainforest.

The real adventure begins here with a breathtaking trip up the Temburong and Belalong rivers in a motorised wooden longboat, the only practical means of reaching the interior. This was an alarming experience, especially when encountering rapids! Expert navigation is essential, as the river is strewn with submerged tree stumps and large boulders which could completely shatter the boat's thin hull.

Finally, after many drenchings and several bouts of adrenaline overdose, we reach the riverside field centre. Not exactly four-star accommodation, but it did possess a commodity I had desired for almost two days: a bed on which to collapse!

## Some Popular North Borneo Fishes

**Gouramis and other Anabantoid Fighters** (*Betta* spp. but not the well-known Siamese Fighter, *B. splendens*)  
Climbing Perch (*Anabas testudineus*)  
Three-spot Gourami (*Trichogaster trichopterus*)  
Giant Gourami (*Osphronemus goramy*)

**Cyprinids (Carp-like fishes)**  
Rasboras. At least eight species. North Borneo is home to numerous cyprinid fishes, including several species of Barbs (*Puntius*). Few, however, are exported for aquarium use.

**Catfishes and Loaches**  
*Clarias* sp.  
*Myxus* spp.  
*Pangasius* spp.  
Borneo Suckers (*Gastromyzon borneensis*)  
Horse-faced Loach (*Acanthopsis choirorhynchus*)  
Khull Loaches (*Acanthopthalmus* spp.). The genus *Pangio* is still disputed by many authorities.

**Miscellaneous Fishes**  
Spiny Eels (*Mastacembelus* spp.)  
Halfbeaks (*Dermogenys pusillus*)  
Archerfish (*Toxotes chatareus*)  
Sleepers (*Eleotris* spp.)  
Mudskippers (*Periophthalmus* spp.)  
Bumblebee Gobies (*Brachygobius* spp.)  
Pufferfishes (*Tetraodon* spp.)  
Note that Borneo does not have any native cichlids or characins (tetras).

## ACKNOWLEDGEMENTS

My thanks to Dr David Pool and Tetra for partly sponsoring my expedition. Thanks also to the Royal Geographical Society in London (RGS) and the University of Brunei Darussalam (UBD) for allowing me to undertake research at the Kuala Belalong Field Studies Centre. The RGS-UBD rainforest project was sponsored by several Corporate Patrons.

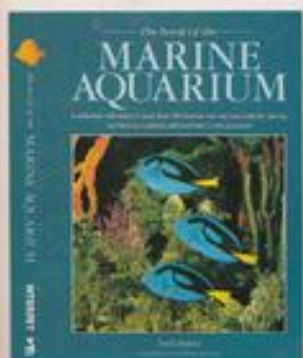
## FURTHER READING

*Brunei Rainforest Adventure*. (1993). BBC Publications. An illustrated account of three young people's rainforest experiences during their stay at the Kuala Belalong Field Studies Centre. Price £6.99.  
Inger, R F and Chin, P K (1990). *The Freshwater Fishes of Borneo*. Reprinted by the Sabah Zoological Society.

# FOCUS ON: BOOKS

## TOP MARINE TITLES

By Gordon Kay



SALAMANDER

My favourite marine book at the moment.

I love books. Books on any topic are a joy to me. As an aquarist, I gain so much pleasure from aquarium books and, as a conservationist and amateur naturalist, works on these topics are a treasure. So, my taste in books is Catholic, to say the least. Here is a look at just a few in my collection.

### Top Choice

*The Book of the Marine Aquarium* (Salamander: ISBN 0-86101-640-8)

This is my favourite book at the moment, not because it has any new, wondrous theories or discoveries in it, but because it does contain good solid advice for the novice, and loads of interesting reading for the more advanced aquarist.

It is beautifully illustrated and has chapters on the marine environment, the biology of fishes and invertebrates and much more, as well as the usual "how to" stuff of more run-of-the-mill works.

The thing that really makes the book work for me, though, is the fact that it is written by a team of contributors, rather than just one author (although, to be fair, the bulk was written by Nick Dakin) so that the reader doesn't get stuck into 'single-track' thinking. The book is superbly written and presented and provides the information in a reader-friendly form.

At £29.99 it seems a little expensive, but after being enthralled by its 400 pages, I'm sure you'll agree that it is money well spent. If aquarists were allowed only one book, then this should be their choice... I only wish I'd been involved. Oh, by the way, the photographs are stunning.

### Definitive Butterflies and Angels

*Butterfly and Angelfishes of the World — Vols 1 and 2 — (Vol 1: Mergus ISBN: 3-88244-000-7, Vol 2: Mergus)*

These books are old friends and, in my opinion, still deserve to be called the definitive works on the subject. They are getting a little long in the tooth these days — being originally published in the '70s — but they are wonderful and still very relevant today.

These books look at every species, from both a natural history, and an aquarium viewpoint. Of course, they are wonderfully illustrated — my favourite books on my favourite subject.

### Great Trekking

*Sea Trek* (BBC Books, ISBN 0-563-36091-7)

Anyone who was, like me, enthralled by the marvellous series which this book accompanies (remember, it was the one where that couple went everywhere with goldfish bowls on their heads?) cannot fail to gain an enormous sense of satisfaction from this tome.

This is the type of work that you find yourself picking up time and again. There are chapters to match each programme in the series, on six different marine habitats, ranging from the Galápagos Islands, to the Great Barrier Reef; worth £17 of anyone's money.

### Wordy but Good

*Marine Aquarist Manual — Comprehensive Edition* (Tetra Press, ISBN 3-89356-130-7)

I can't help but like this one — despite what I see as its shortcomings (there are mistakes, and the prose is over-elaborate in places).

However, for all that, it is full of sound advice for the beginner. It contains the best account of osmoregulation that I have ever read, a rather good (I think) chapter on common diseases and their treatment, and a super chapter on feeding, as well as all the usual stuff.

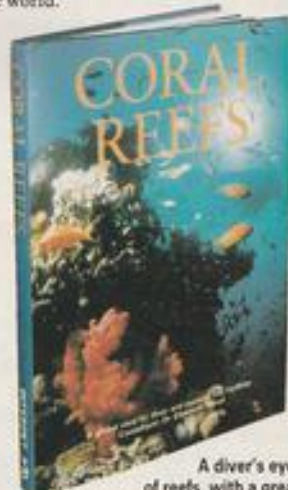
The fish catalogue is a little sparse, probably due to the lack of space, but, overall, this book is well worth having. The cost? About £15.

### Diver's Eye-view

*Coral Reefs* — Les Holliday (Salamander: ISBN 0-86101-463-4)

Les is an accomplished diver who is well known for his work with Operation Raleigh. He is also one of nature's gentlemen.

He certainly came up with a nice book here, for which he teamed up with Dr Elizabeth Wood, one of nature's ladies. With Liz as consultant, Les takes a diver's eye-view of the major coral reefs around the world.



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A diver's eye-view of reefs, with a great deal of useful information for aquarists.


Les is also an aquarist, and the aquarium angle creeps into the work by way of single-page 'asides' into the care of different families of fishes and invertebrates. As with all Salamander/Interpet books, the illustrations are superb.

### Whale of a Book

*Whales and Dolphins* — Dr Anthony R Martin and a team of experts (Salamander: ISBN 0-86101-488-X)

My interest in, and love for, Cetacea is well known to regular *Seaviewers* and, in this regard, I have to say that the £18.95 I paid for this book was the best I've ever spent.

It has to be said that this is a coffee table book (I do so hate that term!) and not one that you would read from beginning to end, but it is no less of a work for that.

There is everything you would probably want to know about these brilliant creatures. Put it on your Christmas list! 

# FOCUS ON: BOOKS

## BOOKS FOR COLDWATER HOBBYISTS

By Stephen J Smith  
Photographs by the author

Along with the increase in popularity of coldwater fishkeeping over the past decade or so, there has been a significant increase in the proportion of books dealing with the subject.

The following titles are taken from my own collection of coldwater references, so it is by no means exhaustive. Now, with the winter months almost upon us, choose your book and curl up comfortably in front of the fire and enjoy a fast-expanding area of the coldwater hobby... reading about it!

### Water gardening

No reference to pond books should fail to give, at the very least, a mention of John Dawson's *Book of Water Gardens* (TFH Publications, 1989, ISBN: 0-86622-662-1). This is one of my personal favourites (and not simply because John is our editor!), providing a rich source of informative and highly readable text, accompanied by a ple-



My favourite pondkeeping and water gardening titles.

thora of excellent colour photographs and graphics.

From the same stable is the biggest book on pondkeeping I have ever seen, *The Atlas of Garden Ponds* by Herbert R Axelrod, Albert Benoist and Dennis Kelsey-Wood (TFH Publications, 1992, ISBN: 0-86622-343-6). Produced in TFH's lavish style, this is a book which, although highly-priced at around £35 or so, is well worth the investment.

Turning to the best of the Interpet stable, James Allison's *The Interpet Encyclopedia of Water Gardening* (Salamander Books, ISBN: 0-86101-559-2) and the companion publication, *The Interpet Bumper Guide to Garden Ponds* (compiled by Dick Mills, Salamander Books, ISBN: 0-86101-636-X) provide two different approaches to the same subject.

The first is a large-format comprehensive book and, arguably, one of the best British publications on the subject, with superb photography, excellent colour diagrams and authoritative text on just about every aspect of pondkeeping. The smaller, Bumper book is a budget-priced volume (available from around £10) which is equally comprehensive and informative, and which really gets down to the 'meat' of constructing, stocking and enjoying your garden pond.

Further pondkeeping 'nuggets' are Frank Orme's *The Landscaped Rock and Water Garden* (Nimrod Press Ltd, 1986, ISBN: 1-85259-006-5), *Ponds and Water Gardens* by Bill Heritage (Blandford Press Ltd, 1986, ISBN: 0-7137 1882-X), and a very pleasant volume called *The Better Water Gardens Book of Patio Ponds* by Gordon Ledbetter (Better Water Gardens, 1982, ISBN: 0-9507982-0-7).

These last three may well be out of print by now, but are all worth looking out for.

### Koi keeping

'Top of the pops' for me, and one of my most-referred-to books is *The Interpet Encyclopedia of Koi* (Salamander Books Ltd, 1989, ISBN: 0-86101-405-7). This large-format book, one of a series of 'Encyclopedias' from this publisher, is packed with information, diagrams and photographs so superb that the Koi all but jump

out of the page! For the would-be Koi keeper and the enthusiast alike, this book has everything you are looking for.

A little-known little volume from which I have derived no little pleasure since its publication some years ago, is *Understanding Koi* (M I George, available from Staffordshire Waterlife, Bower House, Bower Lane, Rugeley, Staffs).

Incorporating sound technical information, this book is written by Koi keepers for Koi keepers.

In addition to some sound technical advice, I am particularly impressed by the sections which look at existing hobbyists' Koi pools (how on earth can they be called Koi ponds...?) and identification of Koi varieties.



Top Koi keeping books for all tastes.

*A Professional's Book of Koi* by Anmarie Barrie (TFH Publications, 1992, ISBN: 0-86622-528-5) is ironically, the perfect book for the hobbyists. As can always be expected from TFH, lots of colour photographs, drawings and diagrams accompany some sound text, to provide a worthwhile volume for every Koi keeper.

Slightly less lavish in its presentation, though none the poorer, is *Tetra's Hobbyists Guide to Successful Koi Keeping* by Dr David Pool (Tetra Press, 1991, ISBN: 3-89356-134-X). David's no nonsense, practical and authoritative text provides a refreshing introduction to the hobby, and covers just about everything which can be said about Koi keeping, accompanied with sensible illustrations and diagrams.

Barry James, too, provides a down-to-earth approach to the hobby in *An Interpet Guide to Koi* (Salamander Books, 1986, ISBN: 0-86101-279-8). An informative text is complemented by superb wash diagrams and some breathtaking photographs.



## Goldfish and general coldwater

Without doubt, the 'Bible' of Goldfish keeping (for regular readers, I make no apologies for repeating this) remains the late Frank Orme's *Fancy Goldfish Culture* (Nimrod Press Ltd, 1991, ISBN: 1-8529-007-6).

Frank was one of the most enthusiastic Goldfish keepers in the UK, as well as being one of the most revered and, although this book (despite being in its second edition) is beginning to date a little in its presentation, it provides just about all the information anyone would want to know about Goldfish keeping.

An alternative volume is Dick Mills' *Keeping Goldfish* (Blandford Press, 1985, ISBN: 0-7137-1508-1). Again, this suffers from a distinct lack of colour illustrations and photographs, but is, nevertheless, a most informative introduction to the hobby — and at a budget price, too.

For the complete novice, *Goldfish as a New Pet* by Anmarie Barrie (TFH Publications, 1990, ISBN: 0-86622-606-0) is unbeatable. Lavish in its illustrations and informative in its text, this book is from a series of "... as a New Pet" titles from this prodigious publisher. Not only does this book provide sensible and practical advice for the newcomer, but it is also crammed with some excellent photographs of some excellent Goldfish.

From the same publisher are two volumes designed specifically for Goldfish enthusiasts: *Goldfish Guide* by Dr Yoshiichi Masui and Dr Herbert Axelrod (TFH Publications, 1991, ISBN: 08662 2-605-2) and *The Official Guide to Goldfish* produced by the Goldfish Society of America (TFH Publications, 1991, ISBN: 0-86622-607-9).

Again, some excellent photographs of some excellent Goldfish are accompanied by detailed and authoritative text and, really, whether or not you enjoy Goldfish, you will surely enjoy these two volumes.

Dick Mills crops up yet again with *A Fishkeeper's Guide to Coldwater Fishes* (Salamander Books Ltd, 1984, ISBN: 0-86101-134-1). Not just Goldfish in this book, but everything (and just about everything!) you need to know about coldwater fishkeeping is incorporated into this little volume, complete with lavish colour diagrams and superb photographs; it is distributed throughout the pet and aquatic trades by **Interpet**.

Tetra are also prodigious in publishing books for aquarists, and I have always had a soft spot for Prof Werner Ladiges' *Coldwater Fish* (Tetra Press, 1983). This book is easy to read, a dream to refer to, and is illustrated with some fine photography and some excellent diagrams.

Phew! This really is just a small selection of some of my personal favourites from my own bookshelves. It would be impossible to include every book currently available for the coldwater hobbyist, so please don't be too disappointed if your own favourite isn't included within this review.

And don't forget, if you can't find the book you are looking for, then ASK! Your local library, bookshop, societies and fellow hobbyists will all be able to help you.



Goldfish and other coldwater fishes are well catered for.

## New Book Information

### Cichlids of North and Central America

by Donald Conkel

ISBN: 0-86622-444-0 Style: TS-184

Hard cover, 10" x 14", 192 pages, over 250 full colour photographs

Price: £35.00

### Sea Anemones as a Hobby

by U Erich Friese

ISBN: 0-86622-539-0 Style: TT-027

Hard cover, 7" x 10", 320 pages, over 225 full colour individually laminated photographs

Price: £29.95

### Goldfish as a Hobby

by Robert Hillie and Gabriele Langfeldt-Feldman

ISBN: 0-86622-410-6 Style: TT-005

Laminated soft cover, 7" x 10", 100 pages, 96 full colour photographs

Price: £4.95

### The Proper Care of Discus

by Bernd Degen

ISBN: 0-86622-548-X Style: TW-130

Hard cover, 5" x 7", 256 pages, over 120 full colour photographs

Price: £9.95

### The Proper Care of Malawi Cichlids

by Mary Sweeney

ISBN: 0-86622-367-3 Style: TW-124

Hard cover, 5" x 7", 256 pages, over 150 full colour photographs

Price: £9.95

### The Proper Care of Turtles

by John Coborn

ISBN: 0-86622-534-X Style: TW-132

Hard cover, 5" x 7", 256 pages, over 150 full colour photographs

Price: £9.95

### Boas and Pythons: Breeding and Care

by Erik D Stoops and Annette T Wright

ISBN: 0-86622-632-X Style: TS-194

Hard cover, 7" x 10 1/4", 192 pages, over 175 full colour individually laminated photographs

Price: £20.95

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# FOCUS ON: BOOKS

## TOP HERPTILE TITLES

By Julian Sims

There have been some excellent reptile and amphibian books published this year, some for the general herpetile keeper, others for the more seriously minded. Asked to nominate my own personal favourites, the following four titles come top of my list.

### Limited Whiptail edition

This year, the Oklahoma Museum of Natural History (University of Oklahoma, Norman, USA) have published a very detailed book entitled *Biology of Whiptail Lizards (Genus Cnemidophorus)*. The book is a compilation of 15 papers edited by John W Wright and Laurie J Vitt.



Topics covered include evolution, thermoregulation, feeding, reproduction and ecology. At 417 pages in length, with a comprehensive index, references and supported with numerous graphs, tables and black and white photographs, this hardback book is a must for all herpetologists who have an interest in lizards — especially those from the Americas. ISBN 1-883090-01-6.

Published at a price of \$29 (plus \$3

postage), this book is not only good value, but also represents something of an investment, as only 750 copies have been printed — a very limited edition. In 1993, members of The Herpetologists' League were given the opportunity to buy a copy of this book at a substantial discount.

### Excellent-value rattlers

As in past years, the Society for the Study of Amphibians and Reptiles (SSAR) have released several very informative publications during 1993. These include the latest in their series of *Herpetological Circulars*, No 22, *Biology, Status and Management of the Timber Rattlesnake (Crotalus horridus) — a Guide for Conservation* by William S Brown.

The book is 78 pages in length and is



illustrated with 16 colour photographs. Subjects covered include description, distribution, habitat, ecology and threats (by human activity) to the long-term survival of rattlesnakes — an issue raised in the September 1990 edition of *Herpetology Matters*. Excellent value at \$8 (plus \$1 postage). ISBN 0-916984-29-X.

### FOUR GOOD GENERAL TITLES

- ① *The Care of Reptiles and Amphibians in Captivity* by Chris Mattison. (Revised 3rd edition). Pub by: Blandford. ISBN: 0-7137-2338-6.
- ② *The Proper Care of Amphibians* by John Coburn. Pub by: TFH Publications, Inc. ISBN: 0-86622-346-0.
- ③ *The Proper Care of Reptiles* by John Coburn. Pub by: TFH Publications, Inc. ISBN: 0-86622-345-2.
- ④ *Breeding Terrarium Animals* by Elke Zimmermann. Pub by: TFH Publications, Inc. ISBN: 0-86622-182-4.

### Out-of-print choice

Another recommended book published by the SSAR this year is *The Reptiles and Amphibians of South Australia*, a facsimile reprint of the classic book by Edgar R Waite, first published in 1929.

Although out-of-print for decades, this book is still very informative and is highly sought after. It is 270 pages in length and is profusely illustrated with 95 black and white photographs and numerous line drawings. There is also an up-to-date list of the current names of the 112 species of reptile and 12 species of amphibian originally described more than 60 years ago. Price: \$35 (plus \$4 postage). ISBN 0-916984-30-3.

### Gila reprint

Another facsimile reprint just released by the SSAR is *The Gila Monster and Its Allies* by Charles M Bogert and Rafael Martín del Campo. First published in 1956, this monograph is still the only comprehensive treatment of the genus *Heloderma*. The genus contains the only lizards in the world known to produce venom.

The book covers all aspects of the biology of these reptiles, including food and feeding habits, behaviour, metabolism, life history and ecology. There are 58 photographs of helodermatid lizards and their habitats, together with five tables and two distribution maps. Length: 282 pages. Price: \$38 (plus \$4 postage).

A sad additional note: Charles Bogert prepared an extensive preface for this reprint, his last scientific work before his death last year.

Further details about these and previous titles published by the SSAR can be obtained from:

Dr Robert Aldridge, Publications Secretary, Dept of Biology, St Louis University, St Louis, Missouri 63103, USA.

# FOCUS ON: BOOKS

## FRESHWATER TROPICAL FAVOURITES

By Dr David Ford — Aquarian Advisory Service

Choosing favourite books is never easy, especially when there are so many good ones about. However, being faced with this challenge, presented me with a good excuse to go through my library once more. Here are my favourites from the numerous freshwater tropical titles in my collection.

### Precise all-rounder

Top of the list must be *Baensch's Aquarium Atlas* because it is so concise, yet factual. Being German, it is also very precise and correct. I use it as a source of data on any tropical species, because I trust the information given.

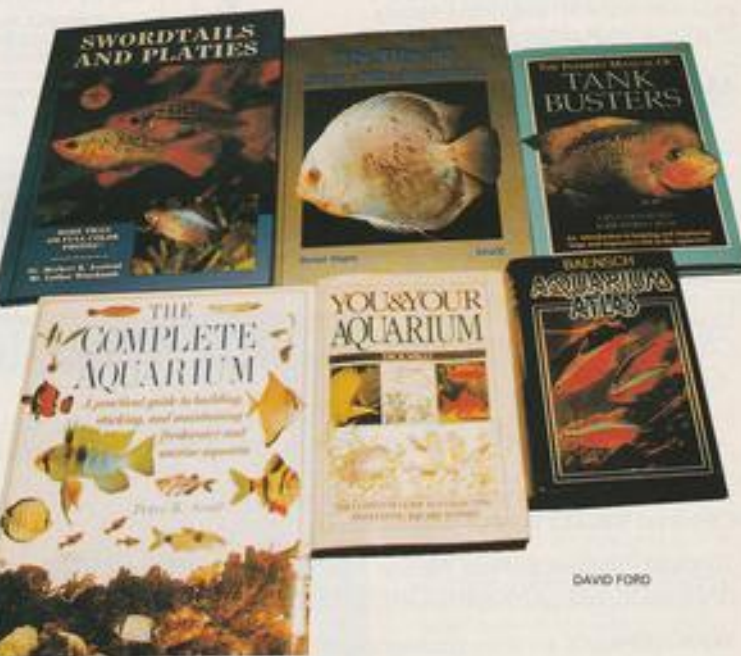
The index is (of course) very thorough, with a General Index, Index of Synonyms and Index of Scientific Names. There is usually a good photograph of the fish itself, current Latin name and others, habitat, date of introduction into the hobby, sex differences, behaviour, breeding, feeding, growth size, best tank size, preferred temperature range and any special information. All this information is given on 600 fish, which is a lot to cram into a book less than 8 x 6in (but it is 2in thick!).

There are also many pages on plants, aquarium technology and ichthyology, making it a very comprehensive book for just reading, let alone reference.

### Wide ranger

Next is Dick Mills' *You & Your Aquarium* because it has such a wide sweep of subjects, from anatomy to photography. It is a very attractive book to just look at, something that is a speciality of the publishers *Dorling Kindersley Ltd*. They use a mix of real photographs and excellent drawings that fit so well with the text. You find you are reading the diagrams, as well as the words, and that makes everything so clear and easy to understand.

The book includes data on subjects not usually seen in the encyclopedia-type fish book, such as Choosing Fishes and Showing Fishes, and diagrams on how an air-pump works, or how to set up a breeding



DAVID FORD

tank. It is ideal for the beginner who wants to take the hobby seriously, or as a reference work for experienced hobbyists wanting a change in aquarium type.

### Ecological choice

Number three is also a *Dorling Kindersley* publication and so has the same good presentation style. This is *The Complete Aquarium* by fish veterinarian Peter Scott. Peter's scientific approach makes the book very attractive reading for me, with its chapters on special aquaria, such as

Amazon Rain Forest Stream, Zaire River Rapids, Papua New Guinea Sandy River, East Africa Rocky Lake and so on. Marine and brackish are covered too, even the British Rock Pool aquarium.

The book has an excellent introduction with chapters on water, habitats and ecologically correct data, such as man's influence. The appendix is also scientific, with Understanding Water Chemistry and Understanding Biological Filtration, plus a useful Glossary.

I was pleased to see my name among the acknowledgments... one likes to be associated with success!



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## Discus King

Like all good aquarists, I think Discus are wonderful fishes, and a book on these fish has to be in my library. In fact, there are several (even a Discus magazine that only managed one issue) but the favourite is *The Discus, King of the Aquarium* by Bernd Degen in an English edition by Tetra Press. The book is as large as the fish itself and so carries life-size colour plates of many superb specimens. Even so, it is not just a pretty book. The text is packed with useful data for the Discus lover, from breeding to disease treatment.

The translation is good but does remain true to the Germanic approach, so be prepared for phrases such as "In the beginning, there was quite unnatural respect for this true King of the aquarium" or "the road back to the pure-blooded wild-caught breeds must also be trod". Stirring stuff!

## Tank busting selection

Interpet have published many books, especially the small, cheap but excellent Salamander series, but from their growing range, I have one special choice: *The Interpet Manual of Tank Busters* by the well-known aquarists Gina Sandford (*A & P's Tomorrow's Aquarist*) and Richard Crow of the CAGB and BCA (Catfish Association

of Great Britain and British Cichlid Association, respectively).

Most encyclopaedic books on tropicals cover the community fishes, with small mention of larger fish, usually just a warning not to buy them. However, really keen aquarists will always want to own a true pet fish, and one can only relate to the larger fishes. A sensible book on such fish is essential, and Gina and Richard have written it well.

The very first chapter sets the scene: Practical Matters, with subsequent chapters on setting up large aquaria, buying and moving big fish and how to filter on the grand scale. Then, many large fish are listed with their special requirements. Eighteen families are covered, from Giant Gouramis, to long Spiny Eels, and included is the most popular of all big fish, the Oscar.

## Livebearer spectacular

At the other end of the scale are the ever-popular *Swordtails and Platies*. The latest book from the vast TFH library is devoted to these livebearers. It is a large volume (at a large price, but built to withstand just about any crisis a book can meet). In typical TFH style, it is full of photographs that are almost three dimensional, and has the usual commercial break chapters! Written by (the inevitable) Dr Herbert R Axelrod and Lothar Wischnath,

the text is the most comprehensive survey of the many varieties I have ever seen.

Biology and breeding are well covered, but the disease section is only a token one, perhaps because these fish are so hardy and easy to keep. There's little data on nutrition. In fact, the comments on available foods are quite funny, and one of the reasons the book is on my most favourite list!

Most aquarists should own at least one of these six books. In fact, a keen aquarist, like me, can justify owning all six... **AGP**

### Book Fact File

*Baensch Aquarium Atlas* by Dr R Riehl & Hans Baensch, Hagen (UK) Ltd, ISBN 3-88244-050-3 (1991).

*You & Your Aquarium* by Dick Mills, The Dorling Kindersley Pet-Care Library, ISBN 0-86318-086-8 (1986).

*The Complete Aquarium* by Peter Scott, Dorling Kindersley Ltd, ISBN 0-86318-803-3 (1991).

*The Discus, King of the Aquarium* by Bernd Degen, Tetra Press, ISBN 3-923880-95-2 (1986).

*The Interpet Manual of Tank Busters* by G Sandford & R Crow, Salamander Books Ltd, ISBN 0-86101-473-1 (1991).

*Swordtails and Platies* by Dr H R Axelrod & L Wischnath, TFH Publications Inc, ISBN 0-86622-090-9 (1991).

Isolated freshwater habitats can harbour unique species and be susceptible to localised extinctions.



# Breeding Programmes and Fish Conservation

## PART 2

### *Protection Priorities*

**Dr Chris Andrews** of the National Aquarium in Baltimore continues his review with a look at three important groups of fishes and their environment.

*Photographs by the author.*

**F**ish populations (not exclusively, but especially those in freshwater) are in urgent need of conservation attention. The long-term conservation of species must involve preservation of whole ecosystems and their species at all trophic (feeding) levels. Further, all conservation measures must have an evolutionary perspective.

Protection of the world's aquatic life depends on the fact that every ecosystem is inter-connected and influenced by the activities of mankind. Since less than 3% of the world's surface area has protected status, with very few completely aquatic reserves, it is clear that wildlife conservation will depend upon multiple use of habitats outside of formal reserves.

Also, it is likely to become necessary to promote the wise management of entire watersheds in certain areas, starting with those which are most pristine and least impacted (as yet) by human activities.

### Role of Zoos and Aquariums

Zoos and aquariums are, of course, well suited to help raise public awareness of aquatic conservation problems and seek both popular and financial support for rational intervention and preventive or restorative efforts. Similarly, zoos and aquariums are now becoming more involved in breeding programmes for threatened fishes.

The IUCN\* Captive Breeding Specialist Group (CBSG) has identified three freshwater fish faunas for initial conservation attention. These are:

- ① Lake Victoria fishes
- ② Desert fishes
- ③ Appalachian stream fishes

Each of these faunas is characterised by moderate to high levels of species richness,



The introduction of the Nile Perch (*Lates niloticus*) into Lake Victoria was a major factor in the decline of the local cichlid species.



high levels of endemism and a large proportion of threatened forms (an endemic species is one found in only one place).

## 1 Lake Victoria fishes

Severely affected by the introduction of the predatory Nile Perch (*Lates niloticus*) and a number of other factors, most of the several hundred species of endemic fishes (mainly Haplochromine cichlids) are considered to be threatened or already extinct. The captive breeding programme for Lake Victoria fishes was recognised as an official

Commercial fish farming enterprise in Burundi, Africa.

*Haplochromis pectoralis*, an endangered Haplochromine from Lake Victoria.



CBSG studbook in December 1990 and has three primary goals:

- ★ preserve in captivity 40 of the most endangered Haplochromine cichlid species that are representative of the full range of the morphological diversity of the fauna, thus maintaining both research and reintroduction options for the future.
- ★ establish captive populations of non-Haplochromine food fishes that are important in aquaculture.
- ★ establish managed, productive populations of non-endangered Haplochromine cichlids of long-term importance in research.

Chaired by the New England Aquarium (USA), with assistance from the Columbus Zoo Aquarium (USA), this project is being developed into a full American Association of Zoological Parks and Aquariums (AAZPA) Species Survival Program (SSP), with a European co-ordinator for the captive breeding effort at the Amsterdam Zoo Aquarium (Holland).

However, throughout the development of the Lake Victoria programme, special emphasis has been placed on field conservation efforts and research. Known as the Lake Victoria Research and Conservation Program, a group of international scientists is attempting to integrate the work currently underway in three of the countries bordering the lake (Kenya, Uganda and Tanzania), as well as the captive breeding efforts which are taking place in Europe and North America.

High on the list of objectives is also the establishment of a regional centre for aquatic conservation training in Kenya.

At present, about 25 institutions are participating in the captive breeding efforts involving approximately 25 taxa of Lake Victoria cichlids, which are from a number of different trophic (feeding) groups, including piscivores (fish-eaters), insectivores, epilithic grazers (these graze on algae and other forms of life which encrust rocks), mollusc crushers/shellers, paedophages (fry-eaters) and zooplanktivores (these feed on tiny free-swimming micro-organisms). Several other trophic groups are, however, absent from the breeding programme (e.g. crab-eaters, scale-pickers), and the deeper water species are missing completely.

Overall, the captive breeding programme for Lake Victoria cichlids presents a number of interesting challenges to those involved, some of which may be of relevance to other fish breeding programmes. These include:

### (i) Species challenges

A large proportion of the lake's 350 or more endemic fishes may be extinct or threatened, and new taxa are still being described.

Founder individuals from certain taxa have proved difficult to obtain, and with a high degree of phenotypic plasticity (variable physical appearance) and low genetic

diversity in many of these fishes, decisions must be made as to which taxa, and at what taxonomic level, should be preserved.

## (ii) Individual recognition

Breeding programmes frequently rely upon the marking of individual animals (which has been problematical with these fishes), and the alternative of completely separating broods of the same species from different origins will become a significant drain on available resources.

## (iii) Future introductions

Since one of the main threats which brought about the decline of the cichlid fauna (the Nile Perch) cannot be removed from the lake, the likely success of any future introduction programme remains to be proven, and may be more relevant to inshore, bottom-dwelling species, than to the more open water forms.

## (iv) Amateur resources

Amateur hobbyists, and the trade which they support, are a significant resource in terms of tank space, manpower, publicity and even financial support.

This is being explored in relation to the Lake Victoria programme and also a number of other fish conservation initiatives, noting that the involvement of hobbyists in captive breeding programmes for threatened fishes will require careful management and co-ordination.

One group (the Aquatic Conservation Network) is keen to develop a more active role for hobbyists with regard to fish conservation, including captive breeding. For further information on this exciting initiative contact Rob Huntley at 540 Roosevelt Avenue, Ottawa, Canada K2A 1Z8.

## 2 Desert fishes

Desert fishes are being severely impacted by a number of human-related activities, especially water abstraction and pollution, on a global scale. This programme is being co-ordinated by the New York Aquarium (USA) with assistance from the Dallas Aquarium (USA). Thus far, a total of 14 North American public aquariums and museums have agreed to participate in the programme, which is under development into a full AAZPA SSP.

Attention is currently centred on a number of fish taxa from south-west USA and Mexico, and a collaboration has begun between the New York Aquarium, the Dallas Aquarium and the Autonomous University of Nuevo León (Mexico). New York and Dallas Aquariums, aided by two corporate sponsors from the pet trade (Python Products, Milwaukee and Tetra Sales, USA), are supporting the Autonomous University's Desert Fishes Breeding Center.

As part of the collaboration, two endangered Mexican endemics (*Cyprinodon abascoi* and *Megapsilon apocis*) have been shipped to New York for captive breeding and the Dallas Aquarium has received stocks of an additional three species (*Cyprinodon fontinalis*, *C. nassus* and *Cyprinodon* sp./Charco Azul). The Dallas Aquarium is also working with *Cyprinodon eximius*, in conjunction with the Texas Department of Parks and Wildlife.

Eleven institutions are currently displaying or holding the Desert Pupfish (*Cyprinodon macularis macularis*) and this particular sub-species is already receiving considerable attention from both state and federal agencies.

Therefore, it is likely that these animals will be replaced at all but two institutions by severely threatened Mexican *Cyprinodon* species.

Five species of *Xiphophorus* (Swordtails and Platies) are being managed by the New York Aquarium, and four of these (*X. couchianus* — Northern Platy, *X. gordonii* — Cuatro Ciénegas Platy, *X. milleri* — Catemaco Livebearer and *X. clemenciae* — Yellow Swordtail) are listed in the 1990 Red List (IUCN, 1990).

One of these (*X. couchianus*) is considered to be extinct in nature and has been maintained at the New York Aquarium since the late 1950s. Stocks of this species have now also been dispersed to the Desert Fishes Breeding Center (above), the Columbus Zoo Aquarium and the Steinhart Aquarium (both USA). Additional taxa which have been proposed for involvement in the Desert Fishes SSP include 10 species of Mexican goodieids, eight of which are currently listed as threatened by IUCN.

Although in its development stage, the Desert Fishes Program shows great potential. If the anthropogenic (human-derived) threats can be removed from the discrete habitats of these fishes, and the habitat subsequently restored and secured, reintroductions from carefully managed captive populations will have a significant impact on their conservation.

Nonetheless, there is a need, wherever possible, to take account of the genetic management of captive stocks, and such management with a longer-term evolutionary perspective is essential for the effective conservation of endangered fishes.

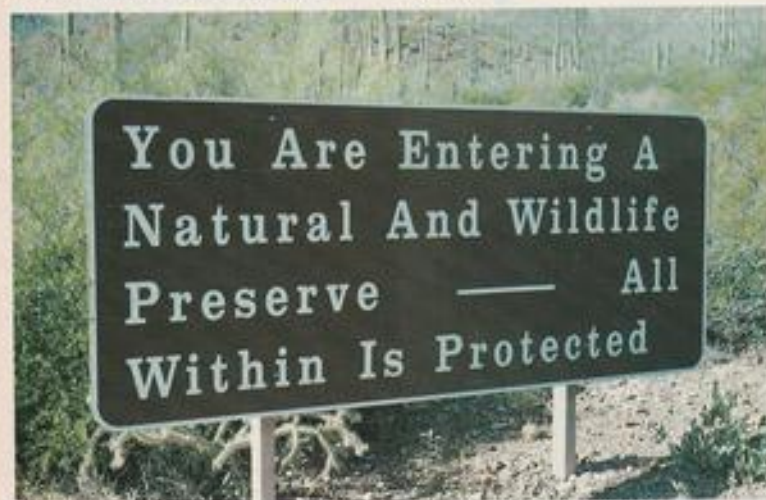
## 3 Appalachian fishes

The streams and rivers of southeastern USA contain a large and diverse range of fishes, some of which are naturally uncommon and/or suffering from the effects of habitat disturbance and destruction. To date, only very preliminary efforts have been made to instigate the Appalachian stream fishes as an AAZPA programme, which is likely to involve (among others) the recently opened Tennessee State Aquarium (USA).

However, the US Fish and Wildlife Service and the University of Tennessee are involved in an active recovery programme and a restoration effort (including captive rearing and reintroduction) of the threatened Smoky Madtom (*Nottus baileyi*) and Yellowfin Madtom (*N. flavipinnis*).

(TO BE CONTINUED)

\* International Union for the Conservation of Nature and Natural Resources (World Conservation Union).



Locking up areas of habitat is probably not the final solution to protecting the world's threatened species.

Coming up in Part 3:  
How we can put  
thoughts into action

# QUESTION TIME

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Each query receives a personal answer and, in addition, we will publish a selection of the most interesting questions and responses each month. Please indicate clearly on the top left hand corner of your envelope the name of the experts to whom your query should be directed.

All letters must be accompanied by an S.A.E. and addressed to:  
Questions Time, The Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.

Herpetology, Julian Sims. Koi, John Cuveller. Tropical, Dr David Ford. Coldwater, Pauline Hodgkinson. Plants, Barry James. Marine, Gordon Kay.

## COLDWATER



Quality home-produced fish, such as this London Shubunkin, will tend to be more expensive than those produced on a large commercial scale.

### High cost of quality

I recently decided that I would like to own some good-quality line-bred Fancy Goldfish. I therefore went along to a non-commercial breeder but was surprised at the asking price for some English-bred fish.

Why would such fish cost so much?

The price of English-bred fish — even that of some of the best strains — is not always higher than similar quality imported fish. However, you must remember that, unlike the commercial breeders abroad, the home-bred British breeder has to take into consideration the cost of the electricity needed to warm the water in the rearing tanks or ponds.

Then, of course, home-bred fish are reared with the principle of quality, rather than quantity in mind, and those which do not come up to standard are culled, rather than grown on as those of the commercial breeder.

Food costs are also much higher, for the commercial breeder buying in bulk always gets a better deal, so practically everything concerning breeding and rearing is at a higher cost for the amateur or hobbyist goldfish breeder.

Speaking from experience, I can assure you that, at the end of the season, if selling a few surplus fish has helped to reduce the costs involved, the hobbyist can feel well satisfied; few could ever hope to make a profit. A good thing to take into consideration is the fact that you are buying into a strain, getting a pedigree animal which is often well worth any extra cost.

## KOI



### Nitrate control

My problem with my Koi pool is its high nitrate level. Ammonia and nitrite levels are both fine, but the nitrate is far too high for my liking.

I have been carrying out water changes of around 25-50% all summer and autumn but feel that this can't be right. Your advice would be greatly appreciated.

Unfortunately, high levels of nitrate are increasing everywhere, thanks to numerous factors, including fertiliser run-off, together with a series of near-drought condition seasons.

Thankfully, high levels of nitrate are not normally regarded as particularly hazardous to fish (within reason), so you should not be unduly concerned.

Your heavy water changes, however, will certainly not help matters, as there will already be large amounts of nitrate present in the tapwater, so, if possible, try to keep changes to a minimum. Don't forget that the nitrification taking place within the filter is also adding to the levels.



Nitrate removal made easy.

Should you still feel concerned, I'd recommend fitting a nitrate-removing system to your feed water supply which would also remove any chlorine at the same time; not a bad idea! Purity on Tap now offer such a system which can be supplied to our own specifications. I've already fitted one of my own. Their number is 0488 648319; it's certainly worth a call. (See also **Product Round-up** page 62 in the September issue of *A & P* for further details of this system.)

### Winter preparations

With winter just around the corner, we are thinking of installing a heater inside our pool filter. Is this a good idea?

Our pond is 9½ft long and 3ft deep and totally bare. Should we add anything to it for the winter months?

I think it is essential to provide some form of cover if large Koi are to survive unscathed through heavy frosts and prolonged cold weather, particularly in a shallow pool such as yours. A large (6 x 4ft) of 4in polystyrene sheet, as supplied for house insulation, would be ideal, as this can be easily weighted down against the effect of the wind.

In addition, I'd recommend fitting two pond heaters in the pond proper, as opposed to the filter box.



## MARINE



### Living rock die-off

I have had a marine fish tank for just under a year.

About four months ago, I noticed that the living rock was beginning to die off. I was advised to test the water for nitrates and to change three buckets of water every other day.

I managed to get the nitrates down from 100mg/litre to 12.5mg/litre. Recently, though, tests have shown that the levels have risen once more. Could I keep levels down by using distilled or spring water for the changes?

You don't actually say what you keep in your aquarium. Although your letter states that it is a "marine fish tank", it also states that the living rock in it was dying off.

Generally speaking, nitrates will not harm fishes, especially when they accumulate slowly (which they usually do). However, it should be noted that certain families do not thrive in water with a high nitrate content. For example, Butterflies will not do well when nitrates are above 20ppm/20mg per litre.

Despite this, and because it is never a good idea to have concentrations of any substances — however small — that do not

occur naturally in the wild, we must take steps to eliminate nitrates if we possibly can, no matter what we keep.

As you have already found to your cost, non-fish life fares very badly in the presence of even very low nitrate concentrations.

To achieve low levels, you could use distilled water, or spring water, as you suggest, but this would cost a fortune over the long term. It would be far more cost-effective to treat your tap-water before use either with a reverse-osmosis unit, a de-ioniser or, a 'Nitragon' unit.

### Safe ozone

What do you think is the best way of introducing ozone into an aquarium?

You should introduce ozone via the column of an air-operated protein skimmer. Never introduce it via an air diffuser direct, as ozone will harm your fishes' gills.



### Surgeon choice

When my new tank matures, I hope to keep an Emperor Angel, a Powder-blue Surgeon, a Regal Tang and a

Yellow Long-nosed Butterfly. I also hope to introduce two Cleaner Shrimps. Is this a good selection?

I would think again about keeping a Powder-blue and a Regal Tang together. Two surgeons can be a problem at any time, but trying to keep two of the same colour is asking for trouble.

If you must keep two surgeons, go for two species that are not only different in colour, but also in size.

Powder-blue Surgeons are best kept away from other surgeons and tangs, particularly blue ones.



STEPHAN MOORBOOD



### Favourite oxygenators

I have grown 'Crispa' in my pond for years, but would like to try a new oxygenator next season. What would you recommend?

My own personal favourites are: *Potamogeton crispus* — the Curly Pondweed — which resembles bladderwrack without the bladders, and *Hottonia palustris* — the Water Violet. Both are native plants, although somewhat localised in their distribution.

*Hottonia* does better in soft-water areas, but, if successful, the pale-blue flowers will be freely produced, justifying its common name. The foliage is bright green and finely divided.

### Non-flowering lily

My garden pond has a large overhanging willow tree, and the pond only gets about four hours of sun in the afternoon.

My water lily, a white one, has never produced any flowers, although I add fertiliser regularly. What am I doing wrong?

You did not say in your letter how long the lily has been established. Newly-planted lilies often fail to bloom in the first year.

However, I think the problem is one of insufficient light. You probably will have to change your variety of lily. James Brydon — red — will often succeed in this situation.

Alternatively, try a *Nuphar*. *Nuphar japonicum* is a handsome plant with arrow-headed floating leaves and small, yellow, flowers tinted with red.

James Brydon — a good lily for 'limited-sun' situations.

## PLANTS



GORDON WIGENS



HARRY GREEN/FLORIDA TROPICAL FISH FAUNA ASSOCIATION

Oscars — of any variety (this is an Albino Tiger) — are great fish . . . but very messy feeders.

## Words of wisdom on Albino Oscars

I would like to buy some Albino Oscars and would welcome any advice you might be able to give me on keeping and breeding them.

Oscars — albino or otherwise — will eat anything. If the water quality deteriorates (and remember, Oscars grow rapidly and produce copious amounts of dissolved excreta) they will become unhappy, shown by hunger strikes. To resume feeding, improved water quality is necessary via a bigger tank, better filtration, more frequent water changes, and fewer fish per tank.

The fish are messy eaters so filtration must be good, and this must be accompanied by lots of partial water changes. Under-gravel filters are not suitable; an internal or external power filter is best.

Oscars won't generally breed until they are about 6in — 15cm — about 2½ years old. You have to buy a pair or bring up a shoal of the fish and let a pair form; you can't tell the sexes apart.

If a pair does form, they should be isolated in a 2ft, preferably 3ft, tank. If fighting occurs, use a partition to separate them, but if they show breeding tubes, spawning will occur.

You can leave the pair with their eggs. Feed the young on freshly hatched brine shrimps and flake foods. Although up to 500 eggs may be laid, only a

dozen or so Oscars will usually make it eventually. You then need lots of big tanks! Repeat spawnings can occur when the first family is grown up, i.e. 2 or 3 months.

## Stress-relieving fish

I am doing a project on the 'Power of Pets' and will be tackling topics such as their stress-relieving qualities.

Can you recommend any relevant leads with regards to fish?

Fish have been proven to be restful, reducing blood pressure and heart rates.

We do not have any literature on the subject but information is available: Write to **The Society for Companion Animal Studies, Secretary Dr Alan D Walker, New Malden House, New Malden, Surrey KT3 4TB.** Ask for a copy of their *Pets — Natural Healers* from 'Living Together — People, Animals and the Environment', Boston, USA, 20-23 August 1986.

You could also contact **Customer Services, Pedigree Petfoods, Freeby Lane, Waltham on the Wolds, Leics LE14 4RS.** They have pamphlets on the subject.



## Herptile import controls

We live in Germany, but will shortly be returning to England. We would, obviously, like to take our two Red-eared Sliders with us. What are the current regulations regarding the importation of herptiles into the UK?

Significant changes regarding the movement of wildlife (animals and plants) within the European Community came into effect on 1 January 1993 with the introduction of the single market.

One result directly related to the reduction of trade barriers is that Customs surveillance on the movements of items between EC Member States has decreased. Even though fewer routine checks are made, the following points should be carefully noted when wildlife is imported into and moved around the EC:

- ① Permits and certificates are still required for species protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- ② Permits are no longer required for the import and export of non-CITES species and their products between the EC and other countries.
- ③ Within the United Kingdom, the import and export of many species not listed on CITES was previously controlled by the *Endangered Species (Import and Export) Act, 1976*. Since 1 January this year it has not been possible to retain this control. However, sales controls under the Act have been extended and now include 196 species.

I would suggest that you contact Felicity Chapman at the Traded, Registered & Exotic Wildlife Division of The Department of the Environment to find out exactly what documentation you need to complete before you bring your freshwater turtles back to the UK.

Her address is as follows: **Felicity Chapman, Wildlife Division, Department of the Environment, Tollgate House, Bristol BS2 9DJ. Tel: 0272 218691.**

## Box Turtle diet

Would you please give me some useful tips on the feeding of Ornate Box Turtles?

Adult American Box Turtles are omnivorous in their choice of food, i.e. they eat both meat and vegetation. Thus, the food offered must not be exclusively meat-based, but should be as varied as possible.

However, young Box Turtles show a preference for a more carnivorous diet of lean beef, white slugs and earthworms.

Favorite vegetable material which is quickly taken includes ripe, red slices of tomato, lettuce leaves and slices of sweet apple.

Feed Box Turtles as often as they will take food. In this way, they will tend to put on weight during the warmer summer months. A good summer is essential to ensure survival through the leaner winter months.

In addition to fresh meat and vegetation, the diet of Box Turtles should also contain an adequate supply of calcium.

Ornate Box Turtles enjoy a varied diet of meat- and vegetable-based foods.



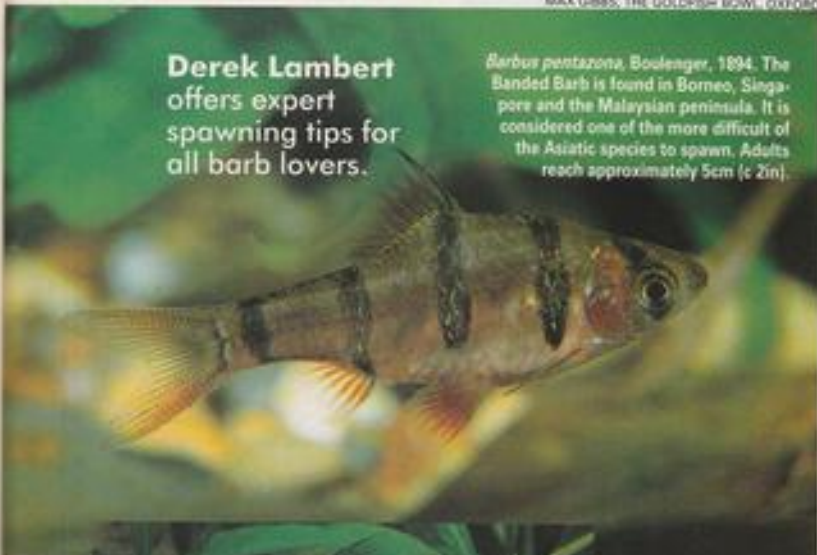
SHARON WATSON

# Keeping and Breeding: **BARBS**

MAX GIBBS, THE GOLDFISH BOWL, OXFORD

Derek Lambert offers expert spawning tips for all barb lovers.

*Barbus pentazona*, Boulenger, 1894. The Banded Barb is found in Borneo, Singapore and the Malaysian peninsula. It is considered one of the more difficult of the Asiatic species to spawn. Adults reach approximately 5cm (c 2in).



*Barbus lateristriga*, Valenciennes, 1842. The Spanner Barb is found in Sri Lanka. It is one of the larger species of Asiatic barb achieving 18cm (7in) in the aquarium.

MAX GIBBS, THE GOLDFISH BOWL, OXFORD

MAX GIBBS, THE GOLDFISH BOWL, OXFORD



*Barbus tetrazona*, Bleeker, 1855. The Tiger Barb achieves 6cm (2.4in) in the aquarium. This is the cultivated 'Green' or 'Moss' variety.

Few fish have enjoyed the sort of continuous popularity that barbs have. Almost since the beginning of the hobby itself, this group of fish has been regularly kept by aquarists, always scoring high in the popularity polls. The reason for this popularity is obvious to anyone who has watched a shoal of barbs swimming in the outflow of a power filter; it is the closest sight in the aquarium hobby to a school of dolphins playing in the ocean.

## Info lowdown

Many barbs are ideally suited to life in a community aquarium, being of small size, peaceful but lively temperament, and with some striking colours. Most species kept by aquarists are in the 5-10cm (2-4in) size range when adult, but larger species are also kept.

One of the biggest, but still practical, species is the Tinfoil Barb (*Barbus schwanenfeldi*). This species can attain 35cm (14in) in the aquarium, but it is still a tiny fish when compared to one of the largest barb species. This is *Barbus sor* which comes from India and can achieve 1.6m (c 5.25ft) in the wild!

Barbs belong to the largest family of fish known, the Cyprinidae, with approximately 1,600 species documented so far. They occur in most parts, but not in Australia, Central America, Madagascar, New Guinea, New Zealand or South America. Almost all species live in freshwater, with just a few able to tolerate brackish conditions; and one species of Redfin has been found in marine conditions.

The Cyprinidae belong to the order Cypriniformes which, together with the orders Gonorynchiformes and Siluriformes, make up the super order Ostariophysii. What all these fish have in common is a Weberian Apparatus (also called Weberian Ossicles). This structure is derived from the first four vertebrae (back bones) and links the inner-ear region to the swimbladder.

The Weberian apparatus amplifies sounds and vibrations, thus helping the fish to 'hear'. This is the reason why, if you tap on the front glass of an aquarium, the barbs dart away and may injure themselves on a rock or the end of the tank.

I had one Barb-like fish (*Leptobarbus hoeveni*) which was so sensitive to vibrations, that he would shoot forward every time someone walked near his aquarium. Unfortunately, even in a 2m (6.5ft) long tank, he would regularly bang into the end glass and damage his nose. By the time he died (aged well over 10 years) his whole mouth and nose were twisted to the left.

## Basic needs

Barbs like warmth, light, space and plenty of oxygen in the water. Most species are shoaling, riverine fish which are much happier in groups of six or more. When kept singly, many of the more robust and lively species can become fin-nippers.

This is particularly true of the Tiger Barb (*Barbus tetrazona*). Lone specimens of this species can become quite troublesome in a mixed community aquarium, but a shoal rarely, if ever, causes trouble to the other inhabitants.

## Tank design

The ideal barb tank is quite large (1m — 39in-plus), with plenty of open areas for the fish to swim in. Some plant cover is appreciated, so that fish which are being picked on or have a more timid nature (I know this is something of a contradiction in terms — a timid barb?) can find respite from the rough and tumble of the shoal.

Filtration should be provided by either a power filter or a sub-gravel filter with a power head. Water changes are particularly

appreciated, and most species enjoy 1/3rd of their water being changed weekly. While quite tolerant to a variety of aquarium conditions, a temperature of 75-85°F (24-29°C) and water which is on the slightly soft and acidic side are preferred.

## Transport

When transporting barbs from the aquarium shop home, remember that they require relatively high levels of oxygen in the water to survive the journey.

Unless the bags are particularly large, or the fish very small, insist that they are bagged up with no more than two fish per bag and, if the fish are large, then only one fish per bag is safest. This is particularly true during hot weather.

## Diet

In the wild, barbs are omnivorous (feed on both plant matter and meat) and will eat just about anything which comes their way. In the aquarium, they will readily take flake, pellet, and any other prepared foods offered.

Live or frozen foods, however, should be added to their diet on a regular basis to keep them in the peak of condition.

## Livebearer?

All barbs are thought to be egglayers, although *Barbus retiparus* was thought to be a livebearer when first described by Weber in 1897 (*Zool. Jahrbuch, Syst. X, 152*). This is because, during a dissection, he came across some young 8mm fish with large yolk-sacs in the ovary of an adult fish. So far, no other scientist has come across this phenomenon and it now seems likely that Weber was describing the fish's last meal, rather than its developing babies.

## Personal experience

Personally, I have spawned a number of different species of barb over the years, and most breed in much the same way, being egg scatterers.

Broadly speaking, however, they can be separated into two groups: the Asiatic species, which are generally very easy to spawn (and make up the bulk of the species available through the trade), and the African species, which are much harder to breed and are relatively rare in the trade.

Of the Asiatic species, my favourite is the Cherry Barb (*Barbus nana*) which comes from the plains of Sri Lanka. In recent times this fish has, reportedly, become quite rare in the wild. However, many millions are bred each year for the aquarium trade, so the species is quite safe in captivity.

I have spawned Cherry Barbs on several occasions now and use pretty much the same set-up each time. The adults are separated into two tanks, with males in one and



The pair presses closely together just prior to releasing eggs and sperm.

females in the other, for conditioning. This is done with lots of live food and additional feeds of flake food during a two-week period.

During this time, the water is changed over from their normal hard, alkaline, tap-water to soft, slightly acidic water. This is usually done by adding rainwater to the tank to lower the pH and hardness.

I never make large changes to the pH or hardness all at once, as the fish can die from shock. Instead, I drop the pH by no more than 0.5 of a degree every few days until the water has a reading of about 6.5-6.8. By changing the tank water with rainwater, the hardness also drops as well until it reaches about 100 ppm.

The spawning tank is carefully scrubbed out with an aquarium cleaner and thoroughly rinsed out. It is then filled with rainwater and tapwater until the water conditions are the same as in the conditioning tanks. Several nylon wool mops are sterilised with boiling water and placed on the bottom of the tank.

At this time, no filtration or aeration is used. Ideally, I like to place the spawning tank where it will catch the sun first thing in the morning.

## Spawning

Once the tank is set up and the females are looking well filled out with roe, and the males are starting to spar with each other, I select the best pair of fish to spawn. The best male in the tank usually has the brightest colours and tends to dominate the other fish, while the best female has

the fattest body. The pair is placed in the spawning tank in the evening just before the lights are turned out.

All being well, the male will initiate courtship first thing in the morning. This usually consists of flashing his fins in front of the female and 'dancing' around her, occasionally nipping and nudging her. The female will swim up and down the tank, becoming more and more aroused. At this time, both fishes' colours are heightened and spawning usually starts within an hour of first light.

The spawning clinch usually consists of the pair rolling over on their sides, with the male's fins wrapped around the female. Occasionally, the whole of the male's body wraps around the female as they roll over. At this point, eggs and milt are expelled and fall into the spawning mops.

After several hours, the pair stop spawning and settle down to eating the eggs. Obviously, the sooner you remove them from the tank, the more eggs you will have! In a good spawning, these can number 250+ and, in most cases, the majority will hatch after 24 hours.

## Fry rearing

At first, the fry hang on to the mops or the sides of the aquarium but, after about 24 hours, they become free-swimming and move towards the surface. At this stage, they are too small to eat all but the smallest of foods.

Personally, I start my babies off on



As the pair rolls over, the adhesive eggs are expelled above the spawning plant.



*Barbus semifasciatus*, Guenther, 1868. The Golden Barb originates in South-east China, from Hong Kong to the island of Hainan. The fish pictured are of the cultivated yellow morph, which is commonly known as "Barbus shuberti" or Shuberti Barb which achieves 7.5cm (c 3in) in the aquarium.



DERRICK LAMBERT



Centre, *Barbus callipterus*, Boulenger, 1907. The Clipper Barb originates in West Africa, from Cameroon to Niger, and achieves approximately 6.5cm (2.6in) in the aquarium. The fish pictured is a male which spawned for me about 10 years ago.

Above, *Barbus titteya*, Deraniyagala, 1929. The Cherry Barb originates on the plains of Sri Lanka. It may be threatened in the wild, but many millions are bred in fish farms around the world each year for the aquatic hobby. It achieves 5cm (2in) in the aquarium.

Liquifry. I put a few drops of this food in the tank as soon as the eggs are laid to start off the development of infusoria (microscopic organisms). As soon as the fry are free-swimming, I feed a few drops of Liquifry about three times a day. This is stirred into the water to make sure it spreads throughout the tank.

After about a week, the fry are large enough to eat newly-hatched baby brine shrimps and, from then on, the growth rate is very rapid on a mixed diet of live and dried foods.

The only problem that I have encountered with the babies of this species during the first few months of life is sus-

ceptibility to Velvet Disease. This is why I sterilise everything in the tank when setting it up and use artificial media instead of living plants. Since adopting this method, I have not had any problems with Velvet anymore.

## African success

I have only spawned one of the African species of barb and that was the Clipper Barb (*Barbus callipterus*). The method I used was exactly the same as above, but triggering the fish to spawn was much more difficult.

The tank had been filled with rainwater with a pH of 6.5 and hardness of approximately 50 ppm and the fish were conditioned on bloodworms, *Daphnia* and minced beef heart. After several weeks, the female had filled up with roe and the male was looking in prime condition (I only had the one pair).

After I had placed them in the spawning tank for a few weeks and nothing had happened, I added about 10% melted snow water which was about 5°C (c 9°F) cooler than the tank water. This cool water treatment is commonly used to trigger catfish

to spawn; it worked a treat with the barbs.

Unfortunately, I did not observe the spawning itself, but over 300 eggs were scattered in the mops and on the bottom of the tank. These were not so adhesive as many species of barbs, eggs are, and tended to fall out of the mop when it was moved.

Virtually 100% of the eggs hatched after 24 hours and the fry were free-swimming on the third day. The same diet was fed as to the Cherry Barbs and the fry achieved a size of 3cm (1.2in) in only four months.

## Good sale potential

As a group, the barbs make beautiful additions to a community tank, but they are also ideal subjects for your first attempt at breeding egg-layers. Most of the commonly available species are relatively easy to breed and, providing you rear them up to the same size as those available in the shops, you should be able to sell them without too many problems.

One thing to remember when selling fish to a shop is make sure you obtain a reasonable price for them. The shopkeeper is NOT "doing you a favour taking them off your hands". If the fish are well grown and of a popular species, then the shopkeeper will have no trouble selling them and will not have any of the problems which can be associated with imported fish.

### BARB TIPS

- 1** Many barbs are ideally suited to life in a community aquarium, being of small size, peaceful but lively temperament, and with some striking colours.
- 2** Barbs like warmth, light, space and plenty of oxygen in the water. Most species are shoaling, riverine fish which are much happier in groups of six specimens or more.
- 3** Adult barbs are separated into two tanks, with males in one and females in the other for conditioning. This is done with lots of live food and additional feeds of flaked food. During this conditioning process, the aquarium water is changed over (if necessary) to soft, slightly acidic water.
- 4** The spawning tank should be carefully scrubbed out with an aquarium cleaner and thoroughly rinsed out. This helps reduce the risk of diseases attacking the eggs and fry.
- 5** Place the spawning tank where it will receive early morning sun, if possible.
- 6** Once the pair has stopped spawning, they will settle down to eating the eggs. Obviously, the sooner you remove them from the tank, the more eggs you will have!

# KOI CALENDAR

## Where have I been?

The highlight of the Koi calendar is the BKKS National Show at Billing Aquadrome. This year, the 'National' moved away from its traditional Japanese-style judging in favour of an English-style show which attracted 324 entries from hobbyists and dealers around the country.

Over 8,600 spectators attended over the weekend, and they were entertained by some beautiful fish, many dealers both old and new and, if young at heart, by Ferdie-Dee the clown.

I arrived on Sunday morning and chose to change my usual routine from looking at the Grand Champion and other winning fish, to circulating around the dealers' stalls first. Dealer stands were set up in many ways and placed before the hobbyist everything from Koi, through lanterns, to every conceivable pump, filter and food.

Dealers over, it was on to the show Koi, and there really were some lovely fish to see. The good side of English-style shows is that the onlooker has the opportunity to see people's personal collections of Koi since each entrant's fish are all in the same vat. We all have different tastes, and these did come through as I walked around the vats. Once again, the Koi were housed under a marquee and vats were arranged around the outside perimeter to give visitors an excellent view.

Just one of numerous vats of superb Koi at the National.



Grant Clifton — winner of several trophies at Koi '93 — including that for Supreme Champion.

The major prize winners were as follows:

- Supreme Champion** — Size 6 Kohaku — Grant Clifton.
- Second Best in Show** — Size 6 Sanke — Eric Sida.
- Mature Champion** — Size 6 Sanke — Eric Sida.
- Adult Champion** — Size 4 Sanke — Ian Stewards.
- Baby Champion** — Size 2 Kohaku — Mr Price.
- Champion Jumbo** — Kawarimono — E Sida.
- Best Tategoi** — Size 4 Shows — Richie Penn.
- Dealer Champion** — Size 6 Kohaku — PWL Fish Industries.
- Best in Size 1** — Kingirin — A Peppercorn.



- Best in Size 2** — Kohaku — Mr Price.
- Best in Size 3** — Kohaku — D Slater.
- Best in Size 4** — Sanke — Ian Stewards.
- Best in Size 5** — Sanke — Mr Beck.
- Best in Size 6** — Sanke — Eric Sida.

## Jobs for the month

Winter covers are in place and our Koi are now ready for the long British winter. If you have a heating system for your pond, I guess that your Koi will still be feeding. If you do not have a heater, then the metabolism of your Koi will almost certainly have shut down, to tick over at best, and it is wise to be cautious with feeding under these conditions.

Pond maintenance is still important, as dead and dying algae must continue to be removed. If possible, arrange pond covers such that minimum disturbance is caused when keeping an eye on the fish and 'vacc'ing off the pool.

Subject to well designed covers which will not disturb your Koi too much when you visit the pond, keep a regular eye on them so that any developing problems can be caught before they get a real hold. It does not take long for Koi to catch on that they are not going to be fed when you look in on them and they invariably remain calm during your visit.

## Vortex update

A couple of months ago I mentioned my 1993 project that was intended to improve my filtration system by the addition of a couple of Spirex vortex cham-

bers, and last month I discussed my overcrowded pond situation and how much effort was required to keep 'good water'.

Well, one of the vortex chambers is now fitted (hopefully both, by the time you read this) and a few of my Koi collection have moved to new homes.

Already I can see an improvement in the quality of my water. Test results for the usual parameters of ammonia, nitrite, nitrate, oxygen and pH have always been good, but clarity, and that indefinable 'something' we Koi keepers look for, which were lacking of late, are now returning.

The importance of good water quality has been mentioned many times before. Not only do Koi thrive in good water, but they can also actually improve as well. Skin quality is probably one of the first improvements generally noticed by the owner when the water quality is high.

## Cheeky problems

Cheeky, my 20in Inazuma (lightning) Kohaku, who from observation only partly spawned last year, got bigger and bigger this year until she was really quite misshapen.

Indeed, the scales at both the pectoral and ventral ends of the body cavity had started to stand out, literally due to the enormous swelling of the body, and an increasing amount of time was being spent 'lying around', albeit coming eagerly for food when we approached the pond.

When my friend Paul Stacey saw Cheeky, he suggested that she be given a hormone injection to help ripen the eggs. He put me in touch with a local fish farmer and, after much discussion with him, it was decided that due to the by-now quite low water temperature in my pond, it would be best to take Cheeky back to his premises where he

## Getting filters off to a flyer

The once-mysterious 'New Tank Syndrome' is now a well-understood reality, as is the solution to it. Helping effectively to deal with this 'problem' is BIO-BAKTOL PLUS — FILTER STARTER from **BIOPLAST**.

As may be surmised by its name, this is a highly-concentrated micro-culture of anaerobic micro-organisms vital for the biological filtration and biological balance of any aquarium. By quickly providing the all-important filter bacteria, there need be no lengthy waiting period between setting up and introducing the fish; bacteriological reduction of wastes begin at once, and the build-up of ammonia and nitrite is prevented.

Although obviously required with any new set-up, BioBaktol can also be used advantageously after cleaning out filters, replacing old filter media and after treating the aquarium with medication.

Details from: **BIOPLAST (UK) LTD., Unit 1, Old Railway Goods Yard, Kildwick Crossing, Keighley, West Yorkshire BD20 7DA. Tel: 0535 630230; Fax: 0535 633690.**

## Nothing kinky about hoses

Garden hose often seems to have a life of its own, but **HOZELOCK** have the answer. Their **MULTIPURPOSE, SUPA-FLEX** and **PROFESSIONAL HEAVY DUTY HOSES** will all perform to perfection for their chosen water-distributing roles without tying themselves in knots.

The **HOSE GUIDE** is literally a 'third hand' to assist when feeding out or rewinding from the reel. An **ACCESSORY RACK** is a wall-mounted tray in which to store sprinkler, car-brushes, hose-fittings, etc. in one convenient place.

The top-selling **System 2 WATERSTOP CONNECTOR** can now be distinguished from the **Standard HOSE END** by its bright red central core; no need to worry if the water will stop automatically when you disconnect the applicator — inadvertent, accidental soakings are not thing of the past!

Details from: **HOZELOCK LIMITED, Haddenham, Aylesbury, Buckinghamshire HP17 8JD. Tel: 0844 291881; Fax: 9844 290344.**

# WATER'S EDGE

BY DICK MILLS

## Turn up the brightness



I remember the look on our kids' faces when they saw *Star Trek* on our first colour TV as I turned up the colour for the first time. You can now add extra brightness and bring out the colours of the fish even more with a **BEAUTY LIGHT** from **INTERPET** without the garishness of some other colour-enhancing fluorescent tubes.

The nine sizes of tube (1in and 1.5in diameters, with lengths between 18in and 60in) feature a colour spectrum designed to enhance the reds and blues with a bright effect and good green rendition. This is well suited for aquariums with either living plants requiring low-light levels

(*Cryptocorynes* or *Anubias* spp.) or, more especially, plastic plants. The tubes have a 10,000 hour average-useful lifespan.

The **Beauty Light** extends the lighting range developed by **Interpet** for all levels of fishkeeping, following hard on the heels of the very successful high-tech aquatic tubes such as **Triton** and **Blue Moon** lamps.

Details of all products, including over 40 new ones, can be found in the new **Interpet Product Catalogue** available from: **INTERPET LIMITED, Vincent Lane, Dorking, Surrey RH4 3JX. Tel: 0306 881033; Fax: 0306 885009.**

## Tubifex in Space?

Actually, live foods boldly coming from where man has

rarely gone before, or rather, live foods being stored more efficiently and for longer thanks to space technology.

Pioneering imports of the new



products, **BARRACLOUGH'S FISH AND AQUARIUM SUPPLIES** sachet-packed live foods, such as **Tubifex**, **Glassworm** and **Bloodworm**, can now last up to six weeks in storage, providing they are kept in the cool and away from strong light.

Details from: **BARRACLOUGH'S FISH & AQUARIUM SUPPLIES, Haycliffe Lane, Bradford, West Yorkshire BD5 9ET. Tel: 0274 576241; Fax: 0274 521245.**

## 2,000litres/hour — but quietly!

Yes, that's the rating on the new **OTTO PH2000 POWER-HEAD** from **LAHAINA**, but that's only a small part of the exciting range of **OTTO** products now released. Equally impressive in performance are the **EXTERNAL CANISTER POWER FILTERS**, of which the **PF300G** and **PF450G** turn over 1200l/h and 1800l/h respectively.

The **OTTO AIR PUMPS** are high on power, but very low on noise: many have **Hi-LO** switches, while the **SPECIAL SA9500** model is just something else entirely. How about a mains-operated airpump, delivering 9.5 litres/min, which automatically switches over to its own internal 12v DC supply should the mains fail, and run for up to 10 hours in this mode? It also has a 12v DC input so that a car battery can be used for up to 14 days. Now you can take your fish to shows without them suffocating in any prolonged traffic jams.

Worried about high temperatures in the aquarium due to hot weather (!), or even a high number of fluorescent tubes being used? The **OTTO TA303 THERMASTER CHILLER** is suitable for fresh or saltwater aquariums up to 400 gallons and will take the temperature down to 50°F (10°C) — very handy for native marines. A micro-computer-controlled thermostat operates to within 0.5-1°F either side of the desired temperature and the whole unit is exceptionally quiet in operation.

Should things go into reverse, the unit can be used as a highly accurately controlled heating system by the addition of an **OTTO AQUARIUM HEATER**. The cost of this unit is a remarkable reduction over previous prices, considering its exceptional performance.

Details from: **LAHAINA AQUARIUM SYSTEMS LTD, 'Lahaina', Kellas, Elgin, Morayshire, Scotland IV30 3TW. Tel: 0343 89209; Fax: 0343 89296.**

## MARINER HEATER/THERMOSTAT

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## Clear tanks, naturally

Accelerating and improving the 'waste disposal' efficiency of the aquarium must be a good thing, and CRYSTAL CLEAN FISH TANK CLEANER from TIMEGUARD promises just that.

The powder contains both heteromorphous and nitrifying micro-organisms which carry out the whole range of biological cleaning — converting wastes to carbon dioxide and water and denitrification. Next comes nitrification, removing toxic ammonia, through nitrites, to nitrates.

The acceleration comes by the ability of the organisms to multiply on a continuous basis,

## WATER'S EDGE

### Pre-filtered protein removal

according to the level of work (ie waste material which is their 'food'). There is therefore no danger of overdosing, as the bacterial population is automatically and naturally regulated. The result of using Crystal Clean is a balanced and healthy, clean aquarium, with fewer water changes and filter cleaning being required.

Details from: **TIMEGUARD TRADING LIMITED, Charterland House, 2251 Coventry Road, Sheldon, Birmingham, West Midlands B26 3NX. Tel: 021 742 0622; Fax: 021 742 0626.**

oxygen-rich water is directed down and out into the aquarium again.

Excellent points are that the prefilter protects the impeller against debris damage, while the flowmeter clearly indicates any loss of performance due to any prefilter clogging (clean it!). Filtered air intake to the venturi assists creation of superfine bubbles; foam can be seen collecting in a special area, but the collection chamber is made of black material to prevent algal build-up — quite a likely occurrence, as the cup is situated right near the aquarium lights. Directional discharge return assists water circulation in the aquarium.

Details from:

**UNDER-WORLD PRODUCTS, Units 1 & 2 Belton Road West, Loughborough, Leicestershire LE11 0TR. Tel: 0509 610310; Fax: 0509 610304.**



## Fishes don't breathe air do they?

Maybe they don't, but there's no reason why any air entering into their aquarium shouldn't be of the highest quality. Apart from tobacco smoke, there is a whole host of air contaminants around ranging from furniture sprays to carpet cleaning fluids, not to mention so-called air fresheners. **STRE-AIR** is a small in-line filter from **DEPENDABLE PRODUCTS** which will remove all these impurities and safeguard the fish even further.

Bothered by kinky hoses? No, not ultra-fashionable stockings of legware, but by filter hoses restricting themselves around corners, and so on. **KINK-EASE** is a support around hoses which, by avoiding kinks, maintains optimum water flow. It fits all popular diameters of hose. Details from: **DEPENDABLE PRODUCTS, 1 Bracken Road, Ingrow, Kelghley BD22 2DF. Tel/Fax: 0535 600030.**

The now-familiar Visijet Power-head (with adjustable flow-rate monitored by built-in flowmeter) draws water through a prefilter sponge, and the turbo-injector system then produces a froth of micro-bubbles for maximum skimming efficiency. Dissolved organic compounds are separated from the water in the counter-current contact chamber into concentrated foam which is pushed up into the collecting chamber, while the discharged



# WHAT'S YOUR OPINION

BY BILLY WHITESIDE

## Windy loach

A lovely fish of which I am very fond is the Weather Loach. These amusing fish are very peaceful and feed as happily from the surface or the floor of the aquarium. On occasions, the fish will eject large bubbles of gas from the vent — rather like a bad case of bowel wind!

I am now hooked on coldwater fish after my many years with tropicals alone. For £2 or £3 you can buy a lovely Fancy, or a Weather Loach, or a Moor or a Rainbow Dace. They are beautiful and restful to watch and need a minimum of care.

## 'Ironic' lily

I've got a selection of lovely close-ups of tropical water lily flowers. I particularly like the one in the photograph. The irony is that I photographed it in Northern Ireland, recently, a few miles from my own home!

It's one of several being grown as an experiment in small ponds in a conservatory by **Desi Bryans, of Grosvenor Tropicals**, near Belfast. The conservatory, attached to the firm's quarantine fish-house in the Holywood Hills, near Belfast, obviously shares the same climate as my small greenhouse.

The miniature Thai ponds and the conservatory ponds suggested to me the idea of trying a tropical water lily in my own greenhouse. I had a look round plastic containers in local stores and decided that a cheap, black plastic bucket that holds several gallons of water would probably be quite big enough and deep enough. They can be bought for a couple of pounds. A small, plastic dustbin might also suit.

My greenhouse is unheated in winter, so fish might not survive in it; however, a tropical water lily will die back in winter and produce new growth in spring. I understand that the gigantic Amazon Water Lilies, *Victoria amazonica*, are now usually grown as annuals in some bot-

anic and garden displays, e.g. Kenilworth Gardens, in Washington DC. If you give a tropical water lily a try in a large bucket in your greenhouse or conservatory as a result of my comments and photographs, please do drop me a line and let me know how it goes.

## Amazing bowls

On a recent visit to Thailand I was amazed to discover just how easy it is to cultivate tropical water lilies and fish in very small spaces. Of course, the ease is due to the lovely climate in Thailand; there is no such thing as tropical or coldwater fish there!

There is water at around 30°C for most of the year and that's the temperature at which fishes and tropical water lilies thrive.

I was most interested to discover large porcelain 'bowls' or dishes, rather like a giant cup of about a metre across the top, housing a flourishing water lily and a small shoal of fish. Such miniature ponds were quite com-

mon around hotel patios, in gardens, etc.



mon around hotel patios, in gardens, etc.

The decorative one in my photograph was situated in the grounds of the Grand Royal Palace, Bangkok. Such ponds housed a Lotus or other water lily, and a shoal of small fish that I could not see clearly because of the luxuriant foliage. They were probably some species of Mosquito-fish intended to consume mosquito larvae.



## Fancy loss

I was greatly saddened this month to lose the Fancy Goldfish that was recently savaged by a pair of coldwater catfish which shredded its fins and sucked out one of its eyes (see **WHAT'S YOUR OPINION?** — October).

The eye socket healed over well, but the poor fish, although it seemed to adapt, eventually died from what looked like Dropsy developing around its tail.

I decided to replace it when I came across a most beautiful Ryukin — a name which I'm not too sure how to pronounce. Rai-O-kin, maybe? **Dr Chris Andrews**, in his book *Fancy Goldfishes*, an Interpet Guide, published by **Salamander Books**, describes the Ryukin as "... a short, deep-bodied fish with a hump in the shoulder region ...".

Mine cost me £7 and now shares its tank with several Fancy Goldfish, a Moor, Rainbow Dace and Weather Loaches. My Ryukin seems to have contracted White Spot disease, so I shall contact an expert.

That's the lot for this month. Please do drop me a few lines on any of the topics I've tackled above — or on any subject that takes your fancy. We'd all enjoy hearing your opinion.

## WHAT'S YOUR OPINION ON:

- 1 Breeding Fancy Guppies;
- 2 Aquarium plants bought by post?

Write to me c/o  
A & P, 9 Tuffon  
Street, Ashford,  
Kent TN23 1QN.

# STONES

*with a sting*

Peter Elphick takes a 'too-close-for-comfort' look at the most venomous fish known — the notorious Stonefish.

It has been said that the fish which is the subject of this article, has no redeeming features whatsoever. It is the most poisonous fish in the sea, is loathsome to look at, and apparently has a disposition to match.

There are three or four different species (family Synancejidae), found throughout the Indo-Pacific area, including the Red Sea. One species, *Synanceia tetracanthus*, is found on the East African coast and has also been found off Australia. A different species, *Synanceia macleayii*, is found on the Great Barrier Reef.

## Feared fish

By whatever name it is called, the Stonefish is feared and respected wherever it is found. In Mozambique, where it is known as the *Shorota*, the children of the coastal tribes are taught at an early age to avoid them.

The Aborigines of the north part of Queensland, who call it the *Dornorn*, have a tribal dance designed to teach novitiates the dangers of this fish. A beeswax model of the fish is buried in the ground inside a sacred area. Elders dance around the area until one of them 'accidentally' treads on the mock Stonefish, and the dance ends amid the simulated shrieks and agonised gyrations of the mortally wounded man.

## Formidable armoury

The body of the Stonefish is soft and slimy to the touch, and is covered with wart-like excrescences. Along its back it has thirteen (yes thirteen — does it know?), dorsal fin spines. Each of these is a wonderfully developed venom injection device, and only the tips protrude from a covering of warty skin.

When a large marine animal approaches — or a human foot — the Stonefish's defence system is mobilised. The spines come erect, and anything that touches one of them is injected with the venom under great pressure. Poking one with a stick results in the milky-like venom shooting out to a distance of about four feet (120cm).

The Stonefish lives in the shallow waters off reefs. The main characteristic is its ability to blend in with the seabed in the

vicinity. Against a broken coral background, it is almost impossible to spot until one is only a foot or two away. In volcanic areas, the fish is darker in hue, which has led to the theory that, perhaps, chameleon-like, it is capable of changing its colour to suit its background.

The fish does not appear to be prevalent anywhere, but this may be due to the excellence of its camouflage system, and also to the fact that natives everywhere tend to kill them whenever one is sighted.

The largest specimens grow to about 15in (38cm) in length, and weigh in the region of two-and-a-half pounds (1.1kg). They feed entirely on small reef fish, and catch their prey by a quick heave and gulp. This is the only time they move fast. Otherwise, the fish is normally sluggish and lacks all grace of movement.

## Horrible consequences

The effects of a Stonefish sting are horrific. The sting itself is immediately followed by terrible pain, which then increases until it becomes unbearable. (An American lady stung in the foot off Jeddah, Saudi Arabia, wanted to cut her foot off with a diver's knife at this stage).



'Saudi' Stonefish photographed underwater.

The victim becomes delirious and, if in the water, which is often the case, may fall over and drown. In the next stage, the limb begins to swell, and eventually gets to an enormous size.

The venom also has a serious effect on the blood pressure, causing it to drop dangerously. If the venom has been injected into a vein, then death is almost certain to result within a very short time.

Even in cases where the victim has survived, longterm ill-effects have been recorded. Flesh around the wound seems to waste away, and sometimes nothing is left of an affected leg but skin and bone.

## Venom research

In 1952, the name of Professor J. L. B. Smith became well known as a result of his discovery of a live Coelacanth thought to have been extinct for 80 million years. A little later Professor Smith accidentally touched the spine of a Stonefish which had been caught off the East African coast and irresponsibly placed on a tray and covered with an ordinary cloth by one of his workers. (It has been found that the Stonefish can live for an hour or two after being removed from the water).

He survived, probably because his wife was around to give him shots of morphine and novocain. He discovered that the pain was reduced considerably by immersing his hand in hot water. His hand remained weak for several years.

In the sixties, a good deal of research was carried out on Stonefish venom in Australia. F. E. Russell, in an article on marine toxins published in *Advances in Marine Biology* in 1965, reported that the venom was a protein, and therefore sensitive to heat. Treatment by the application of heat is consequently sound, and it has been suggested that in cases where hot water is not immediately available, careful 'toasting' over a fire will do as a temporary first aid measure.

The venom was also found to be sensitive to changes in acidity, and that even mild acids and alkalis tended to destroy its venomous properties. An injection of one millilitre of emetine hydrochloride solution into each puncture, providing it can be carried out within thirty minutes of the sting, is likely to be efficacious.

Later on in the sixties, S. Weiner in the *Medical Journal of Australia*, described the production of an anti-venom serum which helps to reduce the effect of the drop in blood pressure.

### Repulsive fare

I know of no cases where Stonefish have been kept in private aquaria. One might make a nice conversation piece, but its complete lack of endearing habits, and its repulsive aspect, would seem to vitiate against any attempt to keep one in a tank, except for research purposes. Personally, I have seen only three specimens in my life.

Two of these were live, and sighted on a reef in the Red Sea, and one pickled in formalin in a laboratory in Jeddah.

At the beginning of this article it was stated that the Stonefish had no redeeming qualities. That needs to be modified

slightly. The flesh of the Stonefish is eaten by some East Africans, and the Chinese consider it a delicacy. Who are we to argue with those gourmets of the exotic fare? **AMP**



Red Sea Stonefish — packed with venom.



Typical Stonefish habitat off Saudi Arabia.



# UT & ABOUT



Top left, Supreme Scottish Champion, Hugh Bowie of Edinburgh AS, admires his prize-winning fish. Top right, best in show owner Alex Torbet (Edinburgh AS) receives a selection of prizes from me. Above, the Best Fish in Show — a magnificent Green Swordtail owned by Alex Torbet. Above right, SAF's traditional and friendly venue: the Civic Hall in Motherwell.

## SAF goes back home

By Dr David Ford — Aquarian Advisory Service  
Photographs — unless otherwise stated — by the author

The Scottish Aquarist Festival (SAF) has always been the showcase of the Federation of Scottish Aquarist Societies, although it is run by its own separate committee and financed independently. It started in April 1973 at the Motherwell Centre with their first show exclusively for Scottish Aquarists. From the outset, SAF established a reputation as a really friendly get-together for anyone interested in the fishkeeping hobby, and, soon, clubs south of the border began to attend, a situation that remains unchanged to this day.

After two years at Perth, the SAF committee decided to return to their original venue, the Motherwell Leisure Centre, for their 21st Open Show.

There were eight traders, 11 tableaux and two national society stands in the great hall on the second floor of the centre. Approaching 1,000 visitors toured the exhibition for only £1.50 adult, £1 child and seniors, from 10am to 5pm Saturday and Sunday 11 and 12 September.

The hall echoed to Rock 'n' Roll music from a rotating carousel, complete with flashing disco lights by Taylor AS. However, the Scottish Federation of Aquatic Societies (SFAS), Federation of Northern Societies (FNAS) and Association of Aquarists (A of A) judges did not like

the tableau as much the visitors and it did not feature in the winners' list.

First was judged to be an aqueduct by Grangemouth AS in which the water cascaded down the side of the model; second was a slice of birthday cake (for the SAF 21st) by Larkhall &

DAS, which was not only well designed, but also had a toggle switch that visitors could turn on to hear the strains of "Happy Birthday". Third was an undersea scene painted by Musselburgh & DAS.

The other tableaux included two more 21st birthday cakes and a 21st birthday present box, while the SFAS stand handed out balloons printed with a "SAF 21st" slogans to all the children, giving the show a very festive air.

Washington DAS planned a Dragon and its lair for their theme but the trailer carrying the display crashed on the M74 on the way to the show. Luckily no-one was hurt. However, the Dragon did get mangled, but it still put in an appearance... with some Scottish bandaging!

The traditional giant tombola stall sold out on both days and great interest was shown in the Scottish Group of the British Herpetological Society stand, with its display of geckos, snakes

and spiders.

Traders included fish and accessories for sale by Arbroath Aquatic Supplies and Tropics of Stockport, with equipment for sale from Hagen's large stand. Books and magazines were available from the Aquarist & Pondkeeper stall; there was even jewellery from Sabre Design, and flowers from Craiglyn Crafts. The popular bogwood stand all the way from Cornwall attended, and advice was available from the Aquarian Advisory Service stand.

The judges reported many good-quality fish displayed in the tableaux and the Scottish Supreme Championship Class. The Scottish Champion was the same Mexican Goodeid (a), *Algodonichthys zonatus* owned by Hugh Bowie, Edinburgh Aquarists and Pondkeepers, that won in 1992. It is the first time any one aquarist has won the competition twice, let alone consecutively.

The Best in Show was a male Green Swordtail, *Xiphophorus helleri* by Alex Torbet of Edinburgh AS. Alex is a prisoner at Edinburgh jail, but was allowed out specially to collect his Best in Show award. Alex is a long term prisoner who has worked full time at the jail for the Institute of Aquaculture, University of Stirling, on fish, such as *Tilapia*. He is due for release early next year and his story will be the subject of a television programme in the QED series next January. He was also featured in the *Fish People* TV programme during Christmas 1989.

Alex has paid his debt to society, but he stated that the trauma he has passed through was only made bearable by his devotion to fishkeeping... another case where the therapeutic value of pet fish has been proven. What better venue, then, for his triumph in winning a top award than the always-friendly Scottish Aquarist Festival?

# TRADE TALK

## King British helps new shop

Specialist aquatic manufacturer **King British** has helped an Aberdeen hobbyist to open his own shop — after he had been made redundant twice within a year.

Twenty-six year-old **Mike Daly** has kept tropical fish for 12 years and, after losing jobs as both a transport supervisor and driver and storeman in under a year, he and his wife **Alison** decided it was time to turn their hobby into their living and opened their own aquatic shop.



Mike Daly, in business with the help of King British.

Mike immediately turned to King British for help. Explained Mike: "**Michael Knight**, northern UK sales manager for King British, had previously provided us with business advice, and was able to help us get the shop properly stocked, and invested a

great deal of time and trouble with his technical know-how, particularly with making sure that we had the right heating and filtration systems."

The couple deal mainly in tropical fish, but also sell goldfish, tanks, food and books, as well as

a good selection of equipment. "Things have got off to a really good start," added Mike.

"Launching a business is always a daunting challenge, but it's a fantastic help when a company such as King British is prepared to put its experience behind you to ensure a solid start. We are tremendously optimistic for the future."

**Keith Barraclough**, managing director of King British, added: "I am delighted that we have been able to give Mike a helping hand and, with such good foundations on which to build, I look forward to seeing his business go from strength to strength."

## Expert team expands at Tetra

A second fishkeeping expert has been appointed at aquatic foods and treatments specialists **Tetra** as a result of the success of the Tetra Club.

**Bernice Brewster** joins Dr



Bernice Brewster — Tetra's new consultant.

**David Pool** as a part-time consultant to Tetra, to assist with a reported 1,000-plus enquiries a month. Dr Pool explained: "A large proportion of enquiries are related to Koi keeping, or are about water quality in ponds. Bernice is the ideal person to provide our members with expert advice which is straightforward and easy to understand."

Bernice is a graduate of Biological Sciences at London University and worked at the Natural History Museum for ten years, studying all aspects of fish care and identification. For the following four years she worked for a Koi importer, which gave her a unique knowledge of these fish.

## Open Day at Star

A selection of over 500 different varieties, colours and sizes of Fancy Goldfish will be on display at **Star Fisheries'** trade Open Day on **21 November**.

Owner **Andy Green**, remarked: "Fancy Goldfish have grown so popular that they have become 10% of our turnover, and still growing. Never before has anyone had so many fancies under one roof at one time."

He continued: "Rather than closing down coldwater sections or converting them to tropicals for the winter, many outlets have extended their coldwater range to include fancies, thus taking advantage of one of the few truly growing markets in aquatics today."

He concluded: "We have traders from all over the country, including Ireland, coming to the Open Day. Judging by last year's response, it is set to become an annual event that no serious fish buyer will want to miss."

Information about the Open Day, which is open for the trade only, is available by contacting **Star Fisheries, 94a Benhill Road, Sutton, Surrey SM1 3RX. Tel: 081-643 8162-5; Fax: 081-643 8166.**



## Cole Appointment

After a quarter-century of service, **Michael Cole** has been appointed to the board of **Barraclough's Fish and Aquarium Supplies**.

Commenting on the appointment to the Bradford-based company, managing director **Keith Barraclough** remarked: "Michael's appointment is a reflection of the group's confidence in him, and underlines our determination to continue to play a major part in the aquatic industry."

# SOUTH AMERICAN Ecuadorian Sword Plant Puzzle

**Arie de Graaf** unravels  
the close relationship  
between two types of  
Sword Plants

*Photographs by the author*

**O**ur continuing search for aquatic plants found us travelling by bus from Quayaquil to El Triunfo in Ecuador. Shortly before arriving at our destination we stopped to stretch our legs. There, on the right hand side of the road, facing El Triunfo, we found a dried-up, fully overgrown brook. Between the vegetation we discovered some withered leaves of Sword-plants. They were about two metres high. I collected material from three arbitrarily chosen plants and numbered them AdG 777, 778 and 779.

At the Rio Palenque Science Center I used the *Flores of the Rio Palenque Science Center, Los Rios* (Dodson & Gentry, 1978) to identify the specimens. They turned out to be *Echinodorus bracteatus* Micheli, distinguished from *E. grandiflorus* (Chamisso & Schlechtendal) Micheli by the winged inflorescences and sessile flowers without peduncles.

## Varieties/subspecies

Fassett (1955) distinguishes two varieties of *Echinodorus bracteatus*: var. *bracteatus* and var. *efenestratus* Fassett. *Bracteatus* is characterised by "blades with stellate tuberculate-based hairs towards the base, and with pellucid (transparent/clear) dots and very short lines", and *efenestratus* by "leaf blades glabrous (without hairs) and without pellucid markings". Rataj (1975) uses this classification, and Holm-Nielsen & Haynes, in a note of 1986, agree.

The latter authors, however, raised the status of variety to the rank of subspecies in the same year: *Echinodorus bracteatus* Micheli subsp. *bracteatus* and *Echinodorus bracteatus* Michel subsp. *efenestratus* (Fassett) Haynes & Holm-Nielsen. The authors argued their point as follows: "After examining these plants in the field and many herbarium specimens, we concluded that they represent two infraspecific taxa."

*Echinodorus bracteatus*  
var. *efenestratus*  
growing in the wild  
near El Triunfo, Ecuador  
(specimen AdG 779).



The glabrous  
["hairless"] leaf  
of *E. b.* var.  
*efenestratus*  
(specimen  
AdG 779).



# AQUATIC PLANTS

## PART 4

Below right, specimen AdG 777 — *E. b. var. bracteatus* — had very few root tubers.  
Below left, of the three specimens, AdG 779 — *E. b. var. efenestratus* had the most robust root tubers.



All three specimens had the same number of chromosomes in their somatic ('body' — as opposed to 'reproductive') cells: 22 — signified by the notation  $2n = 22$ .

These particular chromosomes come from specimen AdG 778 (*Echinodorus bracteatus* var. *bracteatus*).



▲  
The ripe fruits of specimen AdG 777.

The change in status begs three questions:

- ① Are there chromosomal differences between the varieties/subspecies?
- ② Are the varieties/subspecies geographically or ecologically divided (Andreas, 1972)?
- ③ In the case that the second question is answered negatively and both varieties/subspecies are growing together, what would be the distinguishing feature in the case of producing experimental hybrids? (Is it even necessary to carry out hybridisation experiments?)

### Investigations

In an attempt to answer the first question, the somatic chromosome numbers of all three collected plants (AdG 777, 778 and 779) were studied. These all proved to be  $2n = 22$ .

Duplicates of the living material of the plants AdG 777 and 779 were sent to Holm-Nielsen in Aarhus, Denmark. These were cultivated in the greenhouse of the Department of Plant Taxonomy of the Agricultural University of Wageningen in the Netherlands. According to Holm-Nielsen, plant AdG 777 belonged to the subspecies *bracteatus*, and plant AdG 779 to *efenestratus*, while in my opinion, plant AdG 778 belonged to *bracteatus*.

All three plants originated from a single locality. In another locality, both varieties/subspecies also grow together. Therefore, the second question can also be answered, i.e. there is no geographical or ecological division between *bracteatus* and *efenestratus*.

As a result of these findings, the taxonomical unity of variety has to be given priority over the subspecies.

According to Holm-Nielsen & Haynes (1986), the variety *efenestratus* should be endemic in the drainage area of the Río Guyas.

### REFERENCES

If you would like a list of the references mentioned in this article, drop us a line and we will be happy to oblige.

Part 3 of Arie de Graaf's series of occasional articles on South American plants was published in August 1992. Part 5 will appear in a few months' time.

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## New Society

A society dedicated to promoting the enjoyment of the hobby, as well as the environment of aquatic life, has been launched in the Midlands, and has already attracted enquiries from Scotland and East Anglia, as well as throughout the Midlands themselves.

**Midland Aquarists and Pondkeepers Society (MAPS)** has been formed by Rugby hobbyist **Keith Watson**, tropical fish manager at Uilesthorpe Garden and Aquatic Centre. The society is being supported by the centre, who are providing their Conservatory Coffee Lounge as the meeting place, as well as a members' discount on goods and fish.

Meetings will be held bi-monthly, with the inaugural one open to all members of the public on **Thursday 11 November** (7 pm at the Conservatory, Uilesthorpe Garden and Aquatic Centre, Uilesthorpe, Leicestershire).

# SOCIETY WORLD

The speaker at the first meeting will be Hinckley-based specialist aquatic author and *A & P's* 'Coldwater Jotter', **Stephen Smith**, who will be presenting slides from his recent visit to tropical and coldwater fish and plant farms in Singapore and Malaysia.

MAPS will break new ground in the organisation of a society, with a departure from the usual 'committee' structure: "The idea is that this will be a club for members run by members," explained Keith Watson. "All too often, a 'committee' scenario has detracted from the enjoyment of what is, after all, a hobby".

In addition, a library of books and videos will be assembled for members' use, and table shows will be held; while it is anticipated that club visits will be organised as well. A bi-monthly newsletter will also be issued.

Annual membership is just £5 for individuals; family membership is £7.50, and societies can also join for £7.50 per annum. Information from **Keith Watson**,

**39 St Marks Court, Pool Close, Rugby, Warwickshire CV22 7RW. Tel: 0455 202144 (daytime) or 0788 811587 (evenings).**

## Aquacub Competition

The **Aquacub Competition**, which was successfully organised by *'Aquarian'* last year, is to be repeated. Club secretaries are invited to write to **Paul Corbett** before the deadline of **30 November 1993** to receive the first round of questions. All clubs will receive these by 4 January 1994, and answers are requested before 7 February 1994.

The top two highest scoring aquarist clubs will be invited to contest the final at **'Grocklemania'**. If any club cannot attend, the next highest scorers will be invited. The finalists' teams of three will each be provided with two-berth self-catering chalets at Whitecliff Bay Holiday Park, Bembridge, IOW, for the duration of the weekend, plus

two ferry crossings, courtesy of *'Aquarian'*.

Contact **Paul Corbett, The Orchard, Gatcombe, Isle of Wight PO30 3EF. Tel: 0983 721246 evenings.**

## Europischer News

The first issue of *Betta News*, the newsletter of **Europischer Anabantoid Club (EAC)**, has been published.

The EAC was formed by a group of aquarists interested in keeping, breeding and conserving all breeds of labyrinth fish, and the society currently has over 50 members from the UK, France, Germany, the Netherlands and Switzerland.

Contact: **Steve Jones, 61 St Johns Road, Scarborough, N Yorks YO12 5ES.**

## Fish Fayre '94

**Fish Fayre '94**, organised by the Yorkshire Aquarist Festival, will take place on **Saturday and Sunday 9/10 April 1994**. Admission will be £2.40 for adults and £1.20 for children and OAPs.

Contact **Marie Harrop, Tel: 0484 666591.**

## To all Society Secretaries

*Society World is your opportunity to present news of your society to fishkeepers throughout the UK. So, whether you have news of events, shows, results, meeting, or just gossip, do let us know. Send your information and newsletters to: Society World, Aquarist and Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.*

### NOVEMBER

#### Saturday 13

**Washington Aquarist Society & Pondkeepers** — First Open Show (all catfish and cichlids, as well as other classes). Stella Maris Social Club, Albany Centre, Washington. Open: 11 am; Judging: 1 pm; Auction: 12.30 pm; Inter-Society Quiz: 3 pm. Full details from **Robbie Kirkup** on 0914 162247, or **Michelle Jacques** on 0914 167292.

#### Sunday 14

**Bradford and DAS** — Open Show at Clayton Village Hall, Reva Syke Road, Clayton, Bradford. Further details from Show Secretary, **Sandra Stansfield** on 0274 595097.

#### Sunday 21

**Catfish Association of Great Britain** — AGM and Convention at Cavendish School, Wamens End Road, Hemel Hempstead. Main Speaker: **David Sands**. There will also be an auction. Contact **Andy Stratton** on 0444 450132.

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