

NOVEMBER 1998

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# AQUARIST

AND PONDKEEPER

SPECIAL  
**DISCUS**  
FEATURES

NAME CHANGE FOR  
THE ROUND-TAILED  
PARADISE FISH

BREEDING  
LIVING  
FOSSILS

FREE FULL-COLOUR  
**PIKE CICHLID**  
POSTER



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# AQUARIST AND PONDKEEPER

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## EDITORIAL

### REPORTING THE TRUTH ... BUT WHOSE TRUTH?

**B**ank pulls out of British Gas in Rainforest row (Sunday Times, 9 September 1990).

The story behind this 'fighting' headline concerned T.S.B's withdrawal of their shares from British Gas' environmental Unit Trust fund, following complaints from Amazonian Indians living in Ecuador that BG is "polluting and destroying part of the Amazon rainforest".

The allegations claim that BG's oil test-drilling operations (e.g. explosions) in the Pastaza region have driven away game, that workers have hunted the animals and killed the fish with dynamite, that they've polluted rivers, have introduced diseases, and so on.

I can't, of course, vouch for the validity of all these claims. I'm just reporting them second-, third- or 'umpteenth-hand', just as I must also say, in fairness, that the feature reports that BG concedes having caused short-term damage but has found no evidence to support any of the most serious complaints.

Difficult, isn't it? Who do we believe? Who is telling the truth? How can we find out? What vested interests determine what we see or learn as the truth ... or how we report it?

One of the big problems is that, when something appears in print, some people will actually take it to represent the truth, the whole truth, and nothing but the truth. This applies just as much to newspaper reports as to articles, 'columns' and letters in magazines, including our own, of course.

Writers (even editors!), all have their own in-built prejudices. We try to keep these in check, of course, and always try to point out possible 'over-the-top' comments to our writers whenever we can, perhaps questioning the thoroughness of their research, or the objectivity of their statements, etc.

In the end, though, it is impossible to check every statement or claim for 100% accuracy or objectivity. If that were possible — which it almost invariably isn't — it would take so long that we'd probably only be able to produce one magazine per year ... and a pretty boring one at that! Add to this the fact that writers want (and ask) to be free to express their opinion, and you've got a real challenge on your hands, especially when you don't agree with them.

Now, that's the *real* truth ... at least, I think it is!

John Dawes  
Editor

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# THOUGHTS FROM A RIVERBANK

Is it possible to be an angler *and* a genuine aquarist? Jason Endfield doesn't think so.

Last month, I had the great privilege of being in a beautiful part of North Wales on one of those perfect autumn days. I found myself by a swiftly flowing river surrounded by tree-clad hills — the colours of the turning leaves were stunning variations on green, gold and brown, and, every now and then, a rainbow would appear in the valley as showers drifted overhead. A perfect scene.

Well, it would have been but for two things; two people actually — me of course, lowering the tone considerably as I do — and an angler, who many would say adds something to the rural landscape.

Now I have nothing against anglers in principle — catching fish is their hobby, just as keeping fish is ours. What I cannot understand is an angler who is also an aquarist. It just confounds me. Yet here was such an angler/aquarist, as I discovered in a few brief words of greeting. This gentleman apparently had a garden pond ("much easier to land a catch there!" he joked . . .), and specialised in Goldfish, with a couple of tanks in addition to his pond.

I left him with his array of rods and nets and a substantial supply of sandwiches (probably fish paste), and wandered off to philosophise, as one does, in such inspiring landscapes.

How, I asked myself, can a fishkeeper also be a fisherman? To me it is as hypocritical as eating roast chicken in front of a budgie — it's just not the done thing. I'm absolutely sure that these angling aquarists (and apparently there are many), are lacking a very fundamental feeling for fish — perhaps it could be called a lack of respect. Those with a genuine appreciation for aquatic life do, I'm sure, find angling rather sad. This, at least, is my view, and it is a very personal view from an aquarist who believes that there is more to a fish than flesh, scales and fins.



Many fish, when closely observed, display an intelligence remarkable in creatures of their size, and it is this fact that bothers me about 'fishing fishkeepers'. They obviously can't have realised that this intelligence exists, otherwise, surely, they wouldn't be able to catch them with so much apparent indifference.

My view here will probably result in a barrage of verbal defence from the angling aquarist fraternity, and I am ready to listen — though I can't personally see a valid argument to justify fishing for sport by the same people who claim to have a genuine interest in maintaining fish in an aquarium or pond.

It's all a bit 'heavy' this, isn't it? But back in North Wales, happier events were taking place. I settled down to eat my packed lunch on the riverbank, about a hundred yards or so downstream from the angler. A field of cows behind me reminded me that, well, we're all a bit hypocritical at heart — my sandwiches contained roast beef, and I'm sure I heard a cow tut! I suddenly wasn't hungry, and vowed for the fiftieth time to become a vegetarian.

Until now, I hadn't seen any sign of life in the river, but as another shower passed overhead, a loud splashing noise startled me. Just feet away in the river, a large Brown Trout leaped into the air, twisted vigorously, and then, in a flash, was gone. The angler, without a single catch, remained unaware. Another splash in front of me, and my attention was once again diverted to witness a second trout, slightly smaller this time, leaping in and out of the water.

I sat open-mouthed at the sight, not knowing quite what to make of it all — the river had been silent and lifeless, and now, as I watched, there were trout breaking the water's surface at the rate of about one every minute. And all this time, the fisherman sat, fish paste sandwich in hand, totally unaware

that all these fish were by-passing his hook and line. I smiled. It was really as though the fish were outsmarting him, and then turning back to laugh in his face.

I suppose I saw a dozen of the beautiful fish altogether. So, were these trout super-intelligent, maybe displaying one-upmanship (or is it one-upfishship?). That's not for me or anyone else to say. Most likely, it was just nature's way of being fair, and I felt very, very privileged and satisfied to have witnessed the extraordinary scene.

When the show was over, I picked myself up and meandered up to the angler. "Any luck?" I asked.

"Nothing at all, I'm afraid," he replied wearily, "you know, this river used to be full of Brown Trout", he told me, "these days there just don't seem to be any around. It's weird . . ."

"Makes you think, doesn't it?" I said with a wicked smile, as I wandered off following the fish downstream. . . .

**SEE PAGE 90  
FOR NEWS  
OF WHAT'S  
IN STORE IN  
OUR  
CHRISTMAS  
ISSUE**

# Reflections



by David Sands

## PERSONAL VIEWS ON FISH IMPORTS

I am currently enraged about the poor quality of Singapore imported fish. Our editor usually calms me down when I am angry but, in this instance, I hope he allows me my 'full say'. (You want it? You've got it! Ed.)

For years I have known that some Far Eastern bred/farmed fishes are not up to scratch. Many appear to have little resistance to disease, and the current situation with Angels is a perfect example.

I keep wild Altum Angels, wild Scalare Angels (from import) feeding them on prepared foods and I do not lose any, once they are settled. I had a batch of Golden Angels, bred in the North East of England. I sold everyone without loss!

I recently purchased 30 Veiltail Angels, bred in Singapore, on the advice of a wholesaler. He announced that they had been great — not as bad as usual — sold almost all of them. Up until his comments I had left the Angels alone at wholesalers knowing that I could never sell them to a customer knowing full well that they are likely to break out in some untreatable bacterial infection.

I purchased 30 Angels, put them in an excellent tank, neutral pH, superb filtration, yet within a week, every one had slimed up and died.

"We put salt in with all our Singapore fish," said the wholesaler when I called to complain.

It seems that holding waters in Singapore are heavily salted.

There is a water shortage on the island, that much I do know, but who knows the effects of keeping freshwater fishes in low salt levels? Maybe it strips the fish of its natural bacteria, taking away any defence it may have against disease.

I would like to see some research funded by the industry. Or is it true that there could be some who are secretly happy for customers/retail industry people to lose fish so that more can be sold?

If I have wild-caught tetras I may lose a few in the initial settling down period. It is not surprising really; they have undergone capture and holding in nature, plus capture and holding two or three times in captivity without proper feeding or water quality. Once they are settled in my shop, unless I allow something extreme to occur, they are fine until sale. . . . Not so the Singapore fish.

I wonder if any other retailer will back me up when I say that once settled, a Singapore fish might still fall by the wayside. I have Dwarf Gouramis that are surely dying of TB — they eat and still remain pinched in the body!

Should I be treating them with antibiotics, you might well ask? So I can strip them of even more life?

Perhaps I should sell fish and refer the customer directly to the local vet where an antibiotic-flake can be prescribed!

"Here, have a dying fish and don't forget to go straight to the vets!"

I believe the current situation is **totally unacceptable**. All the loss rates suggested by the so-called scare-mongers are probably way off target. The true loss on farm-raised fishes after three months in captivity is probably 75%. **That figure represents many millions of fishes.**

The irony is that wild fishes are much more resistant to diseases — maybe natural selection strengthens them. Yet it is likely that 1992 will see restrictions in the supply of these wild fishes rather than in farmed fishes.

Legislation is initially aimed at marines and I can see why. The loss rate on certain marine

forms has been totally unacceptable for twenty years or more.

Some years ago Richard Sankey and I once appeared on a BBC radio programme defending the aquatic trade. I did want to point out that freshwater tropical losses in numbers terms probably far exceeded those of tropical marines. The programme dealt mainly with marines, so this factor was lost.

I could not defend the aquatic trade at this time. Losses on Singapore shipments and some wild imports have been extreme for twenty years too, but for some reason, none of the conservationists have spotted the problem.

Is it because fish have a poor media image as a wildlife group. Is it because we eat fish? Is it because fish do not have vocal cords with which to scream?

The governing body of aquatic importers may rather concern itself with protecting its import and retail rights. The rights of fish as animals are rarely discussed. Maybe a label detail for an air-freight box. . . .

If an import of primates arrived and within a month 30-50% were dead or dying, it would be national news.

Is our hobby so small that no one cares?

Fifteen years ago I bought a Hognoosed Catfish from a small South London retailer knowing it was going to die. The retailer had accidentally dropped the catfish onto a tiled floor from about six feet and the catfish developed swimbladder trouble. I bought it to save it. Derek Lambourne, of the catfish association, helped me support it in a net and even looked after the catfish until it died. I wanted the fish to live so badly.

A few years later I kept the best group of *Brochis multiradiatus* I am ever likely to keep. Then I was a hobbyist. I knew that we had to care for animals in our keep, and find out as much as we can about them so that we can look after them to the best of our abilities.

Zoos are now a thing of the past. I wonder if fishkeeping and the keeping of exotic animals will become anti-social too? What are your comments?



One of the superb *Brochis multiradiatus* I kept when I was a hobbyist.

**PERSONAL OPINIONS ON ALL  
AQUATIC/HERPETOLOGICAL/  
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PLEASE ADDRESS THEM:**

**c/o The Editor,  
Aquarist & Pondkeeper, 9 Tufton  
Street, Ashford, Kent TN23 1QN**

# Naturalist's notebook

By Eric Hardy

## RESUSCITATED CICHLID

Because a general decline in freshwater fish numbers has again been noticed, the Council of Europe has begun an international campaign to conserve them. Plans include the reintroduction of species which have become rare, or have disappeared.

Among 260 species believed exterminated from Lake Victoria by the introduction of Nile Perch, Ischmael's Cichlid is being resuscitated by breeding experiments with 30 at London's Horniman Museum and 50 at the Wildfowl Trust water at Burscough, in Lancashire. Males turn bright blue in breeding condition.

## New Brighton finds

A new Mersey seaweed from Japan, *Codium fragile tomentosoides*, was discovered when New Brighton marine lake was drained. It went on exhibition in the aquaria of Mersey marine life in Liverpool Maritime Museum's "Dock Watch". Fortunately, it isn't a menace like the giant Japanese Sargassum Weed now invading the south coast after appearing at the Isle of Wight in 1973.

Trippers thought they saw eels swimming in the marine lake, which proved to be male ragworms in their swimming stage. The little Rock Goby was also found there. Peacock Sandworm and the Japanese Sea-squirt, *Styela clava*, were transferred elsewhere temporarily.

## Free Guide

A most informative guide for anyone keeping outdoor crayfish, pond-construction, feeding, water-quality, disease and hatching, is *Crayfish Culture* by Alderman and Wickins, Lab. Leaflet 62, free from MAFF Laboratory, Pakefield Road, Lowestoft, NR33 0HT. It deals with native White-clawed Crayfish *Austropotamobius pallipes*, American Signal *Pacifastacus lenisculus*, Slender-clawed Turkish *Asacus leptodactylus*, European Noble *A. asacus*, American Red Swamp *Procambarus clarkii*, and three Australian *Cherax* crabs.

## New research

The Ministry is seeking an alternative environmentally safer method to control the increasing problem of sea-lice in farmed salmon, at present treated by licence with Aquaguard, containing dichlorvos which the North Sea Conference agreed to reduce by 50% by 1995. Ideas include 'cleaner fish' like wrasse to eat the sea-lice, a vaccine, or orally-administered chemicals with lobster larvae used as indicators of any effects.

Recent Government research grants include £59,746 for genetic studies of Arctic Char based at Stirling University, £67,739 for a Glasgow University zoologist to find how young salmon acquire territories and mates, and £70,838 for two Nottingham biologists to study competition among seaweed-flies!

Minute radio-transmitters fitted to toads on Freshfield dunes, near Southport, show a greater navigational sense in Common Toads than Natterjacks in returning from transplanting further north.

Most aquarists visiting Mediterranean lands have met with the freshwater crab, *Potamon flavianum*, which, as in other crabs, usually has the male as the larger sex. Micheli, Gherardi and Vanninni of Florence University, studying it in Italian hill-streams, suggest the male's larger size leads to more success in mating and meeting receptive females. Females may mate before their puberty moult and store sperm in receptacles for use when mature. This may have evolved because of the limited chances of finding males, when the sex-ratio changes in favour of females, in September.

Underwood and Thomas, of Sussex University, showed that 62% of algae browsed by pond snails off pond plants like Hornwort survive through the gut and resettle to grow elsewhere.

Researchers at Plymouth and Port Erin marine labs have shown that leachates from tributyltin in anti-fouling paints caused female Dog Whelks to assume male characteristics. This is apparently widespread on some seashores, like the Manx

and most of the English-Welsh coast, except the east. It is most on the south coast where boating is more active, and there more females are sterile. The Dog Whelk has thus become an early warning system for contamination.

## Returning Salmon

I don't know if the Mersey can ever be cleaned up to the state where a new run of salmon can be reintroduced, as the Thames Salmon Trust has achieved with 320 migratory grise monitored in their trap at Hampton Court and a total run approaching 500. The first Thames salmon for 140 years was stranded at West Turrock Power Station in 1974.

I was discussing recently with a Trust and National Rivers Authority official a little-known pre-war abortive experiment with which I was associated. He had overlooked a full column article I wrote in the London Observer in May 1934, "Salmon for the Thames," outlining plans to introduce early-running spring (Feb) fish from the Severn or Wye the following year, in the upper reaches at Radcot, Tadpole and Newbridge bridges between Lechlade and Northmor, and others at Inglesham, Castle Eaton, Cricklade and Ashton Keynes between Lechlade and Cirencester. The projector of the experiment was Bryan Bellew of Moreton-in-the-Marsh, who was convinced that the previous experiment failed because autumn-running fish were used, returning in August or September when the river was in its worst state of pollution. I still have the maps and details.

The river also lacked fish-passes.

I had to remind a Mersey Barrage Company committee on which I sit, that recent talk of salmon returning to this river could only be achieved by establishing a run from eggs introduced to upper tributaries rich enough in oxygen. These would have to acquire the 'smell' of the river by which salmon home. The present occasional visitors had no intention to enter, but were swept upstream by the fast tides through the narrow mouth when on their way home to nearby Ribble or Dee.

A 700b salmon taken in the Thames in April 1789 was 4ft long and 3 ft in girth.

## Walton's garrulity

When Isaac Walton kept a sempster's shop in Fleet Street, he probably never fished the Thames, for dare I explode the myth of "the honest angler"? He was what one would call today a hack journalist. Everyone knows that an angler never stops talking about his exploits. Walton wrote 100 books, but only one about fishing, and most of that was compiled from Charles Cotton and Thomas Barker, two very experienced trout-fishers, after interviewing them.

The late editor of the now defunct *Fishing Gazette* told me he failed to find any proof of Walton fishing. Like cooking to Mrs Beaton, herbs to Thomas Gerarde and falconry to Dame Berners, (whose famous books were likewise compiled) "angling" was an outlet for Walton's garrulity, which survived his prodigious literary output in but one work parodied as *The Complete Wangler*.



The culture of native and other crayfish is explained in MAFF's recently published guide.



The best-known of all the Archer Fish species is *Toxotes jaculator*.

## SHOOTING STARS

If you are looking for a fish with unusual skills, why not try keeping Archers? Paul Donovan tried and was immediately captivated by these rather special brackish-water marksmen.

**F**ew fish could boast the ability to shoot down an insect with a jet of water over a distance of some several feet with the accuracy of a fighter pilot shooting down an enemy — other than the Archer Fish — 'star' shooters of the aquatic world.

I came across this fish while visiting a local aquarium in England way back in 1986. Although I had read quite a bit about Archer Fish, I'd never actually got around to locating a specimen from an aquatic shop, or up until that time, had ever seen one. After watching this fish for what must have been at least half an hour, and having seen it shoot a jet of water from the surface and hit an insect perched precariously on an overhanging branch or piece of vegetation with pin point accuracy, I decided there and then that I'd been missing out on a fascinating creature if I didn't buy one sooner or later. I therefore simply had to investigate further.

Archer Fish, of which there are six species (the best-known being *Toxotes jaculator* and *T. chatareus*), belong to the family *Toxotidae*, first described in 1765 by a hospital governor. However, the ability of these fish to shoot down an insect with a water jet was not believed until 1902 when a Russian scientist studied them in some detail and confirmed this. The family has a range extending over

the Indian Ocean, Red Sea, Malay Archipelago, parts of Australia and the Philippines. Archers occur principally in brackish waters along mangrove borders, although they can also be found in the sea and in some freshwater streams.

### Shooting ability

A fully grown Archer Fish can reach a length of around 24cm (c 9.5in) depending on the species, and is capable of sending a jet of water over a distance of some 2m (6.5ft).

Once the Archer has positioned itself almost beneath its potential meal, water is driven into the mouth from the gill chamber by a powerful compression of the gill covers. With the snout just breaking the surface at the precise moment, the water is compressed, and the tongue is forced upwards to form a tube in the mouth thus increasing the speed of the water jet.

Anyone who knows anything about physics, will know about light refraction. If you place a stick in water at an angle it will appear bent, owing to the bending of light rays as they pass from the air into the water. This presents a major problem for the Archer Fish, for how does it judge the position of its target accurately, allowing for this refraction? Observations have shown,

that once a target has been located the fish swims almost beneath it and, at the second it releases the water jet, it shifts its body into an almost vertical position. A stick placed in water at such an angle will appear straight because refraction is reduced; so the fish sees its target in the exact position it should.

Another way distance is accurately judged, is in the adaptation of the eyes. These are large, at least one-third of the size of the head, and are more organised than in most other species. The Archer Fish has binocular vision as the eyes face forward and have large overlapping fields of view, enabling precise distances to be gauged. Vision is very acute and the fish can spot an insect with ease at a distance of several feet as it swims among the tangled vegetation of its domain. Archers are also said to have good vision when the eyes are out of the water.

The Archer Fish does not rely solely on the use of this jet of water to shoot down insects, however, and will take food from the surface or will even take it by leaping from the water. (See our spectacular poster of a *Toxotes chatareus* — Poster No 5 — in the Nov '89 issue of *A & P*.)

Young Archers start spitting water jets at a very early age when only a few centimetres long. Of course, the distance travelled by this jet may only be short, and may at first not be

very accurate. But, the more the young fish 'spits', the more its accuracy develops. Having managed to get my hands on a number of these fishes, I set about designing a set-up which would enable me to witness the remarkable shooting as and when possible.

### Captive shooters

I decided to adopt the same style of approach as I'd witnessed in the public aquarium when I first encountered the fish all those years ago. That involved having the aquarium approximately only half to two-thirds full of water. Once filled to the required level with brackish water and heated to a temperature of 25-30°C (77-86°F), I then decorated the aquarium with plenty of bogwood, rocks, plants and branches, ensuring there was adequate growth above the water line for insects to perch on.

I filtered the aquarium with power filtration using a large external filter. Conventional undergravel filters powered by an air pump would have caused too much surface movement for the fish to exploit their shooting ability to optimum usage and therefore had to be kept to a minimum. Even when I used the power filter, I had to ensure that the return pipe was well below the water line to avoid this problem.

It is important, of course, to ensure that the aquarium has a well-fitting cover glass protecting the lights from any damage which may arise by the water jets produced by the fish; otherwise, a nasty accident could result.

And because I would be adding live insects to the tank, I did not want these escaping and populating my living room.

Archer Fish such as *Toxotes jaculator* will live quite happily in small shoals of 5-10 individuals, although as they age, they tend to become more solitary. Maintaining a group is the best way to ensure that they carry out their power jet attacks on unwary quarry, for they all will be competing for food. What one misses, another is sure to take.

Once installed in the aquarium, the fish were left to acclimatise themselves to their new surroundings. At first, they were nervous and would leap around at the first sign of movement, but gradually they became accustomed to my presence. Because of their nervousness, I gave them a couple of days settling in period before attempting to feed them.

Food was provided in the form of crickets, flies, small locusts, spiders, etc which were avidly taken. Once the fish were used to my presence, they would readily shoot down any moving object while I was watching. Even while not in the room, I would hear the chinking on the glass cover as a fish propelled a jet of water towards its quarry, and sometimes missed.

At times, when I was placing food into the tank and my head was over the water, I would get a jet of water splattering onto my face, something which actually stung. I came to the conclusion that the blinking of my eyelids must have caused the fish to discharge a water jet thinking they were a

potential meal, and that they were not trying to warn them off.

As well as the customary livefoods, the Archer Fish will also take surface foods such as those provided in the form of flake.

### Graceful movers

Archer Fish, other than being kept in species tanks only, may also be maintained in community aquariums with other species of similar size. In most instances they are peaceful fish, getting on with other inhabitants, although they can sometimes show a quarrelsome behaviour. They are graceful movers, propelling their compressed body through the water with the aid of the broad caudal fin. Archers are surface to middle-water swimmers.

They are also quite large fishes. The commonest species seen in captivity is *Toxotes jaculator* which attains a length of 20cm (8in). This is a silver, yellow or grey-green fish with dark saddle-like markings over the back and extending down the flanks.

No reliable external distinguishing features between the sexes are evident, and, as far as I know, no breeding has taken place in captivity. Having said that, though, several books report them to have bred in captivity but none give detailed accounts of this, nor mention literature cited. Despite extensive searching, I have been unable to locate literature to support this, and assume (as already mentioned), that breeding in captivity has not taken place, unless, of course, you can tell me different!

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# Tomorrow's Aquarist

By David Sands

**W**ell, I'm back from my wanderings over the Peruvian Andes and much wiser for the experiences. The beauty of this part of South America has to be seen to be believed. The Spanish invaders must have thought they were in a second heaven as they approached the Inca capital of Cuzco. At 12,000 feet, this city, couched between the Andes with all its mountain fortresses and incredible hill agriculture, produced countless strains of wheat for different altitudes and 200 species of potato.

Such a journey makes a traveller consider the vastness of South America and how the Indians are at one with it when not suppressed by invaders.

## T.A. CORRESPONDENCE

I have received a wonderful letter from **Paul Hardy** (see Letters page next month) who caught the spirit of my conser-

vation words quoted from Volume One of (my original *Corydoras* book) **Catfishes of The World** which was first published in 1983. Our editor called Paul's letter a most eloquent and observant view and I would echo those words.

## Library loans

**Joanna Beal**, from Spalding in Lincs, says she regularly borrows books from her local library and believes she has read all the fish books they have! Joanna wants a pen pal section to T.A. so that people with a common interest can write to each other. I think that's a great idea and will ask our editor if he can publish the names and addresses of those T.A. people who want to correspond with others.

Joanna has kept fish for about three years and is currently saving up for an external power filter for her 36 x 15 x 12in (90 x 38 x 30cm) aquarium. She pays

for the food (pond pellets, Tubifex cubes and tablet food etc) for her Jack Dempsey from her £8 per week wages but she doesn't say how she earns the money.

**Alex Cooke** also wrote to me in response to my requests for information on people borrowing fish books from the library. Alex states that his libraries (Kew and Richmond) have a limited supply and that his school library is full of Latin and historical books. He goes on to say that the most reliable source is the local Waterstones!

On a recent trip to Ireland Alex caught sight of some dolphins (or were they porpoises?) off the Sligo coast. I'm told it's the warm gulf currents that attract them to the west coast of Ireland. Late last year my wife and I wandered around that coastline and I remember a wonderful plate of mussels and creamy pint of the famous Irish black brew!

## Cory drawing

**James Andrew** from Beverley, in North Humberside, sent me a super colour drawing of a *Corydoras metae* (he knows what I like!) in response to my request for contact from any budding artists out there.

James recalls a story about a poor aquatic shop where the staff knew nothing about the delicate species they were retailing, and another shop where they attempted to sell a baby *Italobius punctatus* (the coldwater Channel Catfish) for 75 pence without, he says, any knowledge at all that the Channel Cats had the potential to grow to four feet! They also had a tank with Red Belly Piranhas and neon tetras together! James says it's not very good in this new, environmentally friendly world, when some shops leave so much to be desired. His final word of warning for other fishkeepers on where to buy

# Beware of Imitations

This 60" x 24" x 24" tank is planted entirely with Interpet Plantastics artificial plants. The fish (real) were supplied by Coral Sacca.

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James Andrew's *Corydoras metae* masterpiece.

fish is:

- Ⓐ from a totally aquatic dealer who quarantines stock;
- Ⓑ from a pet shop with at least one employee who has fishkeeping experience.

James also listed nine fishy clowns as per my challenge in T.A. September and he is in the lead for a prize (editor please note) although a Skunk 'Clown' *Corydoras* I'm not sure about.

Here is the list:

Clown Knifefish, Barb,

Loach, *Pecoltia* Plec, Skunk Clown Catfish, Common Clown, Maroon Clown, Tomato Clown and Clown Labrid Wrasse.

Not a bad start...

### Red-bellied photography

Jon Miller writes from Trannack in Cornwall and sends some excellent photographs of his Red Belly Piranha and his Scorpion or Lionfish. Mrs Miller can be seen trying to talk

to their rather grumpy Piranha (so Jon writes) and he asked what is an appendage seen in the Lionfish photo. (I think it's an extended fin ray.)

### Fishy ambition

Finally, Richard Hepplesstone wrote in from Sheffield to say how he had enjoyed work experience at a local fish importer. He's not far off leaving school and would like to be a fish scientist. I would think a few A levels including biology and an entrance into university is the best route. Richard has

quite a few tanks in which he breeds *Geophagus* and Angels. (Please send in an article to the editor!) Richard believes a question and answers section to T.A. would be interesting and I think that's not a bad idea.

Let me know if you've seen any pollution in your local rivers and what fish you would like to keep but can't afford!

Don't forget, the prize of an official 'Aquarian' Expedition to Peru tee-shirt is still waiting to be won (see last month's issue).

Happy fishkeeping.



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# THE ROUND-TAILED PARADISEFISH

Dr. Hans-Joachim Paepke from the Museum der Naturkunde at Humboldt University in Berlin investigates the intriguing story of this spectacular anabantoid and proposes a new name for it.  
(All illustrations by the author. Translated by M. Bailey)

**T**he reintroduction of the Round-tailed Macropodus or Paradisefish to West Germany in 1983 (and a year later to the DDR) revived the interest of Labyrinthfish enthusiasts in a Belontiid which had hitherto made only brief appearances in the European fishkeeping hobby.

This species was imported into Germany as early as 1893, by Paul Matte, a well-known fishbreeder, importer, and exporter, from Berlin; and again in the autumn of 1913 by Siggelkow (Hamburg). During the 30's it was again available for a short time in Europe, and then not seen again until the early 80's. For this reason, our knowledge of this beautiful fish is decidedly patchy.

## Background

In Matte's day the Round-tailed Macropodus was identified as *M. opercularis* (L.), on account of the opercular spot, a character which it shares with the Common Paradisefish; later on it was thought to be *M. viridi-auratus* Lacépède. In 1932, the American ichthyologist G. S. Meyers drew attention to the fact that the specific name *opercularis* belongs to the Common Paradisefish, as the latter has a forked tail, as clearly indicated in the specific description by von Linné (Linnaeus) — "... cauda bifida..." (which means "2-pronged tail"). In Myers' opinion *M. chinensis* is the correct name for the Round-tailed Macropodus. The name dates back to a species description by the Berlin doctor and ichthyologist, M. E. Bloch. In 1790, he established the taxon *Chaetodon chinensis*, which one can perhaps equate with the Round-tailed Macropodus, but the identification is by no means certain. The written description and the coloured engraving are ambiguous, and could be applied to either of the two species.

The single specimen on which Bloch's description of *C. chinensis* is based has long been lost. It is missing from the fishes collection of the Berlin Museum of Natural History, which includes Bloch's material.

## Confused Holotypes

In 1975-6, John Dawes, the editor of *Aquarist & Pondkeeper*, had, in a letter,



Coloured engraving of *Chaetodon chinensis* from Bloch 1790, plate CCXVIII.

already drawn the attention of the then Curator of the Berlin fishes collection to the fact that the collection's 'Holotype' of *Colisa fasciata* (Bloch & Schneider) — the Striped or Giant Gourami — was not a *Colisa* at all, but rather a member of the genus *Macropodus*, perhaps the Type of *M. chinensis*. But, unfortunately, this important suggestion was not investigated further, and not mentioned in the Catalogue.

In 1989, I accidentally stumbled upon this problem for a second time when I examined the supposed Type of *C. fasciata*. The fish was in very poor condition; large parts of the fins were missing, and the snout was also badly damaged. But, as the origin of the specimen is certain (Bloch Collection), and as Bloch himself mentions only a single *Macropodus* in his hand-written catalogue, then this specimen must be the long missing Type of *M. chinensis*.

So what fish does this specimen represent? At least, by good chance, one of the two lacrimalia bones is still present. Its lower edge is clearly toothed, so it can only be *M. opercularis*, as those of the Round-tailed Macropodus have a smooth edge. Thus it is quite clear and definite that *M. chinensis* (Bloch 1790) is a junior synonym of *M. opercularis* (Linné 1758), as could also have been surmised from the characteristic pattern of stripes shown in the engraving.

## Proposed name

What, then, is the correct scientific name of the Round-tailed Macropodus? In my opinion, the name *M. ocellatus* should be used. This name was first used in 1842 by the

English doctor and explorer of Asia, Theodor Cantor, and is supported by an unambiguous description and two type specimens, which can be found in the Fishes Collection of the BM(NH) in London, under the catalogue numbers BMNH 1843,7,21,28 and BMNH 1989,7,1,1. These specimens were collected by Theodor Cantor on the Chinese island of Chusan.

## Distribution

*M. ocellatus* — as the Round-tailed Macropodus is now properly termed — is the Labyrinthfish with the most northerly distribution. Its range in eastern Asia extends from the River Zhujiang (north west of Hong Kong) northwards across central and northern China, including Taiwan and parts of Korea, to about 50 degrees north. While it lives in sub-tropical conditions in the southern part of its range (average annual temperature at Guangzhou is 21.8°C (71.2°F) with the coldest monthly average — that for January — still as high as 14°C (57.2°F), the northern population has to endure long winters with severe frost. Thus, in the



Holotype of *Chaetodon chinensis*. The black spot indicates that the specimen has become somewhat dried out.

province of Heilongjiang, in northern China, the average annual temperature is only 3.2°C (37.8°F). Only from April to October is the monthly average above 0°C (32°F). But the monthly average in the middle of the summer is about 22°C (71.6°F), providing the climatic conditions required for successful breeding.

## Natural habitat

In June 1990 I spent two weeks in North Korea and, during this short visit, was able





My garden pond is used as a summer home for Paradise fish (another good reason for keeping them).



Spawning embrace.

to examine the natural habitat of the Round-tailed Macropodus in the Taedonggan basin near the port of Nampo on the Golden Sea. In this area this fish lives in the lower reaches of the broad river valleys, where rice is intensively cultivated. It is not found in the main rivers, but in the neighbouring waters, eg pools, which are too deep for rice-growing, and in artificial ponds — and sometimes actually in the paddyfields.

The few specimens I was able to catch were living in still waters with scattered growths of *Myriophyllum*, *Ceratophyllum*, and *Potamogeton*, with small rosettes of *Typha* on the water surface. The narrow band of vegetation round the edges consisted mainly of sedges of the genus *Carex*, and, to a lesser extent, rushes (a more exact determination of the plants was not made).

Sympatric species seen or captured were: *Channa argus*, *Oryzias latipes* (very common), *Pseudorasbora parva*, *Gobio gobio cynocephalus*, *Rhodeus* sp.; in areas of open water *Erythro-*

*cultus erythropterus*; and, very common everywhere, *Carassius auratus*, the original form of the Goldfish, which was to be found in all the hotels and public buildings, in large but generally unplanted, aquaria.



Although they measure only 2-3mm, the lachrymal bones of *M. ocellatus* (A) and *M. opercularis* (B) can be used to differentiate between the two species.

There were many species of invertebrates — the large leech *Whitmania laticis*; the "Mud Tube Slug (or snail)" *Lymnaea auricularia*; the Giant Water Beetle *Lethocerus persicus*; the Robber Beetle *Cybaner* sp. and its larvae; numerous larvae, mainly of the genus *Ictinogomphus*, but also of *Aeschna*; and finally, many freshwater shrimps. All in all, an accompanying fauna such as is found elsewhere in Central China.

On 12 June 1990 the water in a locality for the Round-tailed Macropodus, in a pond in a park on the island of Waudo, had a midday temperature of 26.5°C (79.7°F). In winter the water sometimes freezes over completely. The extent of the losses endured by the *Macropodus* are dependent on the severity of the winter. The previous winter had been very severe. Perhaps this is the reason why, in the course of several fishing expeditions, I caught only four specimens. The water was pure fresh water, although only a few kilometres downstream, there were generally high levels of salinity. It was, however, heavily laden with organics.

### Captive care

What makes the Round-tailed Macropodus particularly interesting to the owner of a garden pond is the fact that they can be kept outdoors during the frost-free seasons, at least, in Germany. They may also breed if the summer temperature is constantly above 20°C (68°F) and the pond is well planted. But you will see less of these shy fishes than of goldfish and similar striking species.

Over-wintering is, however, not recommended. In autumn, the fish should be caught, and the best specimens selected for over-wintering in a frost-free room with a minimum temperature of 10-15°C (50-59°F), dim lighting, and a small amount of livefood. A permanently warm temperature of 23°C (73.4°F) is not advisable, as the fishes are very susceptible to fish tuberculosis and are then less ready to breed. These are probably the main reasons why the Round-tailed Macropodus always disappears from our aquaria soon after every new importation. Let us hope that, this time, we will be able to enjoy this beautiful fish for a longer period.

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# Seaview

By Gordon Kay

## ECO-LABELLING

Something very exciting is happening down at Ross on Wye. My friend, Dr Elizabeth Wood, under the auspices of the Marine Conservation Society, has — after a long period of hard work and fund-raising — come up with a new initiative called the ECO-Labeling System.

The proposal is to identify, by means of labelling, in aquatic establishments, those species which are considered to be suitable for trade. It would then, of course, be up to the public to choose between buying animals which are considered to be suitable, and those which are not. It is hoped that they will support the scheme by buying only approved specimens.

Liz Wood discussed in detail the trade in coralfishes in her report *Exploitation of Coral Reef Fishes for the Aquarium Trade* in the mid-eighties. While this report described in

some detail the processes of catching, holding and exporting coralfish species in the Maldives Islands (which came out of the whole thing very well), there was a lot of concern regarding local depletions of wild populations caused by collecting, damaging collection methods, and trade in those species which have a poor chance of surviving in captivity. As well as this, the report also contained the findings of a survey among British aquarists which revealed high mortality rates among all species, which, of course, leads to greater pressure on wild populations. Naturally, the same sort of problems apply to invertebrates.

If this new initiative were to succeed, the choices that people make for their aquarium inhabitants would, of course, feed back to retailers and importers and increase knowledge of the need for self-imposed controls. It would also put pressure on exporters not to catch and ship those species

which are impossible — and therefore undesirable — and also to conform to certain standards regarding management and collecting methods.

Something like this scheme presents problems of its own. There are, for instance, many criteria to be considered such as:

- ① the species' ability to survive a captive existence;
- ② the ability of the species to sustain numbers on the reef;
- ③ the damage likely to be caused to the natural reef environment and;
- ④ there is the question, of course, of differing standards of expertise in catching, keeping and shipping aquarium specimens in different parts of the world.

The first criterion should not present much of a problem. It should be fairly easy to compile a list of species which are impossible or, at least, which do not do well in captivity. It should also be fairly easy to identify the species which, for reasons of rarity for example,

could not sustain being caught on a commercial basis.

The third point is a little more difficult to control, however, as natives of different countries around the world use different methods to catch animals. However, if the recommendations contained in Liz's report were to be taken up (i.e. that controls are introduced via licensing in collecting, exporting and retailing) then, hopefully, methods would become more uniform and more acceptable. This would also take care perhaps, of the fourth problem. Differing standards of expertise and care would all be brought into line if everyone had to be licensed.

However, might I suggest that there is also an imponderable here. All the above assumes a uniform standard of skill and care on the part of the hobbyists. How do you legislate for total beginners who would find it difficult to keep many species successfully until they have gained some experience with more simple species? How do

SETTING UP A NEW TANK?...



## DON'T GET INTO A STATE

To someone who's never set up an aquarium before, shopping around for the equipment and assembling it at home could be a bit of a puzzle—even some experienced fishkeepers find the whole process bothersome.

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you legislate for the fool who will overstock, no matter how much advice is dished out? And, of course, many species which are considered difficult, some people could keep in a bucket.

I do not mean for this to sound as though I do not agree with the proposals — I am just putting my two-pennorth. I wish Liz all the luck in the world in her endeavours, and I sincerely hope that everyone will do their bit to make it a success. I would make it publically known that if there is anything I can do Liz, then I will be only too pleased.

Carrying on the subject of conservation, did anyone notice that it was National Dolphin Friends Week in August? The whole thing seemed to go by almost unmentioned, except for the short interview on the Gloria Hunniford programme on Radio 2.

### WASHED UP DOLPHINS

My local paper carried a short article on 29 August which I found somewhat disturbing. Scientists have warned that Dolphins in the Mediterranean

are threatened by an epidemic like the one which killed thousands of North Sea Seals two years ago. Apparently, more than 50 dead Dolphins have been washed up on Spain's North-east coast in the last month and biologists at the Universities of Barcelona and Valencia say that 6,000 may already have died of a mysterious virus after digesting toxic substances.

Research has shown that only about 1% of dead Dolphins get washed up. Post-mortems have found high doses of Polychlorobiphenyls (PCBs) in the Dolphin's bodies. PCBs are highly toxic substances believed to be responsible for depressing the immunological system. Greenpeace said that PCBs and other lethal substances subject to strict European Community control were being illegally dumped into the sea by petrochemical plants and it urged the Spanish authorities to ensure an immediate end to the dumping.

The levels of PCBs and other deadly substances found in the Dolphins are higher than those found in the North Sea, where thousands of seals died recently.



Humbugs — one of the species likely to get the green light should the Eco-labelling scheme be approved.

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**Herpetology,** Julian Sims. **Koi,** Roger Cleaver. **Tropical,** Dr. David Ford. **Coldwater,** Pauline Hodgkinson. **Plants,** Barry James. **Discuss,** Eberhard Schulze. **Marine,** Graham Cox.

## MARINE

### NATURAL SOLUTION?

*Is it possible to use natural seawater instead of having to buy artificial salt mixes?*

Yes, you could use natural seawater and thus save yourself some money, BUT only if you were first prepared to store all the collected water in glass or plastic containers in TOTAL DARKNESS for six months prior to adding it to your aquarium.

This dark storage period is essential to destroy all the pathogens and parasites which occur in North Atlantic seawater which tropical coral fishes have no natural defence mechanisms against. Please remember that you would also have to have a permanent store of darkened seawater for partial water changes!

### FADING ANGEL

*Over the past few weeks, my Emperor Angel has started to lose its colour. I've checked my books and come to the conclusion that the fish had a parasite infection. My Damsel also had a little white spot. I bought some treatment which has cleared the white spot but my Angel is still the same.*

*Everything in my tank is right. I change three gallons of water every two weeks. I have also noticed that my shrimp is constantly cleaning the Angel, so I wondered if this has anything to do with the problem. We do not use any sprays in the room beside the tank.*

*I've had a word with my local dealer and he advised putting the fish in a container with a stronger solution for a few minutes and then*

*putting it back in the tank. I tried this, but it still does not work.*

Your Emperor Angelfish (*Pomacanthus imperator*) is suffering from a protozoan infection which is very common among captive Pomacanthids (e.g. Koran Angel, Blue Ring Angel, etc) in aquaria but which I have rarely seen in the wild. This disease does not respond to normal protozoacides, such as 'Cuprazin' for example, but does respond extremely well to treatment with 'Octozin', normally clearing up totally by the third day of treatment.

The disease always starts off as small whitish/grey, irregularly-shaped patches which are more easily detected on the darker parts of the angelfish's body. If treatment isn't promptly commenced, the blotches slowly increase in area, joining together to form much larger areas and eventually covering the entire body. Shortly after this, the untreated fish will die.



Pomacanthids kept in aquaria — among them, the Koran Angel — sometimes suffer from a protozoan infection rarely seen in wild specimens.

## PLANTS

### FLOWERING OXYGENATORS

*How do I get tropical oxygenating plants to flower?*

Submerged aquatic plants generally have very small and insignificant flowers as they are pollinated either by air currents or by water currents in many cases. Many, such as *Egeria densa*, do not set viable seed owing to the fact that they produce male and female flowers on different plants and, when the original stock was collected, only male plants were imported.

If you wish to get these plants to flower, you must lower the water level to just a few inches. The plants will then start to assume their emergent form. Provided that the plants are illuminated adequately, they should then flower.

On emergent growth I use a foliar feed, but this would not be a good idea if fish are present. Two species which have pretty flowers are Water Violet (*Hottonia inflata*) and Giant Hygrophila (*Nomophila stricta*).

### RIFT LAKE PLANTS

*Is it possible to grow plants in an aquarium housing small Rift Lake Cichlids such as *Tropheus duboisi*?*

It should be no trouble to grow plants in this situation, provided that your hardness and pH are not too high.

If you are below pH 7.5, then concentrate on tough species such as Cryptocorynes, Anubias, or Lagenandras. These should grow well, as long as you surround the roots with pebbles to stop the fish uprooting them.



ANUBIAS  
AFZELII

Anubias and other tough plants can tolerate African Rift Lake conditions.

## TROPICAL

### SHRIVELLING PLATIES

*I am having problems with my stock of Platies. The fish appear to be 'shrivelling' up — the body goes arched and seems to get smaller. I have been regularly breeding these fish for some time now, but the new fish seem to be getting smaller and some are now dying nearly every week.*

Sorry to read of the deaths of the Platies. The arched spine and fading away is characteristic of fish Tuberculosis (for which there is no really effective cure). The basic problem is why your Platies are subject to the disease, since it is often associated with stress or weak stock.

A clue is in your comments about frequent breeding — perhaps you are using the same female all the time and she is really 'spent', and so is producing weaklings. If you are line-breeding, perhaps you are using brother x sister spawnings which again can produce weak fish.

Remember also that live-bearers often only live a year or two. In fact, in the wild, many fall prey to predators (that live among them) within months. Therefore the fish are not 'biologically prepared' to live for years.

Replace the fish with young, vigorous stock, bright of eye,

colourful and with erect finnage. If you still lose fish, the problem must be in your water quality.

### SLOW-LEARNING SEVERUMS

*My Severums have spawned regularly over the past year. They look after the eggs but then begin to eat them as they start to hatch. On a number of occasions I have netted the male after spawning, but to no avail. Removing the female doesn't alter things either. Their only tank-mate is a 'Pleco'.*

Severums (they were called *Cichlasoma severum* but are now *Heros severus*) spawn regularly, so I would wait until it dawns on them how to be good parents. You should then have so many fry you will need more tanks...

Are you sure the fish are eating the fry? *Heros* spp do eat the egg shells about 72 hours after spawning, but the fry do not become free-swimming until three or four days later. Then they eat each other!

You have obviously closely observed the fish and disrupted their behaviour patterns by netting one or the other; perhaps this has played a part in the fry eating. Try using a screen to give privacy and remove the 'Pleco', too.



LAURENCE E. PRINCE

Severums are usually good parents, but it can take them quite a long time to realise this!

## COLDWATER

### SHINING SUCCESS?

*I have four American Minnows (Red Shiners) in a 3ft tank with a selection of other coldwater fish. Two of the minnows are showing signs of mating and one keeps going back to a particular leaf to tend to it (rubbing against it). Would you please tell me if these fish breed in aquaria and, if so, are they good parents?*

The Red Shiner (*Notropis lutrensis*) is a native to the south and south-west of the USA.

It is quite fussy about water chemistry, preferring slightly alkaline water. The water must be clean and clear, and, by providing these correct conditions, you will find that your fish will thrive. Their colours will also be stronger and there will be a tendency to spawn at various intervals throughout the season. During this time the male, which is distinguished by an inverted darkish triangle just behind the gills, will sport small white breeding tubercles on his head. To add to his beauty, his flanks will take on an intense red coloration which, of course, is where the name of these fish was derived from.

Red Shiners (or Rainbow

Dace, as they are known in the States) are able to tolerate a wide range of temperatures but those over, say 70°F (21°C) are to be avoided as the life cycle is speeded up and their life expectancy of about five years is, consequently, reduced.

I am not quite sure if your fish are actually planning a spawning by tending a leaf as, usually, this species chooses a patch of gravel to deposit the eggs. If they do, however, spawn, I am quite sure that the other fish in the tank will eat the eggs, while any which are overlooked, if fertile, will be eaten on hatching.

To be perfectly honest, I strongly doubt that tank spawnings are all that common. I know that Red Shiners are bred on a large scale, commercially, but I am not familiar with recorded hobbyist spawnings of these little fish. It would therefore be most interesting, if your fish do spawn, to take some photographs and make detailed notes of everything which could trigger them to breed, along with their behaviour during spawning and the feeding of the fry, from Liquifry to Brine Shrimp, and later, *Daphnia* and fine powdered flake. This, I am sure, will make a smashing article of great interest, and one which our editor would certainly be interested in.



NOVA/SCOTT WEAVER/SCOTT WEAVER PHOTOGRAPHY

The Red Shiner, or Rainbow Dace, is bred on a large scale commercially, but only rarely by hobbyists.

Continued on page 29





Sea Anemone *Sagariogeton undatus*, with tentacles partially extended. This uncommon anemone opens more readily when the lights are turned off.

## ENVIRONMENTAL HEALTH FOR NATIVE MARINES (6: Lighting, Introducing Specimens, Stocking Levels)

Andy Horton turns his attention to three vitally important factors which have a direct bearing on the long term wellbeing of native marine creatures  
(Photographs by the author)



Montagu's Blenny, *Coryphoblennius galerita* is superficially similar to the Common Blenny, but with a fleshy flap between the eyes and small blue spots over the body. Most blennies are active by day.

In this article I'd like to examine a number of areas not covered in the preceding five articles, with a brief guide to some aspects of lighting, introduction of new species, and a discussion of stocking levels for British sea life aquaria.

### LIGHTING

Foreign readers who are lucky enough to be able to dive in sun-drenched tropical seas, and who have never had the opportunity to experience the bracing climate of Britain(!) should note the characteristic murkiness of the weather for large parts of the year. Furthermore, storms can churn up sediment in waters already coloured by plankton blooms. The result of this activity is that sunlight does not penetrate to the depths experienced on coral reefs. In aquarist applications, this means that the quality of light is not that important in native marine aquaria, and that a subdued light is generally preferred, to mimic natural conditions.

Many of the native invertebrates we keep are nocturnal, and sub-aqua divers report much of the most interesting life during the hours of darkness when lobsters and large crabs venture out from their daytime nooks and crevices. Long-legged Spider Crabs, *Macropodia rostrata*, wave their legs frantically and swim in a fascinating bicycle-rider's

motion to capture small planktonic creatures during the hours of darkness.

Many of the colourful anemones hide in holes, underneath overhangs and in dark, deep pools. These are termed 'negatively phototactic' (\* see note at the end of this section), with a tendency for the creatures to hide under rocks in response to light. This can be seen clearly in aquaria, where mobile species like the Short-legged Spider Crab, *Pisa armata*, will hide in rock clefts; the 5-Bearded Rockling, *Gilista mustela*, may demonstrate such nocturnal behaviour that it may disappear for two weeks after introduction. Prawns and shrimps feed mainly at night, and nearly all the British sea anemones can be seen at their best if the light is suddenly turned on in a darkened aquarium.

A few animals seek out strong sunlight, notably the Snakelocks Anemone, *Anemone viridis* (= *A. sulcata*), found in the sunniest spot in pools, and others like the Common Blenny, *Lipophrys pholis*, and the Corkwing Wrasse, *Crenilabrus melops*, are active by day. This last species will sleep on its side and display different colour patterns at night.

Fluorescent lights, specially designed for aquaria, are now in standard use. Only one light of this sort will be needed for British sea life kept in the usual 20-30 gallon (90-135 litre) aquariums. It is well to remind the aquarist of a few of the advantages over tungsten (ordinary lightbulbs) light:

① Heat is not emitted. This is very



Common Starfish, *Asterias rubens* — only really suitable for 'cooler' aquaria.

important in coldwater aquaria where a 40 Watt tungsten lamp can add 5°C (9°F) to the water temperature, if placed in a hood over cover glass.

② Fluorescent lights emit a whiter light, which is more attractive and more natural. The colour temperature (Kelvin) is lower<sup>3</sup>, with ordinary light bulbs illuminating with an orange tinge.

③ Fluorescent lights are cheaper to run in the long term, although the initial cost, including starter unit, is expensive.

If the aquarist is attempting to keep seaweeds, special attention needs to be given both to lighting levels and water quality, something which is beyond the scope of this article.

Because of the desirability of low light levels, tungsten bulbs are still used frequently, often creating a mysterious effect as the viewer searches for the shyer species under the subdued 15W or 25W bulb. In Public Aquaria, Conger Eels are often portrayed in this way (a few aquarists keep juvenile specimens of this fish). To avoid the orange tints, a blue-coated 100W bulb<sup>2</sup> is available from photographic retailers. I use one of these in a reflective holder at a distance of at least 1ft (30cm) to avoid heating the water. They retail at 10 times the price of the cheapest lightbulbs, so I restrict their use to demonstrations, and as a focusing lamp for photographic purposes.

In very large aquaria, mercury-vapour lights can direct needed light into dark corners.

\*Note: Phototactic organisms move either towards (positive phototaxis) or away from (negative phototaxis) a light source. If an organism remains attached to the same spot but bends towards light, it is positively phototropic. If it bends away, it is negatively phototropic.

## INTRODUCING SPECIMENS<sup>3</sup>

Fish collected from the shore, and in the shallow seas around British coasts, are likely to suffer a certain amount of stress, and are usually transported in unfiltered seawater. It is important that they should be transferred to a properly established aquarium with a temperature approximately equalling that of the seas in which they were collected (this is vitally important), and at a pH of 8.3 or thereabouts, as soon as possible. Water quality is of paramount importance and it overrides the concerns over introducing disease.

However, if a quarantine tank is used, the aquarist may notice the presence of three diseases. They are:

① Small black spots of the parasite *Cryptocotyle lingua* on the body of any shore fish, especially on small specimens of the snake-like Butterfish *Pholis gannellus*. This is a sea-bird parasitic worm, and although unsightly, it does not kill the host; nor does it spread rapidly in aquaria. It is more likely to be introduced into the aquarium with live limpets and periwinkles than with fish.

② White spots on the fins of small Wrasse, sometimes in enormous numbers. In healthy aquaria, this disease is known to disappear. However, it has also been known to spread in aquaria and to infect all species of Clingfish (Family: Gobioidae). I have not identified the parasite.

③ White worm-like infections of the eye of shore fish, most likely the Blenny. This fish parasite has not been identified. It is easily overlooked, and will only cause distress to the fish in bad water conditions. This disease probably spreads in aquaria, but symptoms are likely to be internal and remain unnoticed in a fish that may live for over five years. Crabs and other invertebrates rarely suffer

extensive shock during capture. Any deaths can usually be attributed to bad transportation on long (over five hours) journeys from the shore, or to introduction into aquaria that are unsuitable. This almost always, means excessive temperatures, especially with Plumose Anemones, *Metridium senile*. Wrasse and Blennies will attack small crabs and prawns.

## STOCKING LEVELS<sup>4</sup>

In my earlier articles, I have hinted that overstocking can result in unsatisfactory tank conditions, leading to the demise of all but the hardiest of occupants. Because of the diversity of life forms, and the different shapes and appetites of the fish, only general guidelines can be given here.

Important factors include:

- ① The water capacity of the aquarium;
- ② The nitrogen input (food) into the aquarium;
- ③ The rate of nitrogen excretion by the animals;
- ④ The rate of nitrogen conversion and oxygen consumption by the filtered bacteria;
- ⑤ The oxygen consumption of the fish and invertebrates;
- ⑥ The temperature of the water and other environmental variables;
- ⑦ Amount of swimming space;
- ⑧ Estimated growth rates;
- ⑨ Type of filtration equipment.

### Water Capacity

Graham Cox (Your Questions Answered — Tropical Marine) has established the principle of 1in (2.54cm) of fish (excluding tail fin) for every 2 gallons (9 litres) of water for tropical fish, when a fully mature under-gravel filtration system is in operation. This figure is arrived at after six months to one year. For the first six months, only half this stocking level should apply, to allow the nitrifying bacteria to become established.

For practical experiences, we can rely on the considerable experience of Graham Cox, and use these figures as a starting point.

### Nitrogen Input

It quickly becomes apparent that not all fish are the same. Some are aggressive and predatory, while others are sedentary, and have rather smaller bodies than fish of the same length. British rock pool fish, for example, may consume substantially less food than free-swimming fish of the same length. From my experience, it is possible to keep Rock Gobies, *Gobius paganelius*, at twice the densities of the recommendation.

### Nitrogen Excretion

This is difficult to quantify as the data are not available. Further, some organisms can vary their excretion rates. On the whole, though, invertebrates can often be kept at higher proportionate densities than fish; even if they consume the same amount of food.

### Filterbed Bacteria

The greater the food input into the tank, the greater the population of filterbed bacteria that will develop. In a grossly overstocked tank, which is quite possible if the aquarist does not exert some restraint, the oxygen demands of the bacteria and inhabitants can exceed the oxygen available, with appalling results. Even low temperatures will not help the fish.

### Oxygen Consumption<sup>5</sup> of the Fish and Invertebrates

Different species have varying consumption rates. Don't forget that larger fish consume more than smaller fish, and that, as the water gets warmer, the fish exert more energy and eat correspondingly more, requiring a higher oxygen content than previously.

When large fish are kept, the stocking levels (as measured in length per water capacity) will have to be reduced.

### Temperature

Dissolved oxygen levels decrease as temperature increases. Demise of fish in hot weather is not entirely a matter of the tolerance limit of that species. An aquarium operating successfully at 15°C (59°F) may be overstocked at 20°C (68°F).

### Swimming Space/Growth Rates

Some of the active fast-swimming fish of the sea are not suited to home aquaria. Juvenile Bass, for instance, are often found inshore in the south of Britain, and will outgrow a tank in terms of the amount of

space required. Other fish require territories, and even a small fish like the Common Goby, *Pomatoschistus microps*, may respond by attacking and killing its rivals. Full grown Wrasse require more space than is normally available in home aquaria. Even the juveniles will eventually outgrow the aquarium. This family of fish (Labridae) requires tanks in excess of 100 gallons (450 litres), as do the hardy Grey Mullet. The aquarist must consider their future food requirements, and note that marine fish will grow as fast in aquaria as they will in the sea. If they are not given sufficient food, they will show signs of malnutrition.

### Types of Filtration Equipment

Slightly higher stocking density levels may be possible if the aquarist is using items of water purity control designed to reduce the amount of nitrogenous waste entering the biological filtration system. These will include:

- 1 Protein Shimmers. It is still not clear how much organic material these units remove.
- 2 Activated Carbon. Because of its limited adsorbive life, the aquarist will need to employ a strict regime of carbon changes if (s)he wishes to use this material to maintain higher levels than normal.
- 3 Ozonizers. These will remove organics and kill parasites, but their expense seems to make them largely the province of the experimental laboratories, and dedicated specialists.

### CLOSING THOUGHT

I am constantly reminded of what Stephen Spotte said in 'Seawater Aquariums' that the successful maintenance of a marine aquarium is a mixture of witchcraft and science. I have only briefly glanced over the aspects which I thought were important. With a genuine care over the creatures in our aquaria, and the appropriate consideration for the natural environment from which the fish and other creatures come, I am sure that anyone who is keen enough, can apply his/her own brand of witchcraft, and embark on the most fascinating hobby in the world.

### Notes & References

- 1 Colour temperature. This unit of measurement is used in colour photography. Readers may be familiar with the orange prints taken with indoor snaps. The colour temperature of a 100W tungsten bulb approximates 2900°K. At mid-day, daylight records 5500°K, rising to 7000°K plus in overcast skies. Fluorescent lamps vary, but are more likely to approximate daylight measurements.
- 2 Brand name is 'Claudivix'.
- 3 *Collecting Techniques in A & P* (September 1987).
- 4 *Advanced Techniques in A & P* (April 1989).
- 5 *Oxygen in the British Native Marine Aquarium in A & P* (April 1990).

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Continued from page 25

## COLDWATER ALL-GLASS FEARS

*My coldwater fish tank is made up of five pieces of glass stuck together with some sort of adhesive, i.e. it has no iron frame at all. I've recently noticed that the adhesive is coming out from between the glass (as if it were being squeezed out) and am frightened that the sides might come apart and do a lot of damage. Can you advise?*

Modern all-glass aquaria held together by a silicone sealant have been in use for quite a few years and have proved themselves cheaper to buy, lighter in weight, easier to construct, less likely to leak, and (to many people) more attractive than the angle iron frame tanks of old. Yet another plus in their favour is the fact that they need only the minimum of maintenance; just a wipe over with a damp cloth and a polish up with a soft cloth.

When not in use they can be cleaned out, dried, and stored away. This is quite unlike the angle iron frame tanks which often sprang a leak (more so if not used for any length of time), dried out and almost always required re-sealing when brought back into service. The frame also regularly needed a new lick of paint so that the tank always looked at its best.

Of course, there is always some apprehension about the strength of the sealant, but it is really remarkably strong, and there are some extremely large tanks in use which are constructed in this method. In fact, the thickness and durability of the glass causes more concern than the sealant itself.

The bits of sealant which you have seen "as if they were being squeezed out" are just small amounts of surplus sealant which were actually squeezed out when the tank was constructed, i.e. before the sealant 'dried out'. It should not give you any cause for concern.

**GOT ANY  
PROBLEMS?  
THEN WRITE TO  
OUR EXPERTS!**

## PLEASANT CAECILIAN SURPRISE

*I was recently pleasantly surprised to find some aquatic caecilians (Typhlonectes compressicauda). However, information regarding their requirements and care seems to be virtually non-existent. Can you help?*

Caecilians are a unique group of amphibians which are widely distributed throughout the tropical parts of the world, although they are not found in Australia or Madagascar. They are frequently described as "worm-like" burrowing amphibians because of their long, limbless bodies and their preference for living underground.

Caecilians vary considerably in size. The largest, *Caecilia thompsoni* from Colombia, reaches a length of 55in (139.7cm). In contrast, the smallest is *Hypogeophis brevifrons* from the Seychelles. This species only grows to 4.5in (11.4cm) in length.

Some species of caecilian are ovoviviparous, i.e. the females 'give birth' to live young. Other species are oviparous — the females lay eggs. The larvae of some species complete their development inside the egg capsule before hatching, while hatchlings of other species emerge as free-swimming larvae with external gills. These larvae then metamorphose in water, losing their gills before moving onto land.

Out of the 160 species of caecilian discovered to date, no totally neotenic examples have been found, i.e. none are known to reproduce in the juvenile condition.

However, members of the family Typhlonectidae from South America are exceptional because they remain aquatic or semi-aquatic throughout their life. This family includes *Typhlonectes compressicauda*. The largest species in the family is *T. eusei* which grows to a length of 28.5in (72.5cm).

As stated above, caecilians are natives of the tropics. Therefore, totally aquatic species should be maintained in water at a temperature of between 24 and 27°C (75-80°F).

## HERPETOLOGY

Amphibians of all types are sensitive to chlorine in water. It is therefore advisable to allow tapwater to stand for 24 hours before it is used to replace or top up the water in an aquarium used for housing amphibians. The use of dechlorinating tablets is not recommended. If rainwater is used, chlorine is not a problem, but there is the possibility that water-borne infections can be introduced, for example, species of fungi belonging to the genus *Saprolegnia*.

If the water in the tank is not completely changed at regular intervals, excretory products containing dissolved nitrogen can build up to concentrations which are hazardous to health. The tank water can also be filtered to remove suspended solids. As caecilians are burrowing amphibians, totally aquatic species would quickly disturb an undergravel filter. However, alternative power filters would be suitable, for example, an external Eheim unit (electrical pump and filter chamber) with an internal submersible pre-filter. A pre-filter will increase the time between completely dismantling and cleaning the filter chamber.

A pre-filter can contain an all-nylon kitchen scourer and some polymer wool which can easily be removed once a day for rinsing — only two or three minutes' work. Relatively small power filters which are submersible inside an aquarium are also ideal for use with totally aquatic amphibians.

Caecilians like to burrow;

this includes aquatic species. Fine, round gravel on the floor of an aquarium is a suitable substrate for this purpose. Sharp-edged gravel should not, of course, be used because this could damage the skin. Unfortunately, gravel on the floor of the aquarium has one major disadvantage — it traps organic debris, such as fragments of uneaten food and faecal waste. Thus, gravel on the floor of any amphibian tank makes thorough cleaning very difficult.

Although rooted water plants would improve the appearance of the aquarium, and oxygenate the water during photosynthesis, aquatic caecilians would quickly uproot any plants as they move through the gravel. There is also little point in illuminating the aquarium with a fluorescent tube which has an ultra-violet component in its spectrum, since this would be absorbed by the water.

Aquatic caecilians eat earthworms. Terrestrial caecilians are also carnivorous, and eat earthworms and small insects, especially termites. As with other types of amphibian, there can be a certain amount of cannibalism between adults and much smaller juveniles. Therefore, it would be unwise to keep large caecilians with smaller individuals of the same or different species.

The aquatic caecilian *T. compressicauda* has been successfully kept in captivity for over four years at Cincinnati zoo, Ohio, USA.



Caecilians may not look like amphibians, but they are.

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# Spotlight on DISCUS

## DISCUS WATER MANAGEMENT PROGRAMME

Ken Lowe, of Amazonian Aquatic Habitat, puts forward his own personal views and advice on establishing and maintaining adequate water conditions for successful Discus-keeping.



Take care of the water and the water will take care of your Discus.

**T**HE following article has been derived from my own practical knowledge, gained during years of keeping Discus, the King of the Aquarium. I have come to believe that, as a fishkeeper, no amount of paraphernalia and equipment can take the place of some understanding of simple basics in connection with water quality and filtration which will form the 'heart' of the aquarium and the life-support system for the wellbeing of our fish. The following, I hope, will be helpful to all aquarists and that, as a result, the survival rate of Discus and all other fish will be improved.

### STANDARD WATER

From the moment we purchase an aquarium, armed with the desire to keep and maintain Discus, it is vitally important to consider the main ingredient, water.

An aquarium filled with sparkling water from our taps may look very good, but we must consider what this water consists of, and that it is obviously not of the right quality to keep Discus in.

I believe that a 'standard' type of water

needs to be produced from our mains water supply. This means having to use resin filtration to guide the water quality in the right direction. Water from different parts of the country differ in quality and contents of pH, KH, and total dissolved solids, etc.

Our water may look the same, but we cannot see its contents. We can only therefore, rely on chemical indicators and metering equipment to detect other substances.

### My method

My own method of producing a 'standard' water quality which works very well is as follows:

(1) I fill the aquarium (cold water) using the now well-known resin filter NIROGON. This simple-to-use and relatively inexpensive equipment makes it possible to remove harmful nitrates and carbonates (KH); other quantitative exchanges also take place at this point, but I don't think we need to go into these aspects here.

(2) I then filter the water with CRYSTAL CLEAR softening resin, which should be readily available from most local aquarist shops. This resin works better in cold water.

As a guide, simply test the General Hardness (GH) once you've put the water through the resin. If it reads between 2-4 GH you have softened the water and the necessary exchanges have taken place.

(3) I follow this with a few hours filtering with bone carbon, renowned for its absorbent qualities. It will be found that all tests now carried out will be the same as they were at the initial filling of the aquarium with the NITROGON filter, with the exception of there being a reduction of the GH and a raising of the pH.

(4) The temperature of the water will now be nearing room temperature. With a spare power or box filter, I now filter the water through peat contained in a nylon stocking. It will be found that the water will not 'tan' too much at a reasonably cool temperature. I keep a check on the pH, bringing this to between 6.3 - 6.5.

(5) I next add to this now-stable water, 3-4 teaspoons of tonic salts or Tropicure Marine Salts. Table salts **must not** be used.

(6) I then switch on the heater and bring the temperature to 84-86°F (29-30°C) and check the stability of the pH. If aeration is in place (and because no fish are present) the pH may rise to near pH 7. In this case, a small amount of phosphoric acid may be used to reduce it back to pH 6.3 - 6.5.

### Alternative method

A further method which is favoured by many aquarists is to use deionising twin-column filter devices. With this method, totally desalinated water is mixed with raw tapwater in variable quantities to establish a required GH and total dissolved solids, as desired. As a guide, a 50% - 50% mixture will give GH of half of that of the original tapwater GH. The addition of tonic salts and monitoring of pH are still required, of course. Information is best obtained from the dealers of these water-softening devices to avoid any pitfalls regarding their incorrect use, recharging needs, and possible pH collapses.

### WATER MANAGEMENT

By this stage we should have a balanced and stable 'standard water' condition which will support Discus from either hard or softwater conditions with little chance or transfer shock to the fish. To be able to measure any changes in conditions, I suggest the purchase of GH, KH, pH test kits and a digital TDS meter. (Total Dissolved Solids).

Methods of carrying out water changes and maintaining equilibrium in the aquar-

ium have to be decided now, if this has not already been done. I rely on normal elements to maintain a balance, with the assistance of the biological cycle which exists within the aquarium itself.

My equipment is simple: water from the mains, the NITROGON nitrate filter, a drum or spare aquarium (for water storage) and a canister filter containing peat moss. With these simple items, a balance can be maintained quite easily, carbonate hardness is minimal and chlorine is allowed to escape.

The correct use of the NITROGON unit and the peat will make it possible to maintain a steady pH within the aquarium. This I do simply by running the NITROGON unit to obtain water of approximately pH 7 before recharging it with rock salts. The peat is not used to filter the water continually and when its acidic capabilities are expended, it is simply renewed. This makes it possible to monitor conditions both for simple water management and for water changes. pH's that dive too rapidly undoubtedly show the effects of carbon dioxide, and possibly humic, tannic, and other organic acids. The cause must, of course, be isolated. Alterations to the water management regime will, without a doubt, upset what should now be a smooth-running aquarium. Once a change has been carried out, the temptation to use buffers will inevitably follow in an effort to try and correct the situation. If we succumb, then this, without a doubt, will further upset the equilibrium.

It is my view that no matter how good an aquarist is, mistakes are often made. When something goes wrong there is usually a good reason for it, and it must be back-tracked and 'post mortemed' to eliminate the cause. Nine times out of ten, the filter will be the culprit. If uncertain, going back to 'standard water' and starting again, rather than letting the fish suffer, is not a bad idea.

## FILTER MANAGEMENT

If the water is in good condition and one is satisfied with all the tests, it is then possible to move on to the next stage. Many would-be Discus-keepers are, understandably, confused as to what method of filtration to use. I appreciate that there are many different techniques, all with their advantages and disadvantages, but I believe that cleanliness and low maintenance are of utmost importance. The end result we are looking for is water purity and, of course, balance between the oxygen and carbon dioxide content which occurs when the filtration bacteria are fully activated.

### Basic filter facts

At this point, the basic workings of all filters, no matter what method or type, are similar. First, we add some fish to our aquarium and they, quite naturally, produce urea waste. This waste product will, in turn, be converted into ammonia, then into nitrites and finally to nitrates. This sounds simple, but is it? What of the fish during this process? Nitrites and ammonia are both killers, so the

risks of poisoning have to be taken into consideration.

Maintaining the pH below 7 will keep the non-toxic ammonia (as ammonium) in balance and relatively harmless, while maintaining 300ppm of salts will protect the fish from nitrites.

Having dealt with the initial stages of filtration, one may wonder if there is anything else to do other than take impurities from the water and put it back again in clean condition.

YES! Let us evaluate the action of the filter, which is now a 'respiratory system'; it lives and breathes with live bacteria, both aerobic and anaerobic. We are mainly concerned with the aerobic (oxygen-requiring) activity. It must be understood the aquarium water is in continual contact with the bacteria. Therefore, it is certain that the water returning to the aquarium is as much as 50% deficient in oxygen and will almost certainly be heavily laden with carbon dioxide. If this is not corrected the carbon dioxide (CO<sub>2</sub>) will gradually reach 'overload' level.

Oxygen is very easy to replace in the aquarium with the aid of an air-pumping diaphragm pump (or equivalent) via a swan-neck undergravel filter uplift, or a venturi or other piece of suitable equipment. Carbon dioxide is a little more difficult to remove however. The water surface movement supplied by aeration will help. Spray bars and other means of continual surface movement also assist in the process as can water jetting into the surface.

The effectiveness of these techniques will depend on the flow rates and on whether or not the balance or type and quantity of filter medium being used is being totally exceeded or not. If this balance is not achieved, it will be impossible to keep up with the replacing of oxygen that is depleted, or eliminating the carbon dioxide that is generated.

### Filter 'tuning'

My approach to this problem is simple, and consists of reducing and 'tuning' the filter back into balance again. To carry out tuning, firstly stabilise the pH to 6.3 - 6.5 and maintain the salts at 300 ppm above tap water concentration. By removing filtration medium a little at a time, a slight nitrite increase may result and then rectify itself again. Continue this process until a slight degree of nitrite remains. Then start adding small amounts of medium again until the filter is brought back into tune and balance once more. Nothing must be altered during the tuning process, but once it has been completed, the filter will be in balance, with oxidation and reduction returning to optimal levels again.

The numerous filter materials available today have varying capabilities with regards to their shape, porosity and surface area on which bacteria can gain a foothold and multiply. It is therefore very difficult to know just how much volume of medium to recommend. Both media and flow rates vary a great deal. In addition, there is a world's difference between filtering 10 fish in 30 gallons, or 50 fish in 80 gallons. However,

the foregoing method works well and cuts out the uncertainty, ending up with an adequate volume of medium for the existing conditions.

## Over-filtration

Over-filtration will either appear very rapidly or just simply creep up on you. I have seen it occur within 24-48 hrs, just as the filter 'kicks in'. Depending on volumes employed, the fish will, without a doubt, signal that something is wrong. First signs will be dull eyes, spooky behaviour, darkening, refusal of food, and transparent white faeces. Over a long period of time, stunted growth will become evident and, if the situation is not rectified, death of the fish will follow.

If the situation is rectified promptly, however, the fish can recover to their original condition, unless too much prolonged damage as been incurred.

There can be instances where only a few fishes are kept in the aquarium and the effects they produce will only verge on a situation of imbalance such as that already mentioned in the preceding paragraphs. This is because insufficient waste has been produced by the fish to enable the bacteria to multiply to a dangerous level. However, if a 'tuned' filter is in use, over-filtration cannot occur.

It is worthwhile to mention that, no matter what type of filters are being employed, from trickle filters to canister models, the end results — as far as I can tell — are inevitable if too much medium is used.

The secret of successful Discus-keeping relies on the maintenance of adequate, balanced water conditions. We have all heard it said that good water quality produces good-quality fish. Nowhere is this truer than with Discus.

I have presented some of my thoughts on the subject and outlined some of the techniques that work for me. I hope they prove successful for other Discus keepers too.



Bare tanks such as this one make water management easier than in fully furnished aquaria... but are they as nice?

# Spotlight on DISCUS

## DISCUS HEALTH

Dr David Pool, of the Tetra Information Centre, offers sound advice on how to prevent disease in Discus . . . and on how to recognise and treat them should they arise.



Everybody's ideal image of a Discus — robust and perfectly healthy.

**D**iscus, in common with all of the fish we keep in our aquaria, are subject to a range of different ailments. In the past our knowledge of these diseases and why they occurred was limited, with the result that many Discus died (and they were, consequently, regarded as difficult fish to keep). In recent years, however, our understanding of the needs of Discus has increased greatly and losses are now the exception rather than the rule.

### HOW DO DISCUS BECOME DISEASED?

In this article I would like to examine the main diseases affecting Discus, why they occur and how they can be treated. Before doing so, it is important to point out that all of the Discus that are kept, and for that matter, all of those that are for sale, are diseased. That is, they are all infected by at least one, and often several, species of parasites. These parasites are a natural part of the environment of Discus and all other fishes.

If a Discus is in good condition generally, its immune system (the body's natural means of countering disease) will be active and capable of controlling the infection, ensuring that the parasites are only present in very small numbers. Exactly the same is true in humans. Each of us is infected by a number of different species of disease organisms, such as cold viruses, flu viruses, and perhaps something considerably more serious. But, if we are otherwise healthy, our

immune system will naturally control these diseases and we will feel healthy.

If a Discus becomes unhealthy for any reason, for example, owing to poor water quality, unsuitable nutrition, stress etc, the immune system will be suppressed, allowing the existing parasites to increase in numbers, thus causing problems.

A second situation when disease is likely to occur is following the introduction of new fish into an aquarium. Although these fish may appear perfectly healthy, they will, as already indicated, harbour small numbers of diseases. If the species (or even the strain) of parasites is 'new' to the existing Discus, their immune system will not recognise the organism as being harmful and will initially



Tapeworms can be treated, but with difficulty.

not control it. As a result, the parasites may increase to dangerous numbers.

### FACTORS CAUSING POOR HEALTH IN DISCUS

Discus, as most other fish, are sensitive to a variety of different factors, which could weaken them and eventually result in a disease outbreak. The following are perhaps the most important:

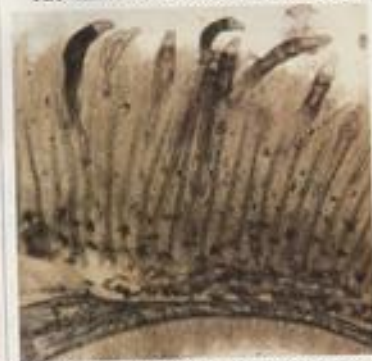
#### 1 Water Quality

Discus are particularly sensitive to poor water conditions and will fail to thrive if not provided with a suitable aquatic environment. Raised pollutant levels (nitrite and nitrate) and sudden changes, or unsuitable values, of the pH and hardness are particularly important.

Raised nitrite levels (> 0.25 mg/l) can be directly toxic to Discus, leading to irritation of the gill and skin membranes, and a reduction in the ability of the blood to transport oxygen. At lower concentrations, the fish will be weakened, allowing parasite numbers to increase. Nitrates are unlikely to be directly toxic to Discus, unless the concentration is greater than 50 mg/l. Again, at lower levels, the fish will be weakened, leading to disease problems.

Discus are traditionally regarded as soft, acid water species, as these are the conditions in the Amazon from where they originate. However, now most Discus are tank-bred specimens and, in some cases, have been acclimatised to harder, more alkaline, water. It is worth checking on this fact when purchasing new fish, as a sudden change in the water quality can have disastrous effects.

The same is true when undertaking a



*Dactylogyrus vastator* — the most common type of gill parasite.

partial water change. Make sure that any adjustments are undertaken outside the aquarium so that the water entering the aquarium is exactly the same as that already present.

## 2 Nutrition

In common with all fish, Discus require a nutritionally balanced diet. In the wild, this is obtained in the form of many types of live foods, e.g. insect larvae, shrimps, etc. In the aquarium, many Discus are also fed on fresh or live foods. Here, the choice is usually limited to beef heart, bloodworms, *Daphnia* and Brine Shrimp. While all are readily accepted by Discus, they do not provide all of the necessary nutrients. Therefore, over a prolonged period of time, this leads to nutritional deficiencies which affect spawning success, coloration, growth, etc.

In the past, flaked food or additives were often added to the foods in order to prevent such problems. Fortunately, there are now a

aquarium, the weakest individual may be constantly bullied, resulting in it being prevented from feeding and becoming greatly stressed (often indicated by the appearance of dark vertical bars on the side of the fish). This fish will be particularly susceptible to disease attack and will often succumb if preventive measures are not taken. In larger groups the aggressive behaviour is distributed between a greater number of fish, with the result that no one individual is overly affected.

## 4 Surroundings

The surroundings in which Discus are kept can affect their overall health and, therefore, their susceptibility to disease infection. They are, for example, very susceptible to bright conditions, and will become stressed and very nervous if not provided with dim lighting or areas of shade. A strong water flow in the aquarium can also result in problems.

cichlids (e.g. Angelfish and Oscars) and gouramis.

### What is it?

Hole-in-the-Head Disease is caused by a flagellated protozoan parasite called *Hexamita*. This parasite is in the same family as *Ocistomonas* and *Spiroplasma* and it is often referred to by these names in older literature. *Hexamita* is a very small parasite (approximately the same size as a blood cell) and can only be detected in the host tissue using a microscope.

### Signs of infection

*Hexamita* may exist as a low level infection in the intestine of most Discus and, possibly, other species, without doing the fish any harm. Under certain circumstances, the parasite numbers may increase rapidly, with adverse effects on the health of the fish.

Fish suffering from heavy infestations of *Hexamita* in the intestine often go off their food, become listless and hollow-bellied, with yellow mucus in the intestine and pale 'stringy' faeces. In Discus the infection is thought to pass from the intestine into the internal organs. Often, the end result of such infestations is the development of the typical lesions in the head region, at the base of the fins and near the lateral line, which often have a small string of mucus arising from the centre.

### Treatment

In some cases, slowly raising the water temperature to 30°C (86°F) for five days has been effective in controlling mild *Hexamita* infections. The increased water temperature stimulates the fishes' immune system, as well as weakening the parasite. In more severe cases, chemical treatment is necessary. Two chemicals often used to control *Hexamita* infections are Emtryl (Dimetridazole) and Flagyl (Metronidazole).

Emtryl should be used at a concentration of 5 mg/l in the water of the tank containing the infected fish. This dose should be given three times, at weekly intervals, with a partial water change between each treatment.

Flagyl is probably used more widely than Emtryl. Sufficient Flagyl should be added to an isolation aquarium to give a final concentration of 7 mg/l. One treatment is usually sufficient, although it may be repeated every other day for a maximum of three treatments. Flagyl can also be incorporated into the feed and fed for seven days. This offers an ideal method of controlling the disease, providing the fish are still feeding, as, in this way, the remedy gets inside the fish where the disease occurs.

An excellent medicated food for Discus can be made in the following way: Firstly, two Flagyl tablets should be ground into a powder and mixed with six crushed food tablets. A small quantity of water is then added to form a thick paste and this is spread on the curved surface of ten food tablets. After being left to dry overnight, the tablets may be fed to the Discus at the rate of one tablet per two adults, or four small fish, each day. The above tablets are ideal for this purpose, as they can be stuck to the aquarium glass



This now-famous photograph perfectly shows the extensive disfiguring effects of a severe attack of Hole-in-the-Head.

number of commercially available foods which are ideal for Discus. One food which has recently been launched is Tetra Prima — a slow sinking granular food which has been widely used by Discus keepers in Germany, Japan and the USA.

## 3 Territoriality

Discus are cichlids and, as such, are territorial to a certain extent. In any group of Discus a 'pecking order' will soon be established in which the weakest individual will be picked on by all of the other individuals. If only two or three fish are kept in the same

## DISEASES OF DISCUS

The actual diseases which affect Discus are, in most cases, the same as those which affect other tropical freshwater fish. The following are probably the most important:

### 'Hole-in-the-Head Disease'

Hole-in-the-Head Disease is widely regarded as the Discus disease as it frequently occurs in these fish, often with disastrous consequences. In fact, the disease can infect a range of different fish species such as other



and are therefore more readily accepted by the Discus.

Emtryl (Dimetridazole) and Flagyl (Metronidazole) are only available on a veterinary prescription in the British Isles, and your local vet should be able to advise you on the calculation of the correct dose levels.

Although both of the afore-mentioned drugs have been used successfully and safely on many occasions, it is important to realise that neither is licensed specifically for use with fish, and, hence, any aquarists using them do so at their own risk. There are also a small number of commercially available preparations which are designed to be used to control *Hexamita*.

## Gill flukes

### What are they?

*Dactylogyrus*, the most common genus of gill flukes is a small, pale-coloured, worm-like parasite which is usually 0.2 to 0.5 mm in length. The adult parasite attaches itself to the gill filaments of the fish using the hooks which are located at the front end of the body. A sucker at the rear of the body is used in conjunction with the hooks to allow the fluke to move across the gills in a leech-like fashion.

The flukes feed on the secondary gill filaments, thereby reducing the area available to take oxygen out of the water. Gill flukes are hermaphrodites (both male and female). Therefore, only one individual on a Discus can reproduce and cause problems. This reproduction is by means of eggs which either remain attached to the gills (allowing the young to infect the same fish) or drop off, after which the larvae search for a new host. The larvae must find a new host within four to six hours or they will perish. At the temperatures usually found in the Discus aquarium *Dactylogyrus* can complete its life cycle within two days.

### Signs of disease

Severe infestations may cause damage to the gills, resulting in the fish having difficulty in obtaining sufficient oxygen. The result of this is that infected fish will often accumulate around filter inlets, gasp at the water surface, or show rapid gill movements. Excess mucus is often produced by the fish as a reaction to the flukes, and this will further exaggerate the problem of oxygen uptake.

The flukes may cause severe irritation which results in the fish rubbing, flexing the gill covers and showing short, sharp swimming movements, followed by periods of laying still on the aquarium bottom.

### Treatment

Good-quality commercially available remedies are, by far, the best means of controlling gill fluke infections. In most cases, they will be effective at controlling the problem within five to seven days.

Before treating a gill fluke infection it is advisable to check the water quality, and in particular, the nitrite and nitrate concentrations, as raised levels could result in similar signs.

## Intestinal disorders

### What are they?

Intestinal disorders is a term covering a multitude of sins. Possible causes of such disorders include the larger intestinal parasites (e.g. nematodes and tapeworms), *Hexamita* infections and nutritional problems.

### Signs of infection

Intestinal infections can manifest themselves in a variety of ways. These include the production of clear, stringy mucus, emaciation, localised swelling or poor growth. In the majority of cases, further diagnosis of the problem is only possible by conducting a post mortem. Unfortunately, this is not always possible, or feasible.

### Treatment

Treatment of an intestinal disorder depends largely on the nature of the problem. Nutritional deficiencies and *Hexamita* infections have already been covered.

Intestinal worms may be controlled using commercially available anthelmintics, such as those used for dogs and cats. Such chemicals are only effective if they get inside the intestine of the fish, though. The best way of doing this is to use a medicated food prepared as described in the section on Hole-in-the-Head Disease.

Perhaps the best remedy for tapeworm infections is a drug called Praziquantel (Bayer) which is only available on a veterinary prescription. This remedy should be used at a concentration of 20-50 mg per kg of fish body weight at two-day intervals for three treatments.

Roundworms (= nematodes) can be controlled using Piperazine citrate which should be used at the rate of 25 mg per food tablet. This treatment should be used twice with a 10-14 day interval between each.

## Sliminess of the skin

### What is it?

Sliminess of the skin is not caused by any particular parasite, but is a term to describe a build-up of mucus on the body. The excess mucus production results in the formation of pale areas on the body, and are caused by irritation of the skin and/or gill membranes. When irritated, the mucus-secreting cells release copious quantities of mucus in order to protect the skin and gills. This irritation may be caused by a number of factors, including poor water quality, bad handling or parasitic attack.

Bad handling is usually easy to diagnose, as it occurs following transportation or capture of the fish and only affects a small number of individuals. Water quality problems account for the majority of 'sliminess' problems. In most cases, the majority of the fish within a certain aquarium will be affected. The sliminess will also tend to be distributed over all of the body, although it may be denser in certain areas, such as around the gills. Raised pollutant levels (e.g. nitrite, nitrate, chlorine, insecticides, etc) and unsuitable or a sudden change in the pH value are the usual causes.

Parasitic attack will usually result if the build-up of mucus is being restricted to certain areas of the body. Infections by protozoans such as *Trichodina*, *Cornia* or *Chilodonella* and skin flukes will all cause a build-up of mucus on the body. Gill parasites, such as protozoans and gill flukes, will generally cause a build-up of mucus around the gills.

If needed, an accurate diagnosis can be achieved by examining a skin scrape under a microscope. To do this, a small quantity of mucus should be taken from an infected area using a cotton wool bud or blunt knife and placed in a drop of water on a microscopic slide. This should be examined at a magnification of x50-x100. If parasites are responsible, they will generally be present in large numbers and be active. No parasites present suggests a water quality or bad handling problem.

### Signs of infection

Sliminess of the skin is usually very easy to diagnose by means of the build-up of mucus on the body of the fish. Other effects include rubbing against underwater objects and shimmying (swimming on the spot). The excess mucus production can also affect the breathing of the fish, resulting in them gasping at the water surface.

### Treatment

Early treatment of sliminess of the skin is important as it can be lethal, either directly or due to a secondary bacterial infection. The method of control depends on the cause of the problem.

[1] **Water quality.** Initially, a large water change should be undertaken to dilute any pollutants.

The replacement water should be of the same temperature as that in the aquarium and should be treated with a tapwater conditioner in order to remove any potentially dangerous chlorine and chloramine which would further irritate the sensitised skin and gill membranes. Water quality tests should also be undertaken in order to determine what caused the problem and the cause corrected.

[2] **Physical damage.** The affected fish should be isolated and treated with a good-quality external parasite/bacteria treatment in order to prevent any secondary infections. In most cases, providing good food and good water quality will result in the Discus recovering full health.

[3] **Parasites.** The Discus should be treated using a reliable external parasite treatment which will control protozoans and flukes. Increasing the water temperature by 2-3°C (3.6-5.4°F) will also help by making the parasites more susceptible.

## CLOSING REMARKS

The diseases discussed in this article are those most commonly occurring on or in Discus, although other species of parasites undoubtedly infect them from time to time. Further information on all of these diseases is available in ADI 49 *Water Chemistry and Fish Diseases* which is available from Tetra (price £1.85 + 20p P&P) at Lambert Court, Chestnut Avenue, Eastleigh, Hants, SO5 3ZQ.

# Spotlight on DISCUS

## DISCUS BREEDING SECRETS

Leading US Discus breeder and 'professional aquarist' Marc Weiss describes his personal approach to successful Discus breeding and reveals a few interesting 'secrets' along the way.



LO WING YAT

A pair of Schmidt-Focke Turquoise Discus with their young. The fish with the lighter colouring is the male.



LO WING YAT

The solution to egg-eating parents — plastic netting.



LO WING YAT

A pair of Cobalts (the female is just visible right at the edge of the picture) with their brood of very young fry.



JOHN DARWIS

Provide a well-matched pair of Discus with appropriate conditions and they will spawn in full view. This pair was photographed in one of the brightly lit show tanks at Cologne Zoo Aquarium.

**A** new friend visited me for the first time recently. He is a miniature reef hobbyist with an extensive collection of delicate and dazzling invertebrate life. Upon entering my Discus room he immediately noticed a pair of Discus dutifully tending their spawn.

"This is harder than what I do with my aquariums," he remarked. His comment, as he stared in awe, typifies the perceived notions by many talented aquarists that the propagation of Discus borders upon sorcery or some rare knowledge that few are privy to.

Nothing, of course, could be further from the truth. It is true that Discus breeders need a better handle on water chemistry and other facets of husbandry than the usual hobbyist, but once certain facts are brought to the fore, the mystery dissolves.

Our intent should not be only to breed Discus, but to breed quality Discus. To produce Discus with good body form, size

and colour, one must plan far ahead for, unlike many other fishes, short-cuts taken, even by the breeder of your broodstock, can later manifest themselves in your failure.

### Locating stock

A good source of Discus can often be located through one's local aquarium society. There are invariably some Discus fanciers in the group; perhaps even a breeder or two. It will not be difficult to obtain the names of dealers and breeders, and importantly, the impression of others, as to their integrity.

Don't be surprised to find a kindred spirit in your own backyard; the cult of the Discus is far reaching!

Some people market Discus as small as 2cm (0.8in); even an expert is hard pressed to assess quality at this point, as spectacular as the parents may be. I believe that one should only consider Discus larger than 6 or 7cm (2.4-2.8in). Common deformities such as

misshapen gill covers or twisted mouths are more easily noticed, especially by beginners, at this size.

At 8cm (c 3.2in) a true picture of the future appearance can often be predicted. For example, one can see if the fish is of a desirable round shape; elongated or oval Discus should be avoided. If the fish is of a high-bodied strain, or high-finned, these characteristics should also be in evidence at this size.

### Fish reactions

The fish should rush towards the observer, looking for food; their eyes clear. Breathing should be regular, both gills working evenly at no more than one beat per second. Breathing from one gill is often a symptom of the gill fluke *Dactylogyrus*. The skin should not be turbid; nor the colour dark.

Generally, at this recommended size, the Discus will be of a medium brown, but some blue spangling will be evident. The fish will

usually show a dark band through the eye and another through the caudal peduncle. The remaining seven bars will be intermittently displayed, according to the fish's mood. It is a fallacy that a barred Discus is a sick one; a healthy Discus is as likely as any to sport these bands.

If the aquarium is dimly lit or not at all, a flashlight shone at a forty-five degree angle to the prospective choice will often reveal colour to come. Bright blue, adult colour, often with blazing red eyes at this size should be avoided for future breeding stock. Hormones used to induce adult colour at an early age may make the fish more saleable to the gullible, but often unfit to breed.

Some of these young fish may be developing a red colour to the iris of the eye. Although attractive and desirable, be forewarned that an adult Discus is as likely to lose the red as it is likely to gain it. Some strains do exhibit more of a propensity for one or the other trends in eye colour, though, and if adult fish are present, one can often judge fairly accurately which way it will go.

### Water quality

Avoid broodstock raised in hard, alkaline water. This may lead to calcium deposits in the sperm ducts as a male fish grows up; these can be poor breeders, or even functionally sterile. Discus raised at a pH above neutral (i.e. pH 7) lack good disease resistance, and are harder to acclimatise to new environments. Discus can be, and have been, bred even in partial seawater, but I prefer to stack the odds in our favour! It may be a year of superlative care down the drain, should we add risk factors intentionally early on.

### Ensuring pair selection

Female Discus tend to stop growing once they begin to ovulate, and egg-laying is quite common as early as eight or nine months of age. As sexual maturity is a function of age, it behoves us to get that fish as large as possible before that point. The larger the female, the larger the spawn!

Male Discus usually do not produce adequate, motile sperm till after a year of age. Often, they exhibit what appears to be infertility or, at least, poor fertility well into their second year. Again, a larger fish will produce a larger volume of sperm, thus increasing chances of success. In view of these facts, I recommend at least seven US gallons (c 3.8 litres) per fish.

Cichlid breeders often use the number six as the minimum amount of unsexable young to procure to ensure at least a pair. Herewith a methodology which usually yields two pairs: If runs and defective specimens have not been culled, mentally divide the group into four categories. First, the runs and deformed are ignored. Out of the remaining fish, the two largest are likely to be males (they are probably more colourful as well). Then pick the two smallest; they'll be females. Two medium-sized ones that are appealing to you should then be picked to hedge the bet!

If the breeder or dealer is honest enough to

have already removed substandard fish, proceed by dividing the bunch into three groups from the beginning.

### Health of breeders

Once you have quality broodstock the key is to keep them free of internal and external disease, as well as environmental stresses. To digress from this rule courts failure as a quality Discus breeder.

Nothing will grow Discus faster, and condition them quicker, than freshwater livefood. Few things will shorten their lives, destroy their fertility and kill their fry quicker than the same diet!

### NO FRESHWATER LIVEFOODS ARE TO BE USED, EVER!

The risks of disease transmission is so likely that they must be removed from consideration. Discus will do almost as well on frozen beefheart, trimmed well-mixed with uncooked shrimp meat, ground, not liquefied, together in a half and half mixture. This should be alternated with feeding of frozen bloodworm. It is a sad fact, but fluke eggs and some other types of parasites can survive freezing.

Unfortunately, there seems to be a need for some "natural" foodstuffs in a Discus diet if they are to breed consistently. Try to find a brand that others have found to be clean. Also keep some formalin and/or Flubenol 5% at hand in case some vermin get through the freezing process. Avoid products that contain organophosphates such as Dipterex or Masoten with Discus; these 'wonder drugs' can affect fertility and the proper development of the fry.

Chopped earthworm and, especially, whiteworms, can replace the frozen bloodworm component of the diet for those who care to maintain a supply of these for their Discus. Feed as frequently as possible; food converts to growth! Remember, you cannot over-feed the fish; you can pollute the tank, though!

### Possible by-pass

The whole procedure and a good part of the work can be by-passed by the purchase of larger fish. 'Teenagers', 10 to 12cm (c 4-4.7in) and eight or nine months old, are the ideal size. They have a good deal of colour and their body form is apparent. They will also often be pairing off at this age. Males will often be larger and more colourful in tank-raised Discus, with pointed dorsal and anal fins.

Expect to pay dearly; breeders with Discus this size have usually saved them because of their potential as their own future breeders.

Fish this size, especially in a commercial facility, have probably picked up a few bugs along the way. It is therefore wise to quarantine them for three weeks, and perhaps a course of metronidazole and Flubenol 5% should be considered before they are mixed with other Discus one may have.

I am suspect of offers of mated pairs. If they are young and have spawned once or twice, even unsuccessfully, I feel safer than with fish that are older and represented as an established breeding pair.

A pair of 15cm (6in), breeding Discus are a 'money machine'. Fish such as this may pass in trade between breeder friends looking for new bloodlines. They are rarely on the market otherwise.

Some less than candid individuals may offer fish for sale that are poor breeders or otherwise 'over the hill' or 'burned out'. As a viable, dependable breeding pair are worth an astronomical amount, one should only buy them if the claims about them can be seen first hand.

### WATER TREATMENT

Water plays no small part in Discus culture. Discus will grow faster in acidic water, their skin slime is thicker, and they ward off disease better, their sperm is more motile and eggs are fertilised more easily.

### Ammonia

Ammonia is ionised into ammonium in acid water, thus losing its toxic properties. Fish perceive overcrowding in part, by sensing ammonia in the water. Keep the pH between 5.0 and 6.0 and reap the benefits! By the way there is no truth that biological filtration ceases at this pH range; check any limnology (freshwater biology) textbook.

### Calcium

Discus eggs are 'calcifugous' — the integrity of the egg membrane being dependent on the lack of calcium in their water. Keep the water soft, under one hundred microsiemens, less than 4° DH or less than 62 ppm, depending on which system one uses to determine hardness. Peat water still works wonders on soft-water fish; its usage is well documented and should not be ignored.

### Carbon

Owing to industrial and agricultural pollution, many aquarists use activated carbon in some form in their water treatment programme. It is only fine for processing water that Discus have not lived in yet. Clean your mains water with it, polish your reverse osmosis water or deionised water with it, but keep it out of the filter in your Discus aquaria! They hate it! The carbon unpredictably leaches compounds it has adsorbed back into the culture water; sometimes rather quickly and suddenly. The Discus will become jumpy and not breed, at the least, and develop lateral line erosion and Hole-in-the-Head syndrome or worse, at the most.

### Biological filtration

Simple biological filtration is, in my opinion, the best, and as we hope to have fry present, the first choice filter of the Discus breeder is the humble, dependable, and mercifully cheap sponge filter!

### Temperature

The last water parameter to address is temperature. Discus do best at about 84°F (c 29°C). At below about 79°F (c 26°C) they lose

disease resistance. Breeders may like to go higher even than 84°F (c 29°C) to get faster hatching and growth. It is hard to argue that this may or may not have merit, but I will tell you this; any Discus that appears healthier at over 86°F (30°C) probably has *Hexamita* (*Spiroplasma*) protozoans in the gut.

Temperature is a trigger mechanism that can be used to induce spawning. A pair or even a group of mature, flirting Discus can be stimulated to spawn by leaving the thermostat set at 84°F (c 29°C) and draining off one-third to even one-half the water and immediately refilling the aquarium with water at 75°F (24°C)! Try it, you'll be pleasantly surprised!

### Water changes

With Discus the more water changing the happier they are, and the faster they grow and spawn; daily is not too much and, if you are feeding properly, may even be necessary. Even parents with fry appreciate 15% daily. To maximise growth, 50% or more is in order. A token 20% weekly change is the bare minimum for just maintenance.

### BREEDING

So, you may ask "How do you breed Discus?". Is that not the title of this article? Ah, dear reader, reams have been written on this! The pair cleans a usually vertical spawning site, perhaps an inverted flower pot. In typical cichlid fashion, the eggs are laid and fertilised.

If the parents repeatedly eat their eggs afterwards, they are given until they are eighteen months of age, and then re-mated with other Discus. Alternatively, a 'secret' method may be employed. A piece of mesh is put around the substrate the eggs are deposited on and is only removed when the eggs hatch, by which time (hopefully) the frustrated parents are too 'bonded' to the fry to eat them.

Discus eggs hatch on the third day after laying. If the parents eat them, let them spawn again, but remove the female afterwards. She is usually the culprit; as her ovaries swell with the next spawn she must 'clear the area' to make room for it. The male will raise them, another 'secret' unveiled.

In another two and half days of being tended to, moved around, blown around by the parents, the fry will become free-swimming and feed off the magical skin slime adult Discus produce at the time. At this stage, if you squirt newly-hatched Brine Shrimp at them, they will eat them. If you liquify some of the food mixture I mentioned earlier and squirt it in front of them they will eat that too. If they eat it you can take them away from the parents so nature can repeat what it has done for eons.

### The real secret of success

You see, if the real 'secret' be told, it is not in the previous, often-related events of the last paragraph. What, after all, could be simpler than to breed a fish that even nurtures its own young? If this is so, then what is it that frustrates would-be Discus breeders?

### THE DIE IS CAST LONG BEFORE THE FIRST EGG IS LAID.

Success comes easy to those who follow the rules and a fish the environment it has evolved to exist in. Provide it with water that does not require it to expend energy to adapt to, and keep it that way. Give it foods that will provide the most nutrition each time they are fed. Keep them free from pathogens, and give them the immunity to deal with our oversights until you notice and can give them aid. Do nothing to impede their efforts to carry on their destiny. And they will!

### DISCUS STUDY GROUP

The Discus Study Group (DSG) is a non-profit organisation established for the purpose of the research, study, and exhibition of the genus *Symphysodon*. The DSG is a member of the Federation of American Aquarium Societies, and adheres to its guidelines. Membership is open to all persons interested in Discus, and includes a subscription to the quarterly *Discussion*.

Membership rates for one year: USA \$16, UK and outside USA: \$21 in US funds. Please make cheques payable to the Discus Study Group and mail to: Ellen Halligan, 73-47 184th Street, Flushing, New York, 11366 USA.

Local meetings are held in the New York City area, as well as by local chapters. There is a yearly international exhibition and symposium. Guests are welcome; write to Ellen for information.

# FIVEWAYS AQUARIA

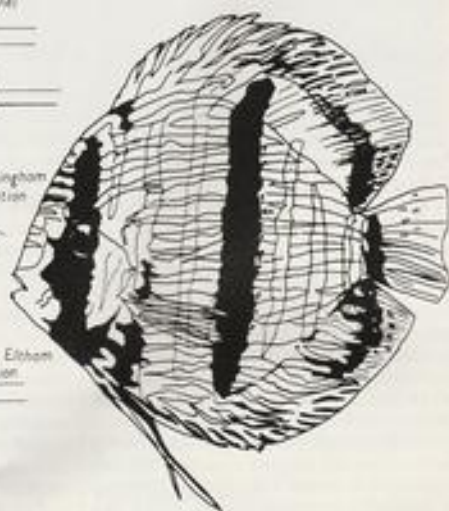
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# Spotlight on DISCUS

## POMP AMONG THE POMPADOURS

Are there really two species of Discus . . . or five subspecies? Equally, are there really as many varieties of Discus as we are sometimes led to believe? *A & P* editor John Dawes raises these and other questions . . . and perhaps a few eyebrows, too!

(Photograph: Max Gibbs — *The Goldfish Bowl, Oxford*)

I remember seeing my first Discus some twenty-five years ago and being struck by how closely they lived up to their name. Perfectly disc-shaped and aristocratically strutting their domain, they truly looked like the 'Kings and Queens of the Aquarium' they were supposed to be. Those first fish I saw were Pompadours or Heckel Discus . . . and moved about gracefully, with a totally appropriate overabundance of pomp.

Things have moved a long way since those days when there were only a handful of types of Discus. We now have varieties of Discus coming out of our ears — so many, in fact, that some of us have great difficulty in keeping up with every new development. It would be more correct to say that we find it impossible to do so, of course, but there's such great 'pomp' about the way in which some (not all, I hasten to add!) so-called experts regale us with their 'knowledge' of Discus, that that would never do, would it?

### Designer Label Classification

Eberhard Schulze was quite right, in my opinion, when he asked, in his December 1989 *Aquarist & Pondkeeper* article, **Hong Kong Discus Fair '89**: "Are there really that many strains available?" He was commenting on a fish farm which was offering 22 different strains of Discus for sale!

Two 'strains' that Eberhard found worthy of note were called WB1 and WB12. It turned out that WB1 was a turquoise fish in which about 40% of the specimens were solid in colour and had mostly red eyes. In WB12 fish, about 80% of the specimens had solid colours and red eyes. Wow!

Eberhard Schulze has no time for 'Designer Label Classification' like this — neither have I. He believes that "the sooner some order can be created out of this confusion, the better it will be for the Discus hobby." Many aquarists, I feel, would echo these sentiments. I certainly do.

### Traditional Discus Classification

Traditionally, there are believed to be two species of Discus: *Symphysodon discus* and *Symphysodon aequifasciata*.

1 *Symphysodon discus* Heckel, 1840. This is the 'true' or Heckel Discus. Its main distinguishing characteristic is that it possesses three main vertical bars on its body. One goes through the eye, another through the centre of the body, and the third through the caudal peduncle (base of the caudal fin).

A subspecies, *S. discus trilineatus* Burgess, 1981, is sometimes encountered in the literature. This subspecies is distinguished from *S. discus* (which, presumably, would need to be regarded as *S. discus discus*) in possessing 53-59 lateral line scales, as opposed to 45-53.

2 *Symphysodon aequifasciata* is traditionally regarded as consisting of three subspecies:

- S. aequifasciata aequifasciata* Pellegrin, 1903 — the Green Discus which, despite its name, has red spots on the body;
- S. aequifasciata anebrodi* Schultz, 1960 — the Brown or Common Discus, whose markings are restricted to the gill covers and head;
- S. aequifasciata haraldi* Schultz, 1960 — the Blue Discus, which has similar markings to the Brown Discus but extending further back on to the body.

There are other differences between the above, of course, but I don't think that they have any direct bearing on the points that I am about to make.

### Species v. Subspecies

The late (and most certainly great) Donn Rosen published a paper in Vol 162 of the *Bulletin of the American Museum of Natural History* in 1979 in which he stated (page 277):

*If a "subspecies" is, by definition, something less than a species, and yet a "species" is the smallest cluster of individuals in nature that can be defined, then subspecies are, also by definition, unobservable and undefinable.*

He therefore concluded by rejecting the 'pomp' concept of a subspecies. There's a great deal going for Rosen's argument, and it is one that has a considerable following.

When applied to Discus, though, there are some difficulties. If the smallest identifiable/observable/definable cluster of individuals constitute a species, does this mean that we have, in fact, five species of *Symphysodon*

(ignoring the many artificial varieties, of course)? Does this also mean that every identifiable/observable/definable population of Discus collected from the Amazon Basin (and there are many such populations) constitutes a separate species?

If anything, I would have thought that the argument would go the other way, with the various *aequifasciata* subspecies being 'absorbed' and regarded as merely different forms of a single species, *Symphysodon aequifasciata*, while the two subspecies of *S. discus* would become one single species.

This would certainly make life easier for those of us who feel that, far too often, apparently trivial differences are given undeserved significance and used to elevate mere morphs to full specific status. This is a distinct characteristic of those ichthyologists commonly referred to as 'Splitters'. 'Lumpers', on the other hand, do the reverse. If I have to classify myself in one or other of these categories, I would say that I'm a 'Lumper'.

### Just one species?

Up to a few weeks ago, I felt rather 'lonely' in my (admittedly unproven) suspicion that *S. aequifasciata* and *S. discus* might, in fact, be different forms of just one single species which, according to the Laws of Priority, would be *S. discus*. I was therefore absolutely delighted to read the following in Eduard Schmidt-Focke's latest superb TFH book: *Schmidt-Focke's Discus Book* (page 95) (see full review elsewhere in this issue):

*The experiments of three breeders showed independently that crossing species and subspecies didn't affect fertility, nor did any signs of degeneration appear. All of these experimental results raise the question of whether all discus varieties known to date belong to only one species.*

When the three breeders in question are Schmidt-Focke himself, Jack Wattlely (US) and Lo Wing Yat (Hong Kong), you've got to sit up and take notice . . . whether you lean towards 'Simplicity among Symphysodons' or 'Pomp among Pompadours'!

FOR REVIEWS OF THE LATEST DISCUS BOOKS FROM TFH SEE PAGE 60.

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# Crossword

## AQUATIC TIMES CROSSWORD

by Derek Witts

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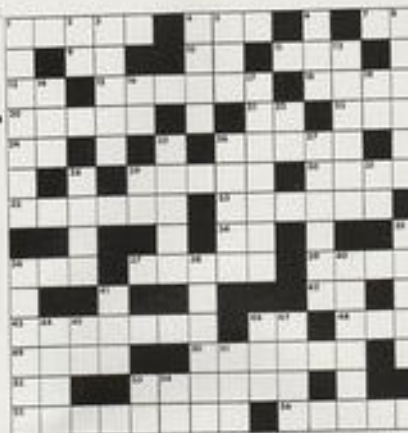
Aquarist & Pondkeeper, Grasslin Rondomatic Crossword,  
9 Tufton Street, Ashford, Kent, TN23 1QN

### Across

1. Upwardly mobile, the veiltail is one of its forms (5)
4. A coloured sea (3)
7. Anno Domini (1,1)
9. Masculine Pronoun (2)
10. Otherwise (2)
11. Pet with seafish form (3)
13. Ascending (2)
15. An Oranda (6)
18. You can have it with chips (4)
20. River fish of the Carp family (5)
21. Third person singular neuter pronoun (2)
23. National Exhibition Centre (initials) (3)
24. Where it's — (2)
26. Edible shellfish (5)
29. Frogs come under this heading (5)
30. 50 across are their young (4)
32. Six legged invertebrate (6)
33. To breathe in (6)
34. Exclamation (2)
36. Definitely a flat fish (3)
37. Amazonian Characin (5)
39. Water carrier (4)
42. Rest and Recuperation (initials) (1,1)
43. A trout with a variety of colours (7)
46. Roman Copper coin (2)
48. A girl's name (3)
49. Hint of colour (4)
50. Young eels (6)
52. Short for Edward or Editor (2)
53. John Dawes visited here in the August issue (6)
55. Snake-like fish without ventral fins (4,4)
56. Used for bloodletting (5)

### Down

1. A fish with a definite kissing habit (7)
2. It should be in your water (2)
3. This fish can be found in a bird's cage (5)
4. Found in a garden or a 'species' of salmon (4)
5. An age (3)
6. Part of a musical scale (3)
8. A fish that could be thrown (6)
12. Also called the Butterfish (6)
14. Used for cooking (3)
16. Pardon? (2)
17. Fish that can strip a man's flesh in seconds (7)
19. South East (initials) (1,1)
22. Thank you! (2)
25. Undo (5)
26. Before (5)
27. This fish form has venomous spines (6)
28. Underwater carrier of man (1,1)
29. Alternating current (initials) (1,1)
31. Masculine French pronoun (1)
35. Pomadasysid making audible sounds (5)
36. Small North American fish it moves quickly! (6)
38. High rise buildings (6)
40. Colourful Labrid (6)
41. Insect egg as fish food (3)
44. Helper (4)
45. Definitely not out! (2)
46. — Maria (3)
47. Fish shops do it (4)
51. Another part of the musical scale (3)
53. — only (2)
54. Spanish Yes (2)





Lionfish are not yet being bred in captivity. All specimens being offered for sale are therefore wild-caught.

## THE ORNAMENTAL FISH TRADE AND CONSERVATION (PART 1)

The text of this article is based on a paper presented by **Dr Chris Andrews** (London Zoo Aquarium) at an International Symposium on the Biology of Rare Fish, University of Lancaster, 16-20 July 1990. The full paper will be published shortly by the Fisheries Society of the British Isles.

*(Photographs by the author)*

**T**he global trade in ornamental fish and associated aquarium and pond accessories is in excess of US\$7 billion each year. Although the majority of freshwater fish involved in the trade are from captive-breed sources, significant numbers are still removed from the wild, especially in Africa and South America. In addition, almost all of

the marine fish in the trade are wild-caught (although some species, eg, Clownfish, are now being bred commercially in increasing numbers).

While habitat destruction, pollution and overfishing for food are the main threats facing fish populations in the wild, the ornamental fish trade may have adverse effects as a result of the introduction of

non-native organisms and via the direct depletion of wild stocks. The ornamental fish trade is ideally placed to raise public awareness of, and actively support, fish conservation efforts, and must maintain a close liaison with legislative-forming organisations seeking to impose further trade restrictions.

During the last three decades, there has



been considerable growth and diversification in the international trade in ornamental fish, and some concern has been expressed over the effects that this trade might be having on wild populations of freshwater and marine fish. This article provides some data on the size of the current trade in ornamental fish, with particular reference to the UK and USA, and (in Part Two) considers the principal ways that this trade may have an impact on fish conservation.

### Size and scope of the ornamental fish trade

The keeping of ornamental fish is a hobby with world-wide interest. According to Axelrod, world-wide retail sales of fish, plants and associated accessories for the ornamental fish hobby in the early 1970s were in the region of US\$4 billion, although it was estimated that, by the mid-1980s, these retail sales had then increased to US\$7.2 billion.

On a more local basis, current annual retail sales associated with the ornamental fish trade in the UK are in the region of £110 million and include live fish sales of £17 million, tank sales of £40 million and live plant sales of at least £7 million. In comparison, total annual retail sales in the USA are now at least £435 million, and probably considerably more.

Information suggests that at least 14% of the estimated 21 million British homes keep ornamental fish (5% in garden ponds, 5% in unheated freshwater aquaria, 3% in heated freshwater aquaria and less than 1% in marine aquaria). By comparison, approximately 8% of the estimated 86 million homes in the USA keep ornamental fish, 7% of which keep fish in freshwater aquaria. In both the UK and the USA there are definite signs of the hobby increasing in popularity, especially with regard to pond keeping and the keeping of marine aquaria. Referring specifically to indoor aquaria, conservative estimates suggest that in 1982, 4% of Belgian and Italian homes, 5% of (West) German homes and 20% of Dutch homes kept fish. Fishkeeping is also popular in Japan, China, Australia and South Africa (among other countries).

Very few data are available on the numbers of fish involved in the ornamental fish trade. Reviewing the available information in 1975 it was found that, for example, between 1972 and 1974 at least 13 million fish may have been exported from Venezuela. In 1970 over 13 million fish were sold from Peru, and in 1973 over 8 million fish were exported from Brazil. Other information suggests that in 1980 over 124 million fish were imported into the USA, and approximately 120 million of these were freshwater fish with the remainder as tropical marine species. Current estimates suggest that at least 150 million ornamental fish are sold on a world-wide basis each year.

During 1987-1989 between 548 and 772 licences were issued each year to import freshwater ornamental fish into the UK. Unfortunately, it is impossible to confirm



These tanks at an exporter's premises in Africa hold much-sought-after Rift Lake Cichlids.



Fishkeeping is popular the world over. This is an aquarium/pet shop in Istanbul, Turkey.



An ornamental fish farm. About 90% of all ornamental fish are captive-bred.

whether the very large numbers of fish covered by these licences (208-589 million fish) were actually imported, or whether this number was, in fact, exceeded.

#### ORNAMENTAL FISH IMPORTS INTO THE UK

	Weight (Kg)		
	Freshwater	Marine	Total
1977	394,722	83,143	477,865
1978	488,971	100,449	589,420
1979	636,076	104,943	741,655
1987	749,944	176,818	926,762
1988	785,308	238,762	1,024,070
1989	887,457	265,100	1,152,557

Note: Weight includes water, packaging and livestock.

Ornamental fish imports into the UK by total landed weight are shown in the table. Imports of freshwater ornamental fish appear to have shown a steady growth over the last decade, with imports of marine origin seeming to have almost doubled. Whereas in 1977 the total landed weight of marine imports constituted about 18% of the total landed weight of all imports, this proportion appears to have grown to 23% in 1989.

Principal sources of freshwater fish imported into the UK include USA, Singapore and Israel, and the principal sources of marine fish include USA, Indonesia

Philippines, Sri Lanka and Singapore. It should be noted that the total landed weight figures for freshwater fish do not include ornamental Carp, or Koi (*Cyprinus carpio*), imported from countries like Israel, Thailand, Japan and the USA during 1987-1989. This could have amounted to an additional 91,328-141,414 kg, per annum.

Attempts to convert these weights to numbers of fish are fraught with difficulties. Elizabeth Wood estimated that, on average, each kilo of total landed weight was equivalent to approximately 30 fish. This would mean that the 265,100 kilos of marine fish imported in 1989 would be equivalent to nearly 8 million fish. Variations in packing techniques, fish sizes and species sensitivities, plus the fact that the landed weights of marine fish also include live invertebrates, all mean that this figure should be interpreted with considerable caution.

Accurate estimates of the number of freshwater ornamental fish imported each year are similarly difficult to establish. Trade sources suggest that the 887,457 kilos of total landed weight of freshwater ornamental fish imported into the UK in 1989 could have amounted to, for example, the equivalent of 100 million small Neon Tetras (*Parachanna innesi*) from Singapore, or 40 million small Goldfish (*Carassius auratus*) from Israel, or 10 million small African cichlids from the USA.

A huge range of fish species (from at least twenty of the fifty orders) are available through the ornamental fish trade, and one major European importer lists 700-800

species of freshwater and marine fish as "commonly available". Barbs, danios and related carp-like fishes (Cypriniformes), characins and tetras (Characiformes), catfish (Siluriformes), tooth carps (Cyprinodontiformes), and cichlids (Cichlidae) and coral fish (Perciformes) are particularly popular.

Although precise supporting data are lacking, current opinions agree that around 90% of the freshwater fish available in the ornamental trade are captive-bred, often on fish farms in places like Singapore, Malaysia, Japan, Israel and the USA. However, freshwater fish are still removed from the wild, especially in South America and Africa, and virtually all of the marine fish which are available to hobbyists are also removed from the wild. Clownfish (*Amphiprion* species) are being produced by a fish farm in the Bahamas and sold into the ornamental trade, and further captive-bred marine species are likely to be available on a commercial basis in the not-too-distant future.



Ornamental fish arriving in Europe from the Far East.

## News

### RESCUING HERO TURTLES

The RSPCA reports that many children caught up in the latest Teenage Mutant Hero Turtle craze are purchasing terrapins from their local pet shops. Unfortunately, many of these terrapins receive improper care and may even die owing to ignorance on the part of their owners. Yet, given a minimum of care and attention, terrapins can live for 20-30 years and become interesting pets.

In an attempt to improve understanding of how to care for these terrapins, Tetra have produced a special free fact sheet on **Keeping Terrapins**. This is available to anyone who may be thinking of keeping terrapins, on receipt of a stamped addressed envelope from the **Tetra Information Centre, Lambert Court, Chestnut Avenue, Eastleigh, Hants SO5 3ZQ** (marking the envelope 'Keeping Terrapins').

Tetra also produce a more detailed 30-page full-colour booklet on Turtles, Tortoises and Terrapins. Copies of this are available for £1.50, including post and packing, from the same address.

### MORE TALKING FISH FROM TETRA

Tetra held the latest of their **Talking Fish** evenings in the Powell Lecture Theatre at Bristol University on 26 September 1990. The evening concentrated on tropical fishkeeping, with lectures by **Dr Chris Andrews** of the London Zoo Aquarium on 'Six of the Worst' - a look at the major aquarium fish diseases; and **Dr David Pool** of the Tetra Information Centre on 'The Secrets of Successful Fishkeeping'. Over 140 people attended the evening and contributed to the proceedings in the form of an active and enlightening question and

answer period after each lecture.

Everyone attending the seminar received a summary of the lectures presented, a selection of literature and a range of Tetra food samples.

The next of the Tetra Talking Fish evenings will take place at the University of Strathclyde in Glasgow on 17 November 1990. Further details from Tetra at **Lambert Court, Chestnut Avenue, Eastleigh, Hants.**

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### PROMOTION FOR DR. CHRIS ANDREWS

Regular *A & P* contributor, **Dr Chris Andrews**, has recently been promoted to the position of Curator of the Aquarium, Invertebrates and Reptiles at London Zoo.

Chris joined the Zoo in December 1985 as Assistant Curator of the Aquarium, subsequently taking over responsibility for the Insect House. The new position came into effect on 1 October, 1990.

We at *A & P*, wish Chris every success in his new post and congratulate him on his well-deserved promotion.

# Coldwater jottings

Stephen J. Smith



## THE PRICE IS RIGHT

"Fancy Goldfish are too cheap!" So says regular correspondent Alex Stephenson, who writes from his Norfolk home that these fish should be priced to represent the years of work which goes into them.

How many people will agree with Alex's opening remark I do not know, but his point is that the low price of Fancy Goldfish devalues both the fish and the work involved.

"This encourages poor husbandry and indifferent treatment — and not only by some

fishkeepers," he remarks. "Many people who buy fish do not seem too bothered when they die, because their replacement can be relatively inexpensive."

Alex continues, "The situation with British-bred Fancy Goldfish is rather different. Specialist breeders command a price in relation to the amount of expertise and effort which has been invested in producing such fine specimens."

I can only agree in theory, Alex, but the appeal of the Goldfish-keeping hobby is that it is fairly inexpensive, and the market will only stand a certain level of pricing. In general terms, you get what you pay for: there is a world of difference between a specialist-bred Moor or Lionhead at £70 and a stunted imported Fancy at £7. But didn't we all begin with a "cheap and cheerful" and yearn for something better?

Perhaps a hornet's nest has been stirred here. What do other readers think? Are Fancy Goldfish, or even Koi and other coldwater species, priced too high or too low? Do you feel you are getting value for money? Or are the price and quality of fish just about right?

Please address your corre-

spondence to me at Coldwater Jottings, Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.

## NORTHERN SOCIETY

I am indebted to Kevin Swanson of Castleford, West Yorkshire for his information in response to my pleas for details from coldwater societies (why are societies so coy?). Kevin is a member of Northern Goldfish and Pondkeepers' Society, who reminds readers that the society holds informal and informative meetings on the second Tuesday of every month at the Sports Centre, Silverwell Street in Bolton, Lancashire, starting at approximately 7.45 pm.

Novice and experienced fishkeepers are welcome, while a monthly newsletter is available and an annual coldwater fish show is held (this year's was in October). Members of both sexes are welcome, as well as "postal" membership. (What distinguishes a "postal" member?)

Honorary Secretary of NGPS is Bill Ramsden, who can be contacted for further information by writing to 8 Ainsdale

Road, Bolton, Lancashire, LS3 3BY, enclosing a stamped, self-addressed envelope.

Thank you, Kevin, for your information. Keep it coming, and do let me know how the show went.

## GOLDEN FIND

There are several extensions to the hobby of 'aquarium and pondkeeping'. Involvement in the hobby can take any fishkeeper much further than simply 'keeping fish'. I have travelled to places I otherwise might not have visited; I have met people I certainly would not have met; I have been a builder, plumber, electrician and water analyst; and I have taken an interest in Chinese and Japanese cultures when they otherwise might have escaped my attention.

One most pleasurable extension of this pursuit of fishkeeping is 'browsing'. How many of us can resist a few moments in that antique shop for a trinket decorated with Chinese carp; or that bookshop 'just in case' there is a rare volume relating to matters aquatic? I have turned up some rare and valuable books on Goldfish on such occasions.



## POND-CLEAN TIME AGAIN

Now is the time to scrub that pond out and, to illustrate that yours truly really does practise what he preaches, my own Goldfish rearing ponds were given a good clean-up immediately after the hot spell had subsided. Although these ponds (this is just one of eight) receive regular treatment by the scrubbing brush in order to ensure the health of growing young Goldfish, now is the time to clean out your pond, removing all waste material and scrubbing over with clean water (no detergents, please). Then you can rest easy throughout the winter.

And just such an occasion arose during my summer holidays on the south coast of England. It may have been a rather discrete antique shop, but it contained one specific treasure which gave me quite a surprise and a great deal of joy to discover.

This was a mint condition, never-been-opened copy of a book by the late Frank Orme, titled *The Landscaped Rock and Water Garden*. Frank Orme was a mentor to me and countless Goldfish enthusiasts. His major work *Fancy Goldfish Culture* is revered as a 'Bible' of Goldfish-keepers; while *Coldwater Jottings* itself is a memorial to Frank, who wrote for *A & P* under the same title for many years until his death.

Published by Nimrod Press in 1986, *The Landscaped Rock and Water Garden* is a departure from the pure 'fish subjects' for which Frank made his name in the aquatic scene, and is a perfect example of those 'extensions' to the hobby which I have mentioned.

While not of the ilk of the most recent books on pond planning — extensive use of colour diagrams and photo-

graphs is only a fairly recent characteristic of hobbyists' reference books — this volume is packed with sound, practical information and advice, accompanied by several drawings by the author.

The finer aspects of getting to grips with building a pond are often overlooked in today's references: it is all-too-often assumed that the budding pondkeeper has an intimate knowledge of trenching, shuttering, garden management and so on. However, *The Landscaped Rock and Water Garden* guides the reader through the whole project as whole, and as part, of the garden scene.

There really is more to building a pond than simply building a pond: this book describes how to plan the garden and prepare the site, where to position the water feature, how to construct the pond, and the subsequent stocking of fish and plants. Even subjects such as rock features, lawn making and paving are given close scrutiny, and a further chapter on electricity in the garden is of major importance; while the all-important task of maintaining your pond in good condition is

also discussed in detail.

*Landscaped Rock and Water Gardens* was published by Nimrod Press in 1986. My researches have indicated that,

unfortunately, this book is no longer available. It looks like you will need to do some 'browsing', but you never know what you might unearth. . . .



"If the Batfish are watching 'Batman', Henrietta the 'penguin', there's only the 'Joker' left — and he should be painting the bedroom!"

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# CAPTIVE BREEDING OF A LIVING FOSSIL (THE JOYS AND FRUSTRATIONS)

Dan Moreno, supervisor of the Rainforest and Aquatics Department of the Cleveland Metroparks Zoo in Ohio, recalls the initial euphoria, subsequent disappointment, long-running frustrations and new-found hope in the long struggle to find a successful solution to the challenge of breeding the threatened Australian Lungfish (C.I.T.E.S., Appendix II) in captivity.



Wonga and Bli Bli.

In 1966 the Cleveland Aquarium received two adult, wild-caught Australian or Queensland Lungfish, *Neoceratodus forsteri*, from a supplier of the Ace Aquarium in Brisbane, Ray E Sperring. This acquisition culminated months of L-O-N-G distance telephone calls, telegrams and other correspondence, much of which was in the pursuit of a coveted collecting and export permit from the fisheries department there.

The availability of Lungfish from Australia today is, apparently, even less promising. In a letter to me dated 24 May 1989, Dr Anne Kemp, Honorary Research Fellow at the Queensland Museum in South Brisbane, stated:

*"The question of export of live Lungfish these days is a difficult one. Our Federal Australian National Parks and Wildlife Service are making it difficult to export Lungfish as they are on the endangered list. I'm refusing any and all requests from overseas, because of the cost to myself in time and money of collecting and sending fish and arranging permits. Legally, no one can ask for payment for their services in obtaining Lungfish and without some sort of payment, it is too much of a chore. As far as I know, Queensland Fisheries*

*Department feel the same, as they usually pass requests to me."*

## Wonga and Bli Bli

The two specimens we received each measured nearly 1m (approximately 39in) in length; they arrived at Cleveland Hopkins Airport on 4 September 1966, without incident. Ray Sperring had earlier assured us he was sending a true pair (always neglecting to mention how he determined their genders) ... "Wonga" for the putative female (with the attenuated caudal fin) and "Bli Bli" for



14-day-old Australian Lungfish larva.

the reputed male (with the slightly blunter tail). I still have no clues as to how, or if indeed, he was able to sex them. As it turned out, we were later, not only able to confirm we had one of either sex, but that he had correctly sexed Wonga and Bli Bli. I doubt that the shape of the caudal fin is a sexually dimorphic characteristic, though.

## Accommodation and maintenance

Upon their arrival at the Aquarium, the two Lungfish were immediately installed in a 1,900 litre (500 US gal — c 420 Imp gal) concrete exhibit tank, measuring approximately 152cm (60in) in length by 116cm (46in) front-to-back and 91cm (36in) in depth. The tank contained aged tapwater at normal ambient room temperatures, averaging about 24°C (75°F), and it was equipped with a sizeable reverse flow (upside-down) outside gravel filter operated by a 2.5cm (1in) air lift. The tank's substrate consisted of a 2.5 to 5cm (1 to 2in) layer of lake gravel composed mostly of sandstones and shales, with some silica that averaged about 6mm (1/4in) in diameter. The only other tank



24-day-old larva. Note the external gills, and the forceps tips (shown to give some idea of scale).

furnishings were a half-dozen baseball- to basketball-size rounded boulders (mostly granite).

The new arrivals settled in quickly and began accepting live night crawlers (Lumbricidae) and cut fish (mostly smelt, *Osmerus mordax*), a diet upon which they appeared to prosper.

Somewhat regular changes using raw tap-water (tempered with warm, when necessary) were made at the rate of about 10 to 20% every month or two. The tank's water remained clear at all times.

## Breeding

So little has been reported about the breeding of this unique and fascinating fish, that I am emboldened to relate and reiterate, in narrative form, these (largely negative) experiences with our pair over the past two-plus decades. It is my earnest hope that by so doing, the effort will somehow contribute toward a successful captive breeding programme for the Queensland Lungfish.

Nearly 17 months after their arrival in Cleveland the Lungfish spawned. At 08.15 hours, 26 January 1968, they were observed head down in a corner of the tank with the male's body partially entwined about that of the female. At this time, there were already about 100 eggs strewn about the bottom of the vessel. During the next (and final) 45 minutes of spawning activity, 100 more eggs were deposited. The female spewed about 6 to 12 eggs at a time, and the male discharged milt at irregular intervals, showing no apparent synchronisation with the egg-laying of the female.

The pH of the water was 7.1 when the spawning took place.

We believe this to be the first captive breeding of the species and, to this day, one of a very small number of such incidents reported anywhere.

No nest or maternal care was evident, so the eggs were carefully netted from the aquarium and placed in shallow enamelled pans with 5cm (2in) of their original water for observation. The eggs strongly resembled those of Ambystomid salamanders. The ova measured about 3mm ( $\frac{1}{8}$ in) in diameter and their nearly non-adhesive, clear, gelatinous envelopes averaged almost 2mm ( $\frac{1}{16}$ in) thickness.

The vast majority proved to be infertile and soon yielded to fungus, but, days later, six were found to be fertile and developing. On and about the 10th day, at a temperature around 24°C (mid-70s°F) the six eggs hatched.

## Rearing the fry

The hatchlings also resembled Ambystomid salamander larvae, and measured nearly 1cm ( $\frac{1}{2}$ in) in length. These were transferred to three pre-established nursery tanks, two per aquarium, with capacities from 125 to 190 litres (33 to 50 US gal — c 27-42 Imp gal). Each tank was equipped with a biologically active sub-gravel filter. These containers were located in different areas of the aquarium building in order further to minimise

chances of a catastrophic wipe-out resulting from disease or a life-support system failure.

The youngsters fed readily on nauplii of Brine Shrimp (*Artemia salina*), both live and frozen commercially prepared (dry, flake) fish food, finely chopped beef heart, minced frozen shrimp and a variety of freshwater algae.

By 20 March 1968, six weeks (43 days) after hatching, the half-dozen baby Lungfish had nearly doubled in length and bore a strong resemblance to the adults.

A few days later all six began showing signs of emaciation and, in spite of a wide variety of foods offered, the last little lungfish died on the 54th day after hatching (30 March) — cause unknown.

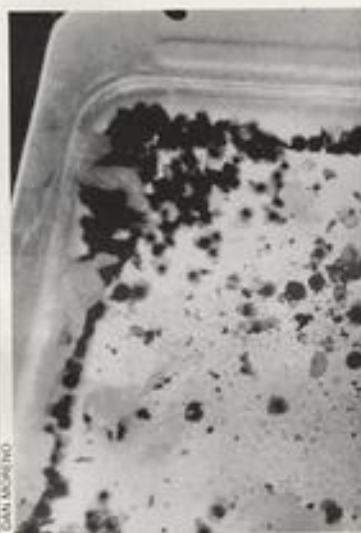
We were baffled. The situation was unchanged when, some weeks later, Richard M Segedi and I co-authored an article which appeared in the 3 September (LXVII) issue of *Drum & Croaker*, entitled "Some Observations on the Spawning Behaviour of the Australian Lungfish, *Neoceratodus forsteri*."

As a result of that note, Dave Miller, the Curator of the New England Aquarium, kindly sent us photocopied pages (pp 158-160) from the book *Fish and Fisheries of Australia*, 1951, by T C Roughley. In it, Roughley relates:

*"Dr T L Bancroft hatched Lungfish artificially and kept them alive for two years, when they were five inches long. Bancroft had little success in rearing the young fish until he discovered that it was necessary to keep them in shallow water, about half an inch deep, provided with a diminutive sandbar on which the fish could rest out of the water."*

## New challenge

Armed with that vital piece of information, we felt, and feel to this day, that our



Original photograph of Lungfish eggs from the 1968 Wonga/Bli Bli spawning at Cleveland Zoo. The eggs (difficult to see) have a light-coloured outer layer and a black spot in the centre.

next attempt at rearing Australian Lungfish hatchlings will be successful. Our big challenge now, as we see it, is to get the pair to spawn once more.

Immediately after our success in 1968 we felt confident they would again spawn in a year or less. Therefore, we simply continued the same feeding, light, temperature and water change regime. Our optimism proved unwarranted, and we were sorely disappointed. The next few years saw our pair move twice within the building, ending up in a tank with two times the capacity, 3,800 litres (approx 1,000 US gal — c 845 Imp gal) and equipped with a light timer that provided them with a more natural day/night cycle.

In 1970 the Columbus (Ohio) Zoo's pair had a spawning — but all the eggs proved infertile, owing, I surmise, to both individuals being female. More recently (1980), during the (Chicago) Shedd Aquarium's 50th anniversary, their lone specimen, then in her 47th year there, produced eggs, which were, of course, infertile. (Incidentally, that individual is still thriving at the Shedd.)

Early in 1986 Wonga and Bli Bli travelled across town from Cleveland's defunct aquarium to the Metroparks Zoo. They were installed in a 4,180 litres (1,100 US gal — c 930 Imp gal) tank in the Primate and Cat Building... since rechristened the Primate, Cat and Aquatics Building. Dr Kemp wrote (1984), in *Memoirs of the Queensland Museum* (Vol 21, Pt 2):

*"Every year, in both areas, N. forsteri begins to breed at a time of increasing day length. In nine out of ten cases within 10 weeks after the shortest day, and once in the lake after 11 weeks..."*

This would correspond to the end of February or the beginning of March in this hemisphere. (Note: Brisbane, Queensland lies between 26 and 27° S. Lat., thus experiencing annual day lengths similar to those of Laredo, Texas which is situated between 26 and 27° N. Lat.)

In a letter to me dated 17 December 1984, Dr Kemp wrote:

*"Temperature and rainfall are not important."*

For that reason, we have not made serious attempts to trigger our specimens to spawn with water changes or temperature fluctuations.

Judging from similar situations elsewhere, as reported in the literature and by their appearance and behaviour, I feel that our specimens remain in good condition and capable of repeating their performance of 20 years past. Others agree. In the words of Dr Kemp (pers comm. 24 May 1989):

*"It's possible your fish are getting too old (but not likely)..."*

Since the new tank at the Zoo was about 380 litres (100 US gal — c 85 Imp gal) larger than their previous one, and did receive some, albeit indirect, natural sunlight via a skylight, our hopes were again raised that these factors would produce a spawning. But, by the fall of 1988, our hopes had dimmed for the season.

In December of 1988 two 1,000W metal halide lamps illuminating the Lungfish tank were connected to a switch governed by a

newly-installed photocell mounted directly below a skylight. The switch was set to turn the tank lights on during daylight hours and off at sunset; simply, automatically, and without regard to local standard time or Zoo visiting hours.

Field studies of the species in its native waters have disclosed that Queensland Lungfish eat substantial amounts of aquatic vegetation. This prompted us in late 1988 to add sliced banana, celery, sweet potato and carrots (the last two items generally fed lightly boiled) a few times per week to their usual diet of whole (raw) shrimp, earthworms and cut fish, mostly Capelin (*Mallotus villosus*).

Dr Kemp and others feel that the presence of aquatic plants is an important trigger to spawn Lungfish. Kemp recommends:

*"Thick stands of Vallisneria spiralis or Hydrilla verticillata. . ."*

But when, in the past, we have provided such items, our pair has promptly demolished our efforts. For the past two years our Lungfish tank has had a heavy artificial "planting" of plastic vegetation that resembles *Elodea*. In the case of the Cleveland spawning, and for the barren spawn in Columbus (1970), plus the "loner" at the Shedd Aquarium (1980), no live plants were present.

Alas, the magic ". . . ten weeks after the shortest day" came and went early this year, with no signs of increased libido evidenced by either Wooga or Bli Bli.

#### POSTSCRIPT

Weeks after the above remarks were committed to paper I received correspondence which seems much too germane not to include at this time; in spite of the fact that the remarks of those who wrote, Dr Kemp and Mr Lambkin, weaken and further confuse some of my own cherished assumptions on this already confusing subject.

This summer, upon the recommendation of Dr Kemp, I wrote to a Mr Lionel Lambkin in New South Wales (Australia), whom Dr Kemp informed me had bred Australian Lungfish in captivity. In response to a request for information, Mr Lambkin sent me a long letter and included copies of papers he has published about his studies on Lungfish breeding and development. Two days later he wrote again, providing even more information and breeding advice. (Real "Southern Hospitality".)

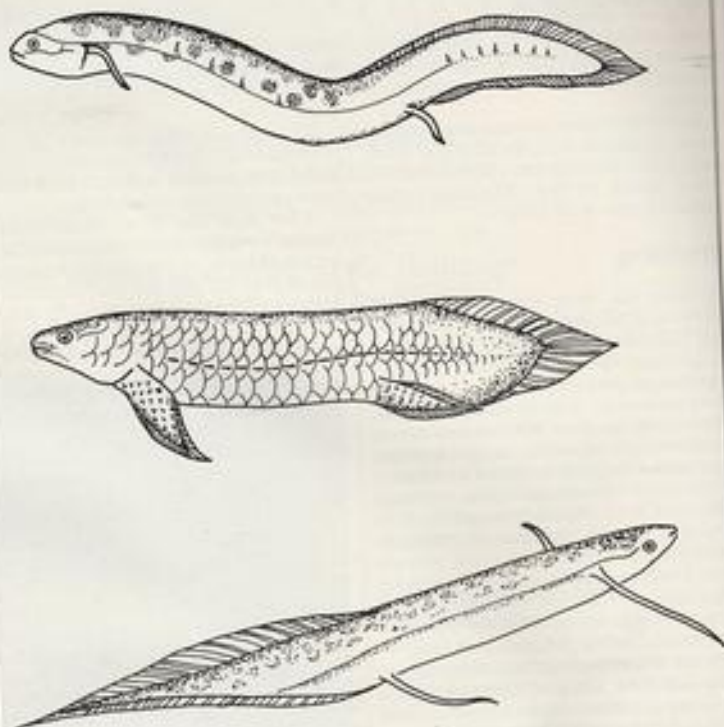
Mr Lambkin argues that the Australian Lungfish should not be treated as a tropical. From his home in Belmont North, New South Wales, Lambkin wrote:

*"The winter here on the coast is much milder than in their natural habitat. Eidsvold lies close to the Tropic of Capricorn, but is bitterly cold in winter, with occasional snow falls in the nearby (Great Dividing) Range."*

He reports that four youngsters put in his pond were observed "feeding in a water at 9°C (48°F)".

In his first letter to me, dated 19 July 1989, Lambkin wrote:

*"Both you and I struck the same problem encountered by Dr Bancroft 50 years ago. Fortunately, I met Dr Bancroft's son Louis, a*



The three types of Lungfish: (top) South American (*Lepidosiren*), (middle) Australian (*Neoceratodus*) and (bottom) African (*Protopterus*).

*farmer at Eidsvold, Queensland, while on my second (unsuccessful) expedition to the area to catch the fish. Louis still has copies of his father's submissions to various scientific bodies and gave me copies of three papers. The first paper described his (and other scientists') frustrations at being unable to rear fish past the critical period. He had a group of school children organised to collect eggs from the river. But he only reared two *Ceratodus* in 17 years from thousands hatched. Survival was almost 100% when he provided shallow water and sandbanks for the little fish."*

Mr Lambkin went on to write: *"My experiments to find out more about the critical period and to find alternatives to Dr Bancroft's idea led to the loss of most of my little fish, plus some lost to predators, including insect larvae, small lizards and garden spiders. I now have 10 or more little *Ceratodus* 8 to 9 months old."*

The very next day (20 July 1989) Dr Kemp wrote to me:

*"Bancroft certainly thought that the small Lungfish had to be able to rest with the mouth out of the water. They don't however do this in nature, and I have reared droves of them without providing them with a sandbank. The cause of deaths in the small fish are*

*numerous and varied, but an inability to draw themselves out of the water is NOT one of them."*

So . . . the 'secure' status of my perceived position on the subject of captive Lungfish breeding went to 'threatened' while I perused Mr Lambkin's latest pronouncements — and quickly deteriorated to 'endangered' after assimilating Dr Kemp's letter.

What remains are even more questions. But during the process of seeking — and maybe finding — some answers, the captive propagation of this fascinating, endangered, 'living fossil' will, we can all hope, become commonplace.

**FOOTNOTE:** Dan Moreno and his colleagues have recently been awarded a research grant by the Institute of Museum Services Conservation Project Support to continue studies into captive breeding of Australian Lungfish over a two-year period, both in the US and Australia.

# Books

## LATEST DISCUS BOOKS FROM T.F.H.

### 1 SCHMIDT-FOCKE'S DISCUS BOOK

By: Dr Eduard Schmidt-Focke  
Price: £19.95  
ISBN: 0-86622-077-1

The back cover notes on this excellent book start off by saying: "In every field there has to be a 'best'... The 'best' expert on Discus is undoubtedly Dr Eduard Schmidt-Focke of Germany".

A bold statement indeed, but one that — unlike so many other 'best' statements — holds more than a grain of truth. There can be few (if any) Discus keepers anywhere who haven't heard of Schmidt-Focke and his famous Discus. There can also be few (if any) aquarists who are not aware of Schmidt-Focke's boundless enthusiasm for Discus. Those who are not, will soon be put right in this book, written with Schmidt-Focke's unmistakable stamp of authority, and in a style that is both highly readable and informative throughout.

The *Discus Book* is not, however, a step-by-step guide to Discus care and breeding. It contains a wealth of information, of course, but much of it is written from the personal standpoint, expressing the author's view, recounting his experiences, and reporting on other workers' successes and failures. The result is a book that is very difficult to put down — one that entertains at the same time as it educates.

I was particularly encouraged to read the great man's comments on page 95 regarding Discus species and subspecies, having, for years, had considerable doubts regarding the specific and subspecific status of the many

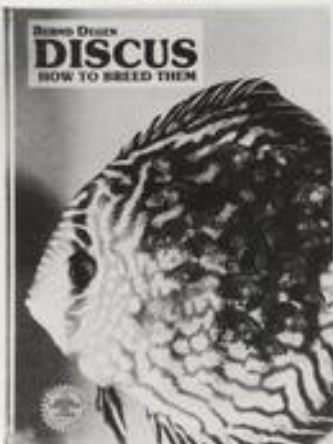
different types of Discus we all know and love. I was also impressed by many of the photographs, some being of a special historical nature, such as those of the first spawning of Blue Discus, Schmidt-Focke's pair of Brown Discus, his first pair of Royal Blues, Herbert Axelrod's photographs of the toptype of the Brown Discus and the holotype of the Blue Discus, Schmidt-Focke's early attempts at photographing spawning Discus, and so on.

I loved this book from cover to cover and would urge all Discus keepers to obtain a copy. If you are not a Discus keeper yet, you soon will be if you buy Schmidt-Focke's *Discus Book*.

### 2 DISCUS, HOW TO BREED THEM

By: Bernd Degen  
Price: £16.95  
ISBN: 0-86622-641-9

I always get a little annoyed when I read a book or an article that refers to fish and/or aquarists as "he" ... as if there were no females of either 'species' in existence. Why, oh why, do people have to insist in using such blatantly inaccurate, chauvinistic (and potentially offensive) terms?



Bernd Degen's book starts in this vein as early as the Preface. We are also told on the same page that Bernd Degen has written more books on Discus than anyone else, and that "he is considered the world's leading Discus authority".

While not questioning, or being able to dispute, the first of these points, some Discus keepers might find the second somewhat more debatable (where does this leave Eduard Schmidt-Focke, Jack Wastley, and other such undisputed authorities?).

Such quibbles aside, *Discus, How to Breed them*, is an authoritative if, on occasions, slightly 'prejudiced', book which will serve any aquarists who wish to spawn these

majestic fish, extremely well indeed. The 'prejudice' comes in statements like "... caring for home-bred fish is definitely a happier chore than dealing with the Asiatic ones", or "Germany, for example, has the market and the interest for these charming domestically produced fish".

I admit that home-bred fish, IF they are of good quality — and this is not always the case — may be desirable, but why single out Asian fish for criticism when the Far East is producing so many excellent Discus, and when this book, itself, features so many of these exceptional fish? Germany is certainly a great Discus market, but what about the US, Holland, Belgium ... or even the UK?

Factually, there are no real weak sections in this book, the best being, without doubt, those dealing with the technical layouts of Discus aquaria and with breeding (including the selection of broodstock), where Degen's expertise and wealth of experience really come to the fore. Anyone who wishes to breed Discus will find a successful formula here — one that has been extensively tried and tested ... and proved to work by an undisputed expert in such matters.

The diet chapter is also very good indeed, revealing some of the author's 'secrets', plus a few surprises, such as the recommended use of flake food ... yes, you read it right — flake for Discus!

Bernd Degen's book contains a wealth of information for Discus keepers of all ages and levels of experience and, at £16.95, represents great value for money.

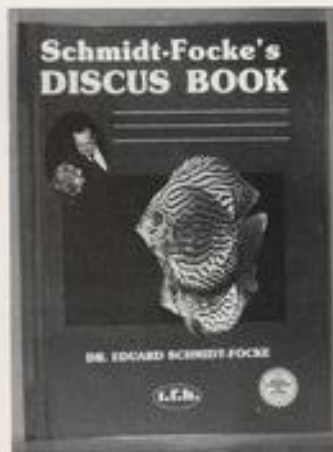
John Dawes

### HARLEKINFRÖSCHE DER GATTUNG ATELOPUS

By: Ralf Heselhaus and Mattias Schmidt  
Published (in 1988) by:  
Herpetologischer Fachverlag,  
Münster, Federal Republic of  
Germany  
Price: Approx £6  
ISBN: 3-9801853-0-3

It is seldom that German language publications are reviewed for the non-technical press, but this little book fills a noticeable gap and deserves a wider readership.

*Harlequin Frogs of the Genus Atelopus* provides a succinct introduction to the lives of these 'stump-footed frogs'. A brief overview of the systematics of the genus is followed by an account of their distribution and characteristic habitats. Colour and black and white photographs of habitats, as well as shots of collecting and photographing *Atelopus*, are given throughout the text. The authors describe trips to Panama and French Guiana, giving useful details on vegetation and the problems associated with collecting and photographing these frogs. Important reference is made to the status of the endangered Golden Frog, *Atelopus zeteki*.





Ateloid toxins are discussed with reference to their function in nature. The natural breeding cycle of *Atelopus* is also discussed in some detail, with interesting notes on mass spawning and population size.

A useful chapter on *Atelopus* in the terrarium, illustrated with a diagram and photos of naturally furnished vivaria, is followed by the bulk of the book (35 pages), giving species and subspecies accounts for *Atelopus chrysiventris*, *A. flavescens*, *A. ignescens*, *A. senex*, *A. spumarius barbatini*, *A. s. spumarius*, *A. varius varius*, *A. v. ambulans*, *A. v. loomisi*, and *A. zetekii*.

Each account gives a brief description, notes on the distribution, habitat and care in captivity of each species, and is accompanied by at least one excellent colour photograph of the species in a natural surrounding. Additional black and white shots supplement the accounts, and the authors have included colour photographs of species variants. Four colour variants of *A. v. varius* are shown, illustrating the bewildering variety exhibited by this subspecies.

A general distribution map for the genus is followed by a clearly laid out species table giving, at a glance, the size, coloration, distinguishing characteristics and distribution for fifteen species and subspecies not treated in the preceding accounts. A short bibliography lists relevant references.

**Harlequin Frogs of the Genus *Atelopus*** exemplifies the type of book that, until recently, has been lacking on the herpetological book market. Covering a narrowly-defined subject area, it will appeal to the herpetologist and terrarium keeper with an interest in frogs, to the bibliophile, and to workers in neotropical herpetology.

By retaining control of the publishing, the authors have avoided the major fault that mars so many of the mainstream herpetological publications, the lack of good original photographs. Illustrated to the high standard that we have come to expect from European publications, ten species and subspecies of *Atelopus* are pictured in colour and black and white. For the non-German reader, the standard of the photographs alone would compensate for any difficulty with the text and make this little book a useful purchase.

It is hoped that future publications from the authors will appear in an English language edition to bring them the wider readership they so obviously deserve.

**Harlekinfrösche der Gattung *Atelopus*** is available from specialist booksellers.

Steven Simpson

## DIGEST FOR THE SUCCESSFUL TERRARIUM

By: Richard D Bartlett  
Published by: Tetra Press  
Price: £3.95  
ISBN: 3-89356-035-1

Richard Bartlett is the founder of the Reptilian Breeding and Research Institute in the US and, as such, is perfectly placed to write a book on "the successful terrarium".

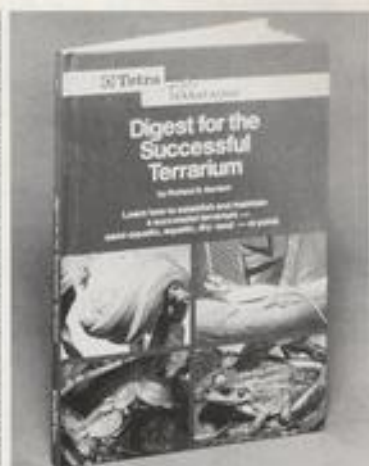
His advice throughout is, therefore, sound and sensible. His photographs, accounting for the vast majority of those published in this 80-page book, are also of a very good quality indeed. Add to this a Glossary, an Additional Reading list of books and periodicals, plus an excellent Care Guide to 25 Common Reptiles, and you have the makings of a most useful publication.

I have no major adverse criticism of the actual contents of this Digest. On the contrary, what's in it, is done well (bearing in mind the limitations placed on the contents by the available space and the over-ambitious aim of dealing with reptiles and amphibians in a single small book).

The text is interesting, among other things, for the way it is organised. Instead of the traditional amphibian/reptile divide, Richard Bartlett has gone for a thematic approach. We therefore have chapters on the Aquatic Terrarium (Aquarium), the Turtle Aquarium, the Semi-aquatic Terrarium and Dry-land Terraria: (i) the Woodland Terrarium, and (ii) the Desert Terrarium.

The style is easy on the brain, while the illustrations are easy on the eye — a real pleasure to look at. This Digest will therefore prove most useful to herpetoculturists in many countries.

It is this last point which, in fact, gives rise to my main criticism. Publications such as this are read all over the world and, while the UK may not be either the biggest or most highly populated country outside the US, it is nevertheless home to a very active community of herpetoculturists... and a most interesting herpetofauna. It is therefore quite disappointing to note that not a single



species of our native amphibians or reptiles is given even a mention.

It would also have helped, in my view, if temperature readings, body measurements and volumes/capacities had been given both in centigrade and fahrenheit, in centimetres and inches, and in gallons (both US and Imperial) and litres. Equally, a section on actual diseases, their symptoms and their treatments, in addition to the Health Aids component, would have been well received by hobbyists.

These reservations notwithstanding, I would recommend the Digest for the Successful Terrarium as a very worthwhile addition to the fast-expanding body of herpetological literature.

John Dawes



# MALAWI

## TRIP OF A LIFETIME (Part 2 — Diary of the Northern Lake)

Squeezed between two separate 'southern' expeditions, John Ferguson's week fishing the northern waters of Lake Malawi yielded some superb fish . . . and some not-so-superb experiences, courtesy of 'Chicken á la Usisya'!

### Saturday, 11 November

**T**HE start of our week-long excursion to the northern end of the lake. At 3.30 am we set off to Nkhota Kota to catch the north-bound ferry. 5.30 am: sunrise. It was one of the most beautiful sights I've ever witnessed. Slowly but surely, the sun appeared over the sand bar, about a mile off the shore, blazing down, waking all life. 8.30 am: the ferry 'Ilala' arrived, late. The concrete platform we had to walk along had been used in past times by a narrow gauge railway. With age, a 15ft concrete section had collapsed leaving just the two rails, about four feet above the water. Local boys were busy earning money ferrying baggage across the gap while we, the passengers, precariously straddled the rails.

Once safely on the main platform and, after much pushing, shoving and haggling, we boarded the boat to the ferry. Our first trip up the lake by ferry and, although we didn't realise it at the time, our home for the next 24 hours! It was full of people and provisions for the northern townships. The overwhelming smell of dried Usipa (the lake sardine) was breathtaking to say the least.

### Sunday, 12 November

We arrived at Ruarwe and we were met by Stuart Grant's northern dive team. They, incidentally, cover the northern part of the lake from Nkhota Bay northwards plus Kande Island to the South. Considering that it took us, on the ferry, 24 hours to get just to Ruarwe, view the map and see what they cover in a 15ft clinker built boat, full of gear, with a 6hp outboard motor!

By the time the 'Ilala' had disgorged her passengers and upped anchor, we were already snorkelling at the northern end of this small bay. The team were catching, for a large European order, 150 pairs of *Pseudotropheus zebra* sp. Pearly (the "Pearl Zebra"). Easily sexed and in abundance, these took an hour to gather. We snorkelled above while the team, on the 'hooker', were below. They would surface part-way and pass the catch to us, hand to hand. We'd then travel to the boat where it would be sorted.

Onto Usisya and Mala rock (pronounced Mara) to catch *Aulonocara baenichi*. The wind had risen and the waves were getting high; a 4½-foot swell. I guess it could be likened to a day's fishing off the Scarborough coast! The team dived some 40ft down to catch these fish and, as the reef was a 100+ ft long, those aboard had to travel with the divers by starting and stopping the motor and steering towards them. The catch was secured in a drum, anchored to the bottom but halfway to the surface, so as to decompress the fish partly for collection the following day, when they would then be taken inshore, readied for collection.

Back on shore, food was foremost in our minds and, as we hadn't eaten properly since yesterday lunch-time, we walked into the village. At the first store there were no provisions except for a couple of bags of rice, margarine, a few packs of biscuits and some soft drinks. These purchased and, with just a few biscuits and soft drinks for lunch, we set off to catch *Pseudotropheus zebra* species "Mustardi 2". They're smaller than the original "Mustardi" caught in the Nkhota Bay area, and quite unbelievable in colour (not that one could see this when the fish eventually arrived in Europe).

Late afternoon we were back on the shore that we were to sleep on, under the stars. No food, so plan "B", or should I say "C", was instigated — the purchase and eventual cooking of one chicken. A new dish was invented: 'Chicken á la Usisya'. A night that will remain in my memory for a long time. The bird was tough, the rice (because we had no salt) was tasteless.

### Monday, 13 November

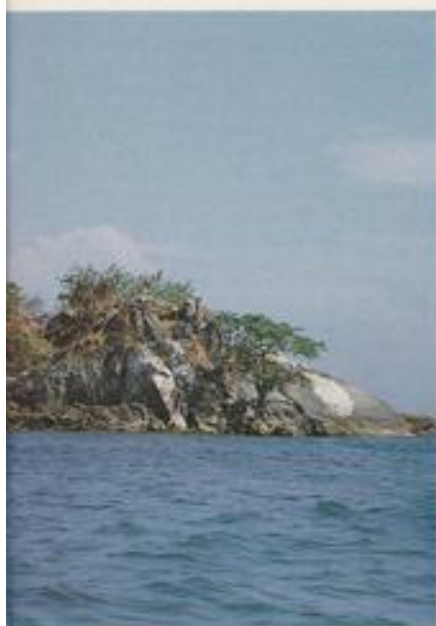
After our ablutions at the shoreline, with the now-interested locals in attendance, we set off to collect the previous day's catch. The waves were still high but, with a little searching, the drums were located. At this moment the outboard motor decided to die. We were drifting about 1½ miles offshore. The lads had then to start paddling for shore. Back ashore, a bit of home mechanics, mixed with a sprinkling of Chichewa swear words, and it was operational again; just in time, as the 'Ilala' appeared on the horizon.



Mphandi Point, Usisya — one of the numerous small



Northern half of Lake Malawi (after Konings, 1989).



Rocky outcrops around the lake.

Sunbathing crocodiles somehow seemed less of a threat than those encountered underwater!



*Pseudotropheus zebra* sp. 'Mustardi II', male — a new fish on Stuart Grant's (see Part I) export list and fairly common around Mala Rocks where this specimen was collected.



The Green Lepturus, *Buccochromis rhoadesii* (formerly, *B. lepturus*) is common around Chisumulu and Likoma.



Diving just off Likoma island is like entering a watery wonderland.



*Nimbochromis livingstonii* is common throughout Lake Malawi. This specimen was caught in the northern half of the lake.

Next stop Nkhota Bay. We were there for just enough time to have a look around, see the fisheries department offices, be shown Stuart's northern base of operations (spare boat and storage area) and grab a snack. Back on the 'Ilala' to Chisumulu.

## Tuesday, 14 November

1.30 am: the 'Ilala' anchored off Chisumulu. We prepared for disembarkation at night (it was bad enough during daylight)! Before I alighted, a call of nature informed me that the chicken had bitten back. Not just me, as it turned out; and four of us had the traveller's nightmare, terrible diarrhoea.

Later that morning we awoke to fine rain and an overcast sky. The guest house we were sojourning in didn't have much food at all (virtually nothing). Not that we were in any mood to eat, having suffered most of the night with our bowels. What we were offered was the best cup of tea this side of Dover. That, and a few locally grown bananas, went down a treat... and almost stayed there, but for the chicken!

George, the Chisumulu dive team leader, arrived mid-morning, apologising for his delay as the team had been caught in the storm coming across from Likoma. They were to go out and catch *Aulonocara hornellae* (the "Blue/Gold") just 50ft offshore and 30ft down. Two of us went with them but, because of the lack of sun, couldn't see too well. We did manage to see them scooping the fish out of the net 20ft down though. While there, they also caught *Aristochromis christyi*, *Tyrannochromis macrostoma*, *Cheilochromis eucilius*, among many other haplochromines.

At this juncture, I had better explain the mode of catching these fish. The net itself is a seine net approximately 5-6 metres long, about 1½ metres deep, weighted at the bottom and with floats at the top. The divers drag this along with them in a 'U' shape. Once placed into position, the divers encircle the net, chasing the fish into its centre. Once a fish is trapped in the netting, the divers disengage it and either (depending upon the depth) place it a pre-located, anchored drum, or bring it up to the waiting crew at the surface.

## Wednesday, 15 November

Off again, this time to catch what the divers called "Big Eye", *Pseudotropheus* species Red Cheek (traded as *Pseudotropheus macrophthalma* Red Cheek). Its native name is M'kokafodya, meaning Glowing Coal or Live Fire. Also on the list were *Melanochromis* species Chisumulu Johanni, a *Pseudotropheus* species the lads called "Zebroides", *Nimbochromis livingstonii*, *Cheilochromis eucilius*, *Champsichromis spilargyus* (they called it Mbwanac), *Dimidiichromis compressiceps* (the famed Yellow Form that doesn't stay that way, for some reason, in aquarists' tanks), *Nimbochromis linni* and *Otopharynx heterodon* (traded as 'H.' Royal Blue).

At the first dive site the team set off first. All of a sudden, like rockets, they reappeared

back over the side, laughing and giggling. When it all settled down, it turned out that one of them had come face to face with a 10ft crocodile!

"She wouldn't move", they said, in between fits of laughter.

Needless to say, we were off to a new location. Even as we got to this new location, six crocodiles went to the water from their sun-bathing spots on the rocks. The two lads went in after their catch and still managed to get the specified numbers.

Also seen, but not caught, were *Labidochromis texilis*, *Protomelas fenestratus* (Steveni Thick Bars). Later that afternoon we set off across to Likoma.

## Thursday, 16 November

We awoke early and were greeted by Andreas and the Likoma dive team. Still suffering from the after-effects of "Chicken à la Usisya", just two of us ventured out to the day's two dive sites to catch *Aulonocara* species Green Face Metallic and *Melanochromis mollis* (traded as 'H.' New Margrette).

The catch completed by lunch-time, we were asked if we'd like to return to the guest house for lunch. We declined the offer, so the crew then set about preparing lunch for us all on the shore, while we sat in the shade of a small Baobab tree.

Lunch was Nsima and fish. The fish might just as well have been salmon and caviar in European terms, for they were the odd Utaka and haplochromines caught in the netting, plus a small *Burgus meridionalis*, about 2ft long, known locally as Kampango.

Nsima (pronounced Sima) is the staple diet of Malawi. It's maize flour that, when water is added and it's cooked, turns to something akin to solid semolina. Not exactly 'Cordon Bleu' but very filling indeed (our first time with Malawi bloat?). This was followed by freshly picked mangoes, off the tree the lads were sitting under. Oh, and I've forgotten to mention, it was on the fin, literally. It was served up on a flipper!

After lunch we were off to the next dive site to catch *Otopharynx auromarginatus* (known as 'H.' Margrette "Big Blotch").

## Friday, 17 November

A slightly more relaxed day. At both dive sites, the lads spent a long time on the 'hooker' searching for fish but without much luck.

By mid-afternoon we returned to Likoma for a guided tour of the cathedral. It's set on a hill overlooking the main bay. Built of stone and with a tin roof, it's a beautiful sight. The team guided us around the various little chapels and crypts.

## Saturday, 18 November

Our last day. There were a lot of fish to be caught before tomorrow, when they would all be bagged, ready for the ferry and the journey south.

Our first stop was right underneath where the ferry anchors when it stops at Likoma. Here were *Aulonocara kuseri* (the Black Top

or Night Aulonocara) plus a most wonderful assortment of other haplochromines such as: *Fossorochromis rostratus*, *Aristochromis christyi*, *Cyrtocara moorii*, *Nimbochromis polyzona*, *Nimbochromis livingstonii*, these we spotted 'playing dead' on the sandy bottom (their local name, translated, is "The Sleeper"), *Tyrannochromis macrostoma*, *Placidochromis johnstoni*, *Dimidiichromis compressiceps*, *Protomelas similis* and *Copadichromis taeniolatus*.

Among the other species spotted were *Lethrinops longimanus*, *Lethrinops praeorbitalis* and another most striking fish known to the divers as *Aulonocara* Yellow Collar. *Dimidiichromis* Kwinge were present in vast numbers, mostly fully coloured males, but keeping just out of range. A good reason why, I imagine, not many adults are ever exported.

At the last site the team were to collect *Melanochromis joanjohnsonae* and *Labidochromis freibergi*. These two little species were to prove to be the quickest, smartest fish of all. No wonder *M. joanjohnsonae* was called *M. sp. "Exasperatus"* by the exporters at one time!

As the fish resided in the shallow waters, the divers used snorkels. We were employed as carriers for the catch, shunting back and forth to the waiting boat. All one could hear was the grunts and shouts of the two divers underwater as they set off in different directions getting tangled up as these little fish darted about evading capture. At the end of this session, the net was torn to shreds, and the divers exhausted!

## Sunday, 19 November

We all packed in readiness for the journey south to Nkhota Kota on the ferry 'Chauncy Maples', accompanied by the fish from Ruarwe, Nkhota Bay and Chisumulu that we, in our own little way, had helped to catch.

The fish, all bagged up, were kept cool at the stern under rush matting strung together in the form of a tent. A sad occasion, leaving this beautiful island in the sun. Our consolation was that we were heading back to a real shower, electricity, cold drinks and good, old-fashioned home cooking.

Once aboard we chanced to look over the side at the local boys selling mangoes, dried fish, etc. One was fishing for *Dimidiichromis* Kwinge. We counted upwards of a hundred adult fish, mostly males, attracted to the ferry's side.

The reason was that passengers were discarding their waste, such as mango peels, banana skins, rice etc. In the time we were there, he only managed to catch three, each about 8in. long.

After a very long day on the ferry, Nkhota Kota was in sight. Another bout of pushing and shoving and we were ashore. The fish stayed on board, to be transferred at Chipoka onto awaiting transport. We travelled back to Kambiri Point, our northern adventure over but looking forward to others in the remaining week along the southern shores of this magnificent inland sea we call Lake Malawi.

Footnote: John Ferguson's 'diary' of the southern part of Lake Malawi was published last month in Part I of *Trip of a Lifetime*.

# PRODUCT ROUND UP

BY DICK MILLS

## AQUARIUM SYSTEMS LTD

What hobbyist wouldn't settle for a filter system that maintains water conditions at zero nitrite and nitrate coupled with a stable pH value? Just such promises are held for **AQUARIUM SYSTEMS'** new **BIO-FILTA**, a 'tank-top' wet/dry trickle filter suitable for both marine and freshwater uses. At present, two models are available, BF100 and BF125, the second unit being just over half as long again compared to the former.

Designed to sit across the tank's front-to-back dimension, each unit requires a minimum 6in (15cm) clearance 'head-room' between the tank's top frame (or internal supporting glass ledges) and the top of the hood interior. (Of course, there is no problem accommodating the 95mm - c 1in - high unit(s) on 'open-topped' tanks lit by pendant-style lamps).

Overall length dimensions of 350mm and 545mm (13.7 in and 21.46in) make crosswise-fitting to 'standard' 12in (30cm) wide tanks somewhat problematical (lengthways may be possible with extra supports — when filled with medium the units will be heavy), but they are primarily designed for much larger tanks, more appropriate in themselves for marine and invertebrate culture.

The box itself is filled with suitable filter medium (crushed

coral for marines, clay granules or any other suitably inert material for freshwater) and water is fed into it by an airlift emptying over a distribution plate running the whole length of the unit: Whisper airpumps (Models 600 and 800) are recommended, depending on unit size or whether twin units are employed or one.

Hobbyists new to trickle-filter concepts may, upon examining their Bio-Filta, wonder where the water comes out again after passing through the medium, and get the urge to drill extra holes in the bottom. This is quite unnecessary (and totally undesirable) as the carefully-calculated waterflow returns past the air-lift pipe's entry point into the box and is more than enough to prevent the unit overflowing: the whole purpose of this type of filtration is that it depends on the slowness of the waterflow to achieve its remarkable nitrification and denitrification processes. Any attempts to modify it in any way will nullify all the benefits arrived at by three years' patient research!

The bottom end of the airlift tube should, ideally, reach any baseplate in substrate biological systems; alternatively, it can be merely inserted a short way into the substrate, or even positioned in clear water as near to the substrate as possible (to ensure maximum 'lift' efficiency), but covered with the normal guard to prevent fish or

invertebrate entry.

Because of its operating position close to aquarium lights, the risk of excessive algae within the unit has been reduced by using opaque materials in its construction. The close-fitting cover also cuts down light entering the unit and reduces evaporation losses too. Retail prices are: BF100 — £40.00; BF125 — £49.00; TWIN (2 x BF125) — £79.00.

Details of the Bio-Filta system from: **AQUARIUM SYSTEMS Ltd.**, 22 Westover Road, Bournemouth, Dorset BH21 2BJ (Tel: 0202 295079).

## ARMITAGES

Filly underwear and aquarium foods hardly seem to have anything in common (if they have, then I've been missing out somewhere all these years!) but then you don't know Bob Armitage.

To dispel any further flights of fancy your minds might be taking (without further ado) the explanation is quite innocent: an ardent tennis fan, Bob was among the many thousands smitten by 'Gorgeous' Gussie Moran, whose stunning tennis fashions became the talk of Wimbledon in 1949. At that time too, **ARMITAGES** were about to launch their new fish food and 'GUSSIE' seemed the perfect name for the equally-exciting new product.

Unfortunately, Miss Moran never realised how she was put on the aquatic map! Now Gussie, the cartoon fish character on the original packaging, has returned to celebrate the product's 40th birthday.

Gussie, the U.K.'s first branded fish food, continues to flourish as a low-cost staple diet bought mainly by children with one or two goldfish, rather than by the serious aquarist with large numbers of community tanks. Since the birth of Gussie in 1950, Armitages have grown into one of Britain's leading manufacturers and suppliers of a vast range of products and accessories for all types of pets including, of course, ornamental fishes. Little did Gorgeous

Gussie know what repercussions she was about to trigger off back on the centre Court — game, set and match to Armitages!

Details of Armitage products from: **ARMITAGES PET PRODUCTS**, Colwick Industrial Estate, Nottingham NG4 2BA (Tel: 0602 614984 Fax: 0602 617496)



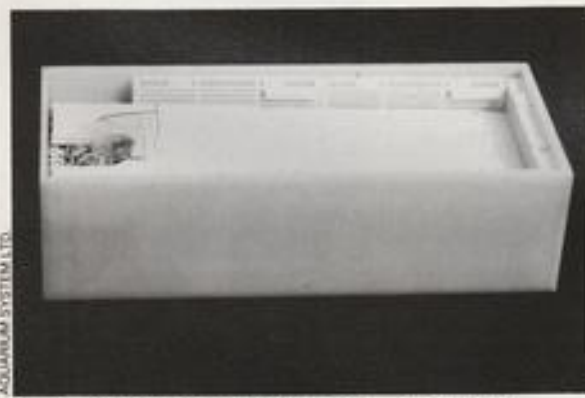
Gussie — 40 years old and still going strong.

## BP NUTRITION (UK) LTD

With retail fish outlets being attached to more and more garden centres, many a terrestrial gardener may feel confident enough about tackling water gardening (as far as the 'greenery' is concerned), but how will their fish fare while these newcomers to fishkeeping are transferring their green-fingered expertise into fish-fingered dexterity?

**BP NUTRITION** believe they can help, as by feeding pond fishes (whether Goldfish or Koi) with their new improved **POND PRIDE** floating pelleted foods, the fish can be assured of getting all that they need in the dietary department, thus taking some of the worry off the fishkeeper.

If you've spent the last few weeks putting in a pond, then it won't have matured fully (nor attracted enough natural foods to it) for the fish to feed sufficiently to put on reserves to survive the coming winter



The latest addition to the filtration scene — the Bio-Filta.

months. Pond Pride will ensure that your fish are fit to face even the worst contingency as, in addition to its 38% protein content, it also contains the full complement of vitamins and minerals, plus shrimp meal, Spirulina and grass meal to boost the natural colour in fish.

Using floating pelleted foods has two distinct advantages — it attracts fish to the surface, where you can check on their numbers, and you can immediately see when the fish have finished eating (so no overfeeding). Pond Pride comes in three water-resistant drum sizes — 200g, 450g and 2.5Kg — and has a shelf life of 15 months; there are also three different pellet sizes to suit small, medium or large fishes. If, as a result of all this good quality feeding, your fish present you with fry, then BP's Pond Pride Flaked food will get them off to the best possible start too.

Details of Pond Pride foods and an information sheet on feeding (especially prepared for those new to fishkeeping) from: **BP NUTRITION (UK) LTD.**, Wincham, Northwich, Cheshire CW9 6DF (Tel: 0606 41133), or from the sole UK distributor, **KING BRITISH** (Tel: 0274 576241).



A culinary delight for Stapely Water Gardens' Koi — BP Nutrition's Pond Pride.

### CRYSTAL CLEAR PRODUCTS

There can't be many hobbyists who don't regard air-stones with a tendency to rise up from the bottom as a nuisance; almost before you can say "Why don't they weight the b----- things down?" **CRYSTAL CLEAR PRODUCTS** have done just that with their

range of **TURBULATOR** diffusers.

Any more diffuser-user problems? Well, they've also made them easy to take apart for cleaning (don't lose the stainless steel weights inside!). They are available in 6 lengths — 2, 6, 9, 12, 15 and 18in — and are reputed to be the longest-lasting diffusers for both freshwater and marine usage. Prices range from £1.98 to £9.49 including VAT.

Details from: **CRYSTAL CLEAR PRODUCTS**, Regan Street Works, Halliwell, Bolton, Lancashire BL1 8AR (Tel: 0204 42801 Fax: 0204 849499).

### AQUARIUM DESIGN

There are quite a number of 'aquarium-furniture' manufacturers, but Glasgow's **AQUARIUM DESIGN** have recently announced developments which shows that they're 'not just a pretty front.'

In addition to manufacturing quality aquarium cabinets (in a wide range of sizes, designs and finishes), they are now the U.K. concessionaires for a whole range of aquarium equipment from **ALGEN MAGNEET**, a leading Dutch manufacturer. This includes **POWERHEADS**, ranging from 100-900 litres per hour in output, internal and external **POWER FILTERS** to suit any size of aquarium, with the largest external unit having a 450l/hour performance.

**THERMOSTATIC HEATERS** are available in six sizes — 50, 100, 150, 200, 250 and 300 watts; four **FOUNTAIN PUMPS** (with optional additional sprayheads) will move 500, 900, 1,200 and 3,000 litres per hour and, to enhance their effect even more, safe 12 volt, **UNDERWATER HALOGEN POOL LIGHTING** comes with red, green, blue and orange interchangeable lenses. Features of the lighting include submerged or above-water operation. Each lamp has its own 'weigh-downable' mounting base or, alternatively, can be clamped to any of the jet assemblies on fountains or **POND FILTERS**.

Looking to the future, **Aquarium Design**, will shortly be adding even more equipment to their list, with trickle-filters and conversions to system tanks.

Full details from: **AQUAR-**

**IUM DESIGN AND MANUFACTURERS**, Block 1, Unit 1, Crowhill Road, Bishop Briggs, Glasgow G64 (Tel: 041 762 1152).

**ALGEN MAGNEET NEDERLAND B.V.**, Koekoeksweg 6, 't Harde NL-8084 GM (Tel: Holland 05255-2100).

### LAHAINA AQUARIUM SYSTEMS

If you're thinking of taking up marines, then a whole new range of products from **LAHAINA** is worthy of your attention. Included in the new 'CASCADE' Powerfilter range are no less than 6 **POWERHEADS**, Models C.180 C.360, C.650, C.900, C.1500 and C.3000. All are self-draining and have immense power for their size; powered by 220/240 volts for European use, plans for American 110 volt markets are well underway. The Cascade range also includes internal and external **POWERFILTERS** and five sizes of **THERMOSTATIC HEATERS** — 50w, 100w, 150, 250w and 300w — in both manual and pre-setting versions. In addition, a full range of **PONDFILTER ATTACHMENTS** will be available.

Lahaina are now distributing their own brand of Marine Aquarium Salt under the name **REEF SALT**. Manufactured in Germany to very exacting specifications, it produces superb water quality for both fishes and invertebrates alike. Two sizes are available — 10Kg (making 300 litres/66 gallons) and 20Kg (600 litres/132 gallons) — and the prices are very competitive at £23.46 and £37.72, respectively but, until 31 December 1990, introductory offer prices of £22.00 and £36.00 should not be ignored!

For details of all Lahaina products and Aquarium Systems write to: **LAHAINA AQUARIUM SYSTEMS LTD.**, Kellas, Elgin, Morayshire IV30 3TW (Tel: 0343 89209 Fax: 0343 89296)

### TETRA

Are you one of those aquarists who think that 'big is beautiful'? Nothing wrong in that, of course, but you may be also thinking that the particle-size of 'standard' foods aren't quite satisfying enough for your fishes. **TETRA** have thought of

that too, and have come up with a new formulation — **TETRA PRIMA**.

Prima is an extruded food which has been granulated to produce a slowly-sinking 'morsel', making it an ideal food for most medium-sized (and larger) tropicals, such as Discus, cichlids and barbs which take their food in midwater.

Of course, once the sinking process stops (by virtue of reaching the aquarium substrate), then it will be just as readily accepted by bottom-feeding catfishes and loaches.

Aquarists in Japan and Germany have already proved Prima's popularity, especially so in Discus-keeping, where it successfully promotes growth and coloration enhancement. Prima is available in 30g packs retailing at £2.25.



Tetra's Prima — tasty morsels for medium-sized and large tropicals.

A free information sheet providing further Prima details can be obtained by leaving your name and address on Tetra's Leaflet Line Ansaphone Service on 0703 643339, or write to: **TETRA**, Lambert Court, Chestnut Avenue, Eastleigh, Hampshire SO5 3ZQ (Tel: 0703 620500 Fax: 0703 628010).

### APOLOGY

In September's **Product Round-Up**, Phoenix's new Koi and Pond Foods were described as Phoenix 200. Despite coldwater fish-keeping being centuries old, we would point that Phoenix 2000 is a more contemporary title! Sorry, Phoenix, our fault.

# THAT GOLDEN MANTLE

*A & P's 'Coldwater Jotter' Stephen Smith, takes a closer-than-usual look at hood development in Lionheads and Orandas.*



STEPHEN SMITH

The fascination of the "Wen" or hood in specialist varieties of Fancy Goldfish, such as the Lionhead and Oranda, is superbly illustrated in this line-up of Orandas, which displays vigorous hood growth, a feature prized by Goldfish enthusiasts the world over.



HUWY NEMELIS

This young Lionhead has yet to develop its full potential hood development, but, nevertheless, is a superb example of its type, and demonstrates perfectly the correct colouring and contrast of hood-to-body colour.



STEPHEN SMITH

While the calico varieties of Fancy Goldfish do not necessarily produce attractive hood colouring, this exciting Oranda is a striking exception, and illustrates perfectly the three areas of hood development.



HUWY NEMELIS

In common with the Redcap, the so-called Chocolate Oranda (not strictly an Oranda type as the caudal finnage is fan-tailed — I would prefer to call it a Chocolate Hi-head) has its hood growth mainly on the cranial region. The developing hood of this example displays the characteristic secretion of mucus from the pores of the fleshy growth — often mistaken for fungal infection.

**T**o enthusiasts of Fancy Goldfish, one of the most prized features of the species is that golden mantle which adorns two varieties of Goldfish — the Oranda and the Lionhead. Commonly referred to as the "hood", this characteristic is more correctly known as the "Wen" and is a major topic of conversation among Goldfish keepers; justifiably so, as it provides one of the greatest and most fascinating challenges to the serious Goldfish breeder.

So, what is all the fuss about? To the uninitiated, the sight of a mass of jelly-like

flesh surrounding the head of a Goldfish may not be a pretty sight. "Why on earth does that fish have its brains outside its head?", remarked one onlooker, with some consternation at a recent exhibition. True, some of the characteristics which make the fascination of the hobby of Goldfish-keeping may occasionally appear grotesque but, in my opinion, a proper hood development on a good mature Lionhead or Oranda is one of the most impressive sights in the aquatic hobby.

This opinion is shared by enthusiasts throughout the world, not least by the

Ranchu Society of Japan, for whom the Ranchu is the country's most prized Goldfish. (Indeed, although it is traditionally supposed that Koi is the 'cultural species' of that country, I venture to suggest that Goldfish, and the Ranchu in particular, occupy an equal, if not superior, stature.)

## HOOD CHARACTERISTICS

The fleshy development of the hood is marked in three main areas of the head: cranial, opercular, and infra-orbital. The cranial development is that part which sits

directly on top of the head, like a cap, from the 'eyebrow' of the fish to the start of the dorsal curve. It is a characteristic of the Redcap (commonly, though incorrectly, referred to as Redcap Oranda) where this cranial development is bright scarlet in colour.

Oranda derivatives, such as the Chocolate and Blue, also have the hood restricted mainly to the cranial region, although some fine specimens have been found with strong overall hood development. The cranial development of the hood has lent itself to a number of names, Hi-head, Hi-cap, and Goosehead, being some examples, while the recent increase in popularity of the Hamanishiki, or Hi-head Pearlscale, has led to some confusion, in that a pair of bubble-like protrusions appear to grow from the cranial development of this variety.

The opercular region of the head is the region across the operculi (gill-covers), or 'cheeks', while the infra-orbital development provides the intriguing sight of a smooth curve of fleshy growth around the lower circumference of the eyes and across the narial region, between the upper lip and the nasal septa. This characteristic sometimes has the appearance of a fleshy 'moustache' and provides Orandas and Lionheads with an attractive 'human' appearance. (This should not be confused with the nasal septa which are the chief characteristics of the Pom-pom.)

A Lionhead or Oranda with a full hood can have the facial appearance of being quite a 'character' in the home aquarium. I have heard say that, once you have kept Lionheads, you will always wish to keep Lionheads, such is their fascination, provided, partly, by the facial expression which the hood appears to give them.

### GOOD HOOD GUIDE

The hood of a mature fish should be evenly developed and should balance visually with the caudal fin of the fish. So often, a good specimen can be spoiled by the hood being so well-developed that it (the fish) is forever nose down in the water. (This trait, however, may be exacerbated in individual fish by a swim-bladder disorder, a common occurrence of the round-bodied varieties of Fancy Goldfish.)

The better developed hoods give the appearance of a ripe, blood-orange coloured raspberry, with the nodules evenly formed around the head. The development of the hood may start within days or weeks of hatching. Fry which show the potential for a good hood have a slightly 'snouty' appearance (i.e. the margin between the 'forehead' and the nasal septa is slightly concave) in profile, but a square-shaped head when viewed from above and, under close scrutiny, will reveal the tiniest of pimples, the first buds of the hood.

I have bred Lionheads in which hood development has been so rapid that, within only a few months, the fleshy growth is as good as any seen on a mature specimen, but it is quite common for the hood development to be slow, only really making any progress



The Redcap, often incorrectly called Redcap Oranda, is a derivative of the Oranda variety and features hood development on the cranial region only, which is coloured bright crimson — the only desired area of colouring on this fish.

when the fish reaches maturity, at about two years of age.

### Mucus secretion

One of the additional characteristics of the development of the hood in a healthy fish is the secretion of mucus from the pitted recesses within the growth. This often causes alarm among newcomers to these varieties, who race to the medicine chest for treatments against Fungus (*Saprolegnia*) and Whitespot (*Ichthyophthirius*). I have even seen perfectly good Oranda specimens disqualified from the show bench for, according to the judging-sheet, having *Sparoglenia*!

There is no cause for alarm: such secretions are merely the result of a larger surface area producing a normal amount of mucus which then oozes from the pits of the hood — the sign of a good, healthy fish (though exhibitors may be advised to 'groom' their fish before showing, by lightly and carefully removing excess mucus from the hood with a damp lint and a very weak saline solution.

### Early disappointment

When breeding Lionheads, Orandas, or their derivatives, enthusiasts have often found that the hoods are poor, causing some consternation. Such a lack of desired hood development in your aquatic offspring does not necessarily indicate that the hood will not develop in successive generations, though. I have seen Orandas which have not produced a decent hood for a number of generations but, surprisingly, a subsequent spawning has produced the most 'powerful' heads, making the hobbyist's patience and perseverance most worthwhile.

However, to produce fish with consistently good hoods, it may be desirable to introduce a good-quality specimen of the same variety into the line-breeding programme. Not only will such a cross provide vigour to the line, but the hood genes from within the 'newcomer' will strengthen the characteristic of future spawnings.



### Cautionary note

Do take care, however, to ensure that the general characteristics of the newcomer are desirable, as webbed caudal or single anal fins, for example, will also be transferred to some degree into subsequent stock. An additional cautionary note is that it is imperative that the fish one introduces are of pure stock. For example, a fish which is metallic in appearance may well have been produced from a strain of nacreous ancestors, and any inherent ancestral characteristics will be transferred into the genetic make-up of the strain.

### Hood colour

The colour of the hood is also a significant characteristic. With the Lionhead and Oranda, which should appear self-coloured (that is, the standard metallic orange colour of the traditional Goldfish), the hood should be blood-orange, providing at the same time, a contrast and a complement to the general coloration of the fish.

Variations in scale colouring of the fish can produce some interesting combinations of hood and body colour. Calico varieties of hooded fish are rarely seen, particularly the Calico Lionhead, and the hood of these fish are, in my opinion, something of a disappointment in coloration, if not in development, as they generally appear to be a smokey-grey.

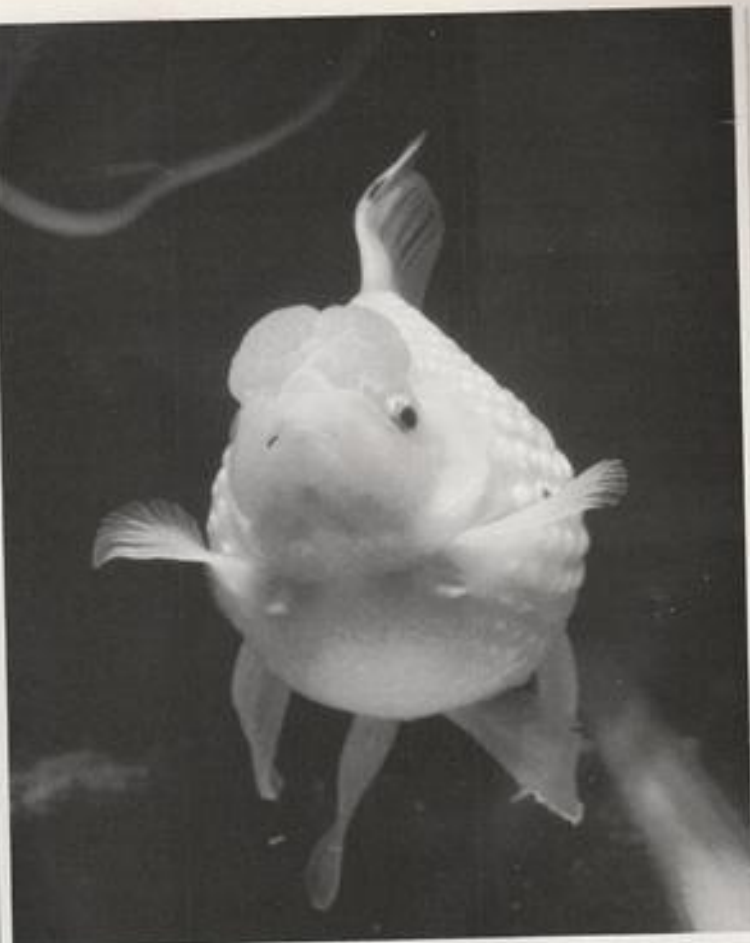
More striking are the hoods of red-and-white varieties, which appear as a glowing yellowish-white. In the case of Redcaps which have failed to colour, there is something striking about the solid white 'cotton-wool' appearance of the hood against the pinkish-white scale colouring of the fish, while I, myself, own a Redcap which gradually lost the scarlet colouring on the cap to a magnificent pure-white development.

A variety which is gaining in popularity, albeit slowly, in the UK, is the Blue Oranda, which I prefer to call Blue Hi-head, as the caudal fins can hardly be associated with the Oranda. The hood development seems to be confined mainly to the cranial region and, while I prefer this to be a solid sooty-blue, I have recently seen specimens where the hood glows with an underlying yellow which is not unattractive.

### CONFUSING NOMENCLATURE

Confusion often arises from the nomenclature of Goldfish varieties, and the Oranda and Lionhead are no exceptions. These hooded varieties hold a special place for Goldfish keepers throughout the world, and this is reflected in the regional variation in name-styles — all referring, broadly, to the same fish, or their derivatives.

In the UK, the Lionhead is the most popular name for the hooded dorsal-less metallic fish. "Hooded Goldfish" is a popular term used in Europe, while the common Australian form is "Bramblehead". The American term "Buffalo-head" has been adopted by a number of British societies, and one of my favourites is the German "Tomatenkopf" (translated to "Tomato-head"),



The Hamanishiki (pronounced "Ham-an-ish-kee") is proving increasingly popular in the UK and features two bubble-like protuberances on the forehead of the fish, surrounded by the "Wen" or hood characteristic. Although referred to as 'bubbles', in specimens I have encountered, they are quite firm and similar to the warty Lionhead hood growth, and may be assumed to be modified "Wen".

but this surely must be a reference more to colour than to the fleshy formation of the hood.

The Japanese name of "Ranchu" is commonplace in the Western Goldfish scene, although distinctions are made by the specialist societies between the Ranchu and the Western types, where the main differences are in body-shape and caudal fins, rather than in the hood. The Ranchu at maturity, sporting a fine hood, is referred to by the Japanese as "Shishigashira-Ranchu", and a similar term is applied by the Japanese to the Oranda. The Chinese refer to a variation of the Oranda as "Oranda Goose-head", where the cranial development is extreme, while the Northern Chinese take my prize for their name of "Frog-head".

By whichever name you wish to refer to the hooded varieties of Goldfish, my advice is this: set up a filtered aquarium with the best pair of Orandas or Lionheads you can find. Visitors may well gaze in awe at "the fish with their brains outside their head",

but I can guarantee they will become your fondest, cheekiest and most treasured pets.

**FOR THE BEST  
ADVICE ON  
ALL AQUATIC  
PROBLEMS  
WRITE TO  
OUR PANEL  
OF EXPERTS**

# Koi Talk

By John Cuvelier

## NELSON AND BROCK

Like most Koi-keepers, I must look at literally hundreds of fish in the course of an average season, invariably passing them by with a sigh, in favour of more pressing needs such as food, drink, and clothing, along with all the other nuisances associated with living today!

Just once a flood, however, my eyes fall upon a particular Koi which I simply must have, in this case a 14in (35cm) Leather Doitsu in brilliant silver and grey, with a black stripe running down from the centre of the head to the mouth, rather like a badger (yes, we've named it Brock!) So smitten was I, that I didn't even try to beat the vendor's price down which, incidentally was the most I have ever paid for a Koi in my 20-plus years of keeping them.

Had I been visiting one of the large Koi emporiums at the time of spotting my prize, no doubt I would have been forced to forego the pleasure of purchase on sheer economic grounds but, fortunately, I was visiting a very small (but growing) aquatic centre at Earl's Croome on the A449 between Worcester and Tewksbury.

Earl's Croome Aquatics had been recommended by a friend as being worthy of a visit, and it certainly was. Only a relatively small selection of Koi are on sale, but are all displayed in conditions which can only be described as five-star, with crystal-clear water and an obviously very caring husband and wife team, the latter half of which was quite distressed at having to lose what was her favourite.

There is a lot to be said for visiting these small outlets as, to be fair to the bigger boys, lower overheads permit lower prices to be charged for their stock. Of course, should you be looking for top drawer Koi, then, obviously, the larger outlets are the places to go, but for we lesser mortals, small is definitely beautiful!

Visiting yet another centre with Sheila my wife, we chanced upon a pretty yellow Ogon of about 6in (15cm) in

length which we duly bought in spite of already having several similar fish. So, you might well ask, why did we buy it? Well, it has only one eye and had obviously been born that way as there is no sign of a socket or indeed any mark of one, and both of us are suckers for anything that needs cherishing. All it took was a look between us without a word being spoken for Nelson(!) to become part of the family.

## EXCELLENT BUY

After my comments regarding the usefulness of a certain book about fish health (less said the better!) I have very kindly been presented with a copy of the *Interpet Manual of Fish Health* published by Salamander. The authors, Dr Chris Andrews, Adrian Exell and Dr Neville Carrington, tell us immediately that this book has got to be good. 50,000 words and 300 superb colour photographs spell out everything one could possibly wish to know about the health of our charges, in layman's language, something most books overlook. I was unable to put the thing down

for two full days after receiving it!

An excellent chapter on water quality, I found quite enthralling, in spite of having had a lifetime's experience in the industry. What I especially liked, however, were the 'boxes' found throughout the volume with such intriguing titles as: *What is Codonion?* and, *What is a Nematode?* or, *What is a Glochidium?* As a strictly amateur fishkeeper, I have to admit to never having heard of some of these 'beasties' but, my goodness, I certainly know about them now!

One thing I cannot understand however, is why I've not come across this book locally because I would certainly have bought it on sight. I can only presume that Hereford is living up to its reputation of being the last place to get anything good.

## TRICKLE TOWER

It's been a long held ambition of mine to experiment with trickle tower filtration, as these devices have been in use in industry for donkey's years and, indeed, are quite popular in Japan where they don't seem to mind about

having weird lumps of plumbing hanging around their pools.

The theory of trickle filtration is simplicity itself, merely a matter of feeding contaminated water into the top of a cylinder containing a series of perforated plates interposed with suitable media in such a way that the dirty water passes in the form of droplets down through successive levels of media, leaving behind the contaminants, vital oxygen being injected at the base of the tower.

The construction of such a tower, while presenting certain difficulties, should not be beyond the skills of a good DIY type, the main difficulty being one of getting at the various levels of media for cleaning and maintenance.

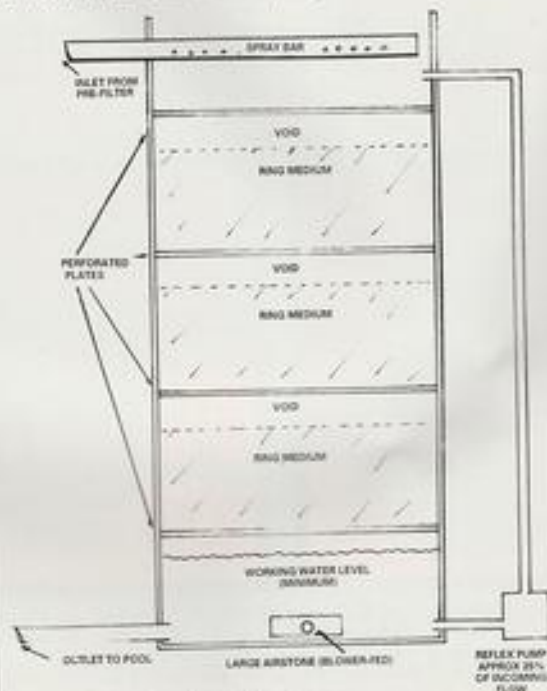
As I can't see yours truly getting around to building one at my time of life, I'm passing on the idea for some other brave souls to tackle. The most difficult problem that I can see is retaining the various perforated plates in such a way that they are easily removable. My own pet idea to be included in the design is the reflux pump at the bottom which allows an air-enriched part of the filtrate to have a second pass. (A Grundfos Selectric 3-speed pump would be ideal for this task.)

It would be possible to 'gravity-feed' the input to the tower but, of course, this would mean sinking the thing into the ground to get the top at pond-top water level, no mean feat if it was a 6-foot tower, but, nonetheless, quite feasible. Obviously, some form of pre-filter would need to be used prior to the tower so as to remove heavy solids. Anyway, the schematic diagram might give you something to ponder upon through the coming winter.

## END-OF-SEASON JOBS

Speaking of which should remind us about all those end-of-season jobs which were queueing up for our attention.

Please don't be tempted to put them off as it's the life of your fish which could be on the line, particularly if we eventually get the hard winter we've been lucky to avoid during the last couple of years.



Schematic drawing of a trickle tower.

# Diary dates

## REIGATE AND REDHILL AQUARIST SOCIETY

The next Bring and Buy sale of the R. & R. A. S. will take place on **Monday 5 November** at Strawson Hall, Albert Road, Horley, Surrey. Doors open: 7.30 pm; Sale: 8 pm. Refreshments will be served at around 9 pm. All visitors wel-

come. For full details, contact Jeremy Spence (P.R.O.), 60 Railey Road, Northgate, Crawley, West Sussex, RH10 2BZ. Tel 0293 512932.

## C.A.G.B. (NORTHERN AREA GROUP)

The Northern Area Group Catfish Auction will be held on **Sunday 18 November** at the

Brigade Hall, Bryn Road, Bryn, near Wigan. Booking in: 1 pm. Enquiries: 0253 28090.

## THAMES VALLEY CATFISH AREA GROUP

Open Show: **Sunday 18 November**, featuring the A of A Superbowl Final. Venue: Amersham Village Hall.

Benching: from 10 am. December Meeting: **Sunday 2 December**. Speakers: Dave Caesar and Malcolm Goss. Venue: Amersham Community Centre. Start: 2 pm.

Both halls are in Amersham-on-the-Hill, Bucks. Canteen facilities will be available at both venues. For further details, contact Malcolm Goss (Chairman), 25 The Gowers, Chestnut Lane, Amersham-on-the-Hill, Bucks.

# News from the societies

## TORBAY NAME CHANGE

The Torbay Aquarist Society will forthwith be known as the Torbay Aquarists and Fishkeepers. The new venue for meetings (held on the second and fourth Tuesdays of the month, starting at 7.45 pm) is: Hookhills Community Centre, Freshwater Drive, Paignton. For further details, contact E P Beck (Secretary), 67 Upton Road, Upton, Torquay, TQ1 4AJ. Tel 0803 311748.

## NORTHERN GOLDFISH AND PONDKEEPERS SOCIETY

Owing to the unprecedented increase in membership over the past few months, the N.G.P.S. committee have had to "close the book on new members". Therefore, until further notice, only postal membership of the society will be available.

To quote from the letter received at the A & P offices: "This is NOT, repeat, NOT a joke. It is the result of an all-out effort to recruit new members, that exceeded our wildest expectations in its effectiveness... this news may be hard to accept in these days of dwindling attendances...".

Further information available from Alan Evans (P.R.O.), 15 Blenheim Close, Hollins, Bury, BL9 8BY.

## PERSONAL TRIBUTE TO JOAN BEATTIE

Trying to remember and piece together dates from memory is never easy, but it must have been around 1980/81 I first came into contact with the Beatties, on the lead-up to the first National Show hosted by the Northants Section, Koi '83. Mr Beattie first spoke to me at Society Committee Meetings, and we had more contact at subsequent meetings. There then came more and more casual meetings, e.g., bumping into each other when the Essex Section hosted the National Koi '85. Throughout 1985/86 Mr Beattie and I became more and more friendly.

Some time in 1983/84 I was allowed to call Mr Beattie, John; it was around 1986/87. Along with Mr John Phipps, we formed the first National Show Committee. It was at these meetings and others that I came across Mrs Beattie, later to become just Joan; don't ask me how or why, I'm not sure anyone can explain how, why, when or where we became friends. Carol and I could sense there was something different.

They would come away for weekends, so all four of us could work for the Society. We were invited to many private gatherings, and it came as quite a surprise to see the close relationship with the Northants Section and the Wine Circle, each attending the other's get-togethers. It was an honour to

become a part of it. All through the build-up to the National Shows, John would drive eight to ten workers up to their house, where Joan would provide breakfast.

Carol and I were invited to stay, sometimes overnight, sometimes weekends, so the relationship grew.

All four of us have been to every Dealer Show for the Society and, of course, their dinner/dances. It was at one of these dinner/dances that Joan had a chap all over her. Thinking she had had enough, I went over to do an "Excuse Me". When I got over to them, Joan said to the chap, "Have you met my son?". Joan always repeated things twice, and so I became, "My Son, My Son".

The four of us flew the flag at Birmingham NEC when invited by the F.B.A.S. and we had all accepted the invite from the same body to go to the Weston-super-Mare event at the end of the year. I don't know what I shall be doing now. One thing's for sure; Carol's (and my) life will not be the same.

Joan found out my love for grapes, so every time we stayed there, there would be a bowl of grapes by the bed. Actually, the week of the build-up to the National Show, I stayed with John as much as I could. The first night, there were grapes by the bed; they could have been John's, I don't know, but every night I stayed, he would say, "Don't forget your grapes".

On Sunday 5 August 1990, Joan was admitted into hospital in Oxford. On Monday 6

August 1990, she underwent an operation, an operation she impressed on everyone around her would have her running, jumping and skipping. Since then, I've received a couple of notes left by Joan which convince me she knew she was on her way. At 10.30 pm Monday John phoned to say that the operation was very tricky and that the next 12 to 24 hours would be very critical. Some time between then and 3.15 am on Tuesday 7 August 1990 Joan Beattie died.

On Sunday 11 August 1990, the society held its 20th Anniversary Dinner/Dance. It was a proud moment for me to be Chairman at this moment in the society's history. It also gave me an opportunity to pay my own tribute to Joan. In the event, I broke down and messed it up, but I tried. So, for all people in or out of this hobby, and readers of *Aquarist & Pondkeeper* who have always supported the B.K.K.S. and its National Shows, this was, and is, my tribute to Joan Beattie (Hon Life Member).

Tony West  
B.K.K.S. Chairman

*Please submit items for these columns at least eight weeks prior to publication of relevant issue of A & P.*

# OUT AND ABOUT

## VIEW OF A CLASSIC WATER GARDEN

Barry James (Everglades Aquatic Nurseries)

(Photographs by the author)

Gloucestershire boasts many beautiful gardens, the biggest of which is probably Hidcote Manor which receives thousands of visitors a year. However, in the course of my business, I get to visit many smaller, but no less enchanting, examples of the landscaper's work.

Recently, on the invitation of the owner, I dropped in at **Abbotswood House**, an imposing mansion on the outskirts of Stow-on-the-Wold. Set in the rolling Cotswold hills, the place is impressive to say the least.

The multi-storey building was designed in the latter half of the 19th century by Edwin Lutyens. The gardens to the front and on one side are typically Lutyens. Laid out in formal style, the walled lawn is in a series of terraces with herbaceous borders, rose beds and a huge rectangular pool, classical statuary and a gazebo.

The planting of the pool follows the formal lines, with vast circular plantings of water lilies and marginal beds of *Iris kaempferi*. Another rectangular pool is found adjoining the west wing.

A ploy used by Lutyens in other famous estates is used here to equally telling effect. The pool is fed from a spring cunningly situated in an arched recess in the wall of the house. This pool, too, is planted with water lilies, including James Brydon, Mrs Richmond and 'Marliaceae Chromatella'. Gorgeous clumps of *Iris kaempferi* of the large-flowered Higo strain are interspersed with *Iris laevigata*, *Lobelia cardinalis* and other marginals.

The gardens to the rear of the house are the work of the other designer with whom Lutyens often collaborated, the incredible Gertrude Jekyll. The landscape here is informal, taking advantage of the gentle slope of the land.

The soil is derived from the Oolitic Limestone rocks which



The spectacular rectangular pool at Abbotswood House.



The upper stream — part of Gertrude Jekyll's impressive informal design.

influence the Cotswold landscape. However, earlier owners spared no expense in making the soil suitable for ericaceous subjects. Thousands of tons of soil were removed and replaced with peat so that rhododendrons, heathers and camellias can flourish.

Running down the hill for hundreds of yards is a meandering stream interspersed at intervals by rock-edged pools. The pace of the water is cunningly varied, from placid streams to thundering waterfalls.

At one point, the stream flows through a beech wood, where full advantage is taken of the rich humatic soil and

humidity. Lush plantings of ferns, bamboos and other shade-tolerant species are exploited. Higher up the bank, the water flows through a series of marginal plantings. Heathers give way to dwarf Asters which are followed by Hostas and Astilbes, in turn, succeeded by Bog Primulas of which *P. florindae*, the Giant Cowslip, was much in evidence at the time of my visit.

American Skunk Cabbage (*Lysichiton americanum*), *Ligularia* in variety, *Peltiphyllum peltatum*, Rheums and Rodgersias dominated the banks of an area of rock gardens and small trees and shrubs. The aquatic flora,

as with most spring-fed streams, was non-existent, apart from clumps of *Fossilsalis* (Willow Moss) which clung to the stones.

The man responsible for maintaining the several acres which make up the garden part of the estate is **Dennis Smalley**, an incredible man who knows every one of the hundreds of species under his care. His small team of full- and part-time helpers work incredibly hard to maintain this garden in its pristine condition.

All the pools and streams are fed by a spring, which supplies thousands of gallons per hour into the complex series of pipes that maintain a constant water level in all the water gardens, winter and summer.

Everywhere I went the pools were crystal clear, with no trace of algae or detritus. On enquiring how this was achieved I got a heck of a shock. Apparently, the pools are emptied and scrubbed twice a year. A mixture of copper sulphate and bleach is then added to the spring water at source and this flows through the system, killing off the algae and bleaching the concrete as it passes.

Dennis freely admits that these chemicals are added on an 'ad hoc' basis based on years of experience. Apart from the water lilies being slightly stunted in their growth, there seemed to be no other harmful effects. However, I have just stocked many of the pools with fish and whether they can tolerate the chemicals as well as the plants, remains to be seen.

Abbotswood was a truly stunning experience for me and I shall return as often as I can to learn as much as I can of the skills which have gone into its make-up. I believe the gardens are open for a few days a year to the general public in aid of charity, so any reader who can manage a visit will be in for a treat.

★★★★★★★★★★★★

# NORTHERN IRELAND AQUARIUM

Billy Whiteside

(Photographs by the author)

Having visited the public aquaria at London, Amsterdam, New York, Monterey, San Francisco and Hong Kong led me to make a return visit to the Northern Ireland Aquarium — which is situated at Portaferry, on the County Down coast, in Northern Ireland.

Portaferry stands on Strangford Lough, an interesting stretch of water where an exceptionally wide range of animal and plant life can be found in the marine habitat. The coast of Northern Ireland has numbers of fiords round it and, in many cases, the word has become shortened to "ford"; hence, Strangford presumably means "strange fiord". An interesting addition to a visit to the aquarium is to cross Strangford Lough on the car ferry. The drive-on/drive-off ferry makes the crossing in only a few minutes and the cost is low for a car and passengers. The aquarium can also be reached by driving around the lough. (Incidentally, in Northern Ireland we pronounce "lough" as if it begins with "law" and ends with a guttural hiss in the throat. We don't say "lough" as in "door lock". Ditto with the composer "Bach", who tends to be pronounced "back" in England.)

In my student days in Belfast I was required to spend residential periods at the Queen's University Marine Biology Station at Portaferry, where my student friends and I did quite a lot of work on the flora and fauna of Strangford Lough. Part of the time was spent on a boat in the lough catching everything from plankton to scallops, and returning to study relevant material under the microscope. A splendid zoology lecturer also introduced us to the pleasures of boiled scallops as a seafood.

The Northern Ireland Aquarium building was erected only a couple of years ago and is, thus, the newest public aquarium I have visited. It is also the smallest. In the foyer, is a well-mounted dry-display area which includes a life-size model of a Basking Shark. Disappointingly, there were no live sharks in the display inside — and



A large model of a Basking Shark welcomes visitors to the Northern Ireland Aquarium.

sharks are the marine creatures that will attract and stop visitors of any age in a public aquarium. (Whales come a close second.)

The Northern Ireland Aquarium contains several smallish display tanks and a number of the size seen in the average fish house. There is also a round, central, open-topped aquarium housing species such as starfish, rays, plaice and scallops. This type of touch-tank is now popular in public aquaria and enables young children actually to touch the creatures on exhibition. I'm not too sure about the morality of, or the educational benefit to be gained from, touching the limited range of creatures that can be kept alive for a period in such tanks. A study of rockpool life on a shore would probably be much more educational and would provide a wider view of the marine environment. However, not everyone has access to a local beach, and primary school children certainly enjoy poking/touching marine creatures that don't threaten them.

The Portaferry Aquarium is geared towards such young children, and a member of staff there can provide an instructional talk to visiting parties of school children.

Species of animals on display included Pollack, Dahlia Anemone, Common Starfish, dogfish, dogfish eggs, lobster, plaice and Grey Mullet. I was most taken by a large, sturdy fish that I took to be a monkfish. Unfortunately, the identifica-



An attractive — and very healthy — Dahlia Anemone at Portaferry's N. I. Aquarium.

tion labels on some of the tanks did not list all the species on display.

Admission prices to the aquarium are: adults, £1.20; under-16, 60p; family, £3; and senior citizens, disabled and unemployed people, 60p. One could probably see all that's to be seen in a half-hour.

In the summer months some hundreds of seals can be seen in Strangford Lough, and there is also plenty of bird life in the area. No leaflets about the aquarium were available when I visited with a school party.

The Northern Ireland Aquarium is open from 10 am-6 pm, Monday to Saturday, and 1-6 pm on Sunday.

I can recommend a trip to the Northern Ireland Aquarium because, as well as visiting the aquarium itself, one can take in the beauties of Strangford Lough in particular, and of the surrounding areas in general. This peaceful and pleasant area of the UK is well worth a visit, especially if there are children in the party.

Continued on page 82

# Letters

## IS THERE A CASE AGAINST FISHKEEPING?

Fishkeeping as a hobby is inseparably linked with the ornamental fish industry.

When Ornamental Fish Industry UK was formed, it opened its membership to individual hobbyists and fish clubs in addition to trade members. This action met with some suspicion and possible distrust in many quarters.

Why should the trade and the hobbyist work close together in one organisation? What were they up to? Inevitably, stories began to unfold and, of course, some sceptical individuals felt it was possibly a way that some people in the trade were seeking to try to control the whole business of aquatics, using the hobbyist as a pawn in some secret attempt to gain a commercial advantage.

In fact, as in so many cases, quite the opposite was true. There wasn't, and isn't, any intent to compete, to take over anyone or anything. It is a genuine attempt to work together to protect our common interest. The effort is to reinforce the continued existence and growth of the aquatic hobby.

The truth is that we all need each other. The recent (October) editorial in *Aquarist & Pondkeeper* and leader article in *TFH* may at long last convince people that the message put forward over the last few years by OFI was not a case of crying wolf, but in fact, was an early warning that all was not well.

What the hobby and trade need is a strong and co-ordinated voice to counter the negative things that appear in the press and media.

To be effective in this objective we need three things:

- 1 We need to co-ordinate the huge numbers of ordinary people who enjoy fishkeeping, hand in hand with the trade who earn their livelihoods in the industry;
- 2 We need to generate substantial funds to take the necessary action;
- 3 We all need to understand each other so that we can pursue a uniform, constructive path of

lobbying the press, the various agencies, MPs, and any other body who can have influence.

Thirty to forty species of fish would be totally unacceptable to all of us. We have to resist such rubbish with all our might.

So let us examine the potential problems. Who is creating them and where are they coming from? There are FIVE main groups of 'ANTI-BODIES':

- 1 Official bodies with the power of law to their hands;
- 2 Welfare groups who command very forceful powers of influence;
- 3 Green groups who are extremely influential;
- 4 Other trade and hobby associations who may harbour different viewpoints;
- 5 The fanatics who act, rather than talk.

All these groups are opposed to some part of our hobby or trade interest in some way, with views and powers detrimental to our own interest. All are well connected. All are very substantially financed.

Our collective task is to promote the fact that fishkeeping is desirable, that it is a respectable hobby with strong emotional and cultural values.

To reinforce the size of the task, here is a list of how the various groups are made up:

### Government Agencies

Ministry of Agriculture, Fisheries & Food. Department of the Environment. Local Authorities. Water Authorities. EEC Commission. European Parliament. Convention on the International Trade in Endangered Species.

### Welfare Groups

RSPCA. World Wildlife Fund For Nature.

### Green Groups

World Conservation Monitoring Centre. Environmental Investigation Agency. Economic Monitoring Unit. Group for the Protection of Nature.

### Other Trade and Hobby Associations

National Farmers Union. Salmon and trout farming interest. Angling associations.

### Others

Animal Rights Movement. The list goes on and on. It is without doubt a very formid-

able list and a matter of concern to everyone who cares about fishkeeping.

Not all the groups should be seen as enemies; some can be beneficial in the right circumstances. It is a matter of being aware which direction each group is following. In many cases, there are conflicting views and objectives being pursued, some which can be used to our advantage.

We have to pick a course between them; one which is in the best interest of the whole concept of fishkeeping; a course which consolidates our right as individuals to keep fish as a part of our cultural heritage.

Hobbyists love and care for fish; their dedication and commitment is a matter that some of the 'Anti-bodies' neither understand, nor wish to.

We have to persuade and negotiate with the decision makers; we have to convince them that fishkeeping is not simply a nice idea, nor a novelty or a status symbol.

Fishkeeping is a serious creative hobby, educational in itself; one that develops skills and close involvement in animal husbandry, while providing many benefits, much pleasure and contentment for a significant proportion of the general public.

The very existence of the fishkeeping hobby has been responsible for the extension and conservation of many species of fish which otherwise would have disappeared long ago. Just take Swordtails, Platies and Guppies as examples. In some instances, certain fish would never ever have been discovered or known to civilised mankind had it not been for the serious interest and concern of the fish hobbyist.

It is the destruction of the habitat that makes fish extinct, not collecting itself. Fishkeeping brings people close to nature without decimating any of the natural sustainable sources; it focuses the hobbyists' attention on the real issues such as whales and dolphins; animals under real threat. Fishkeepers are caring people with a genuine interest in conservation.

We are going to have to fight

hard to be heard. Above all, we must ensure that the interests of fishkeeping are judged fairly.

To achieve fair, logical judgment, it's got to be made clear that 95% of all ornamental fish are freshwater and do not originate from the sea and that 92% of freshwater ornamental fish are farm-reared and do not deplete any natural resource. We understand that, but it is a fact that anyone not connected with fishkeeping does not!

The hobby of fishkeeping is not depleting the oceans of the world. We must ensure that this message penetrates to the very heart of the matter.

The oceans of the world are of major public concern. Misunderstanding and Misrepresentation are bringing the hobby of ornamental fishkeeping under the microscope unfairly.

OFI UK  
(Publicity Dept)

## FESTIVAL GOOD WISHES

We would like to extend Interpet and the F.B.A.S. our best wishes for a very successful weekend at the **Supreme Festival of Fishkeeping** to be held at Weston-super-Mare later on this month.

Mid-Sussex A.S. hope that the latest event turns out to be as successful as the **Festival of Fishkeeping** at Brighton in 1988 which we were proud to host with Interpet Ltd.

Mid-Sussex A.S. have, at present, 26 members and families booked into Weston-super-Mare. We are looking forward to meeting old and new friends of the fishkeeping hobby.

J. A. Smith  
Chairman  
Mid-Sussex A.S.

## USELESS WORDS

I wish your writers would refrain from using the words, "small, medium, and large" when describing gardens and pools.

These words are meaningless. Approximate dimensions are much more useful.

J. E. Thomas  
Romford  
Essex

## ECOLOGY WINS ALL AT SAF '90

Dr David Ford  
(Senior Consultant to 'Aquarian')

The 18th Scottish Aquarist Festival was held, as always, at the Motherwell Leisure Centre. However, this year it was moved from its traditional time of May, to September. Every year it clashed with both the Scottish and English Cup Finals, so it was hoped that a booking later in the year would improve the number of visitors. Unfortunately, it didn't. Saturday, 1 September, was very quiet, but a wet Sunday helped bring in the families.

At £1.50 adults and 50p children, with free parking and brochure, SAF is very good value. Eight traders and 16 tableaux were on show in the large hall and annexe, with a Tombola stall and a day-long bar.

The winning tableaux all had an ecological theme. First was *Scorpion A.S.* with a greenhouse dedicated to information about the greenhouse effect. The *Hobby Centre A.S.* showed a 'Total Doomsday Box' with the story of the destruction of the rainforests, with models in miniature of factories in the jungle. Third was *Larkhall & D.A.S.* with 'Water Pollution Control', a display about the poisoning of water by litter and industrial waste.

The other tableaux included a house — with fish in the windows — by *Greenock & D.A.S.*, a piano by *SLAG (Southern Livebearers Aquatic Group)*, a juggling clown by *Cumbernauld A.S.*, 'Handle with Care' shipping crate by *Alexandre & D.A.S.*, *Edinburgh A.S.* built a pyramid on their show tanks, while *Tess A.S.* had a strong box, *Oban A.S.* had a collection box for the WWF's 'Save a Tree' campaign, and the 'Endangered Species' book was presented by *Glanford A.S.* (this came 4th, another ecology theme), the *Scottish Aquarium Society* managed a black box and *St Andrews A.S.* had a large red omnibus *en route* to Motherwell.

*Taylor High School Ecology Club* showed a 'One World' theme with tropical fish in tree tops and a 'Water

Colours' scheme where a papered wall had water colour paintings, some of which were tropical aquaria. *DHSS (District of Hamilton Showing Society)* displayed a well-made boat, with fish on board.

Books and magazines were on sale at the *Aquarist & Pondkeeper* stand. *Hagen* were selling dry goods and two traders, *Belton Fish Farm* and *Arbroath Aquatic Supplies*, were selling live fish. There were also a cactus stall, security display by the police and a *MacMillan Cancer* stall, *Town and Country Flowers* and displays of tank building by *The Fish Tank Shop*. The advisory stands included *Viviparous (Derek Lambert)* with the *Livebearer Information Service* and yours truly on the 'Aquarian' Advisory Service.

The *Supreme Scottish Championship* was sponsored by *Belton Fish Farm* and the winner was *Keith Liddle* of *Dundee A.S.* with a lovely coloured *Anostomus ternetzi*. Keith had also achieved 25 Best Fish awards this season, and so, received a special presentation from the SFAS. In fact, Keith has been first in the SFAS league table for the last four years!

Best in Show was a *Humpback Limia (Limia nigrofasciata)* owned by *Robert and Karen Kirkup* who also won Best Furnished Aquaria. Their society, *DHSS*, gained the most points.



Larkhall's 'Water Pollution Control' tableau — one of several ecologically-based entries at this year's Scottish Aquarist Festival.

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