

JUNE 1991

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# AQUARIST AND PONDKEEPER

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## EDITORIAL

### AND NOW FOR THE GOOD NEWS...

It can't have escaped anyone's notice (can it?) that, for a long time now, we've been discussing what the optimists among us call "fundamental challenges" (pessimists — or are they, actually, realists? — call them "problems") facing the aquatic industry.

Spring Viraemia of Carp (SVC), Angel Disease, threatened bans, Positive Lists, Negative Lists — they've all reared their heads at one time or other over the past few years. Whenever they've done so, individuals have, as is their right, expressed their views on these, and all manner of other subjects, in the pages of this magazine... and long may they continue to do so.

While all this has been going on, one organisation — in fact, the only organisation that can represent us in the corridors of power — has been beavering away, trying to fend off both perceived and actual attacks on our industry and hobby, gradually earning for itself a level of respectability within 'official' circles that was unheard of ten or so years ago. That organisation is, of course, Ornamental Fish International.

It is probably true to say — without being disparaging in any way whatsoever to other nationalities — that, during its history, some of the most dynamic members of OFI have been (and continue to be) British. It therefore came as no surprise to many of us when OFI (UK) was launched some eighteen months ago.

Since then, considerable progress has been made, but the task is not getting any easier. In fact, the very opposite is the case. And, as the workload escalates, so do the pressures on the nucleus of dedicated people on whom we've all come to depend. Yet, these same people also have businesses to run and livings to earn. On top of this, they are occasionally subjected to misguided, destructive 'accumulations of bovine faeces' (think about it!) from misinformed individuals, some of who have neither the guts nor determination to assume the mantle of responsibility that their 'targets' have so voluntarily accepted to ensure our very survival.

So where's the good news in all this? In two words: Keith Davenport.

Now turn to our Letters page where all will be revealed! My sincerest congratulations, both to OFI (UK) for their foresight, and to Keith Davenport on his key appointment.

John Dawes  
Editor

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# DUTCH LESSONS ON CLOGGED CANALS

What have the Dutch got that we haven't? We are referring to canals, of course! Jason Endfield has some suggestions

**R**ecently, I had the pleasure of spending some time in the Netherlands. As you may be aware, it is the most densely populated country in Europe, so, despite being a terrific place, rather than seeing windmills and tulips, one is more likely to see the charming Dutch people, usually accompanied by a bicycle. Holland, however, is famous for one or two other things — some unmentionable, the others being clogs and canals. It is the canals, and, indeed, what is in them, that I thought I'd talk about this month.

There is no escaping the fact that the Dutch canals I saw, even those in the smaller towns, were rather murky. They are still extremely attractive, though on a warm day the smell is less so, and much of the surface tends to be covered in a bright green slime, which if you'll excuse the pun, clogged them up completely.

Such was the green expanse of one canal that I had to agree with an Italian friend of mine who observed that, "It looks a mid-dow". And you know it did. Indeed, a rather unhappy bicycle stranded in the middle of this 'middow' suggested that at least one poor cyclist had also made this mistake (this served as a warning to other cyclists, though quite what happened to the owner of this bike remains a mystery!).

I began to compare these Dutch canals with the apparently clean canals I knew back home — none of which resembled middows... I mean meadows... in the slightest.

I was soon to discover the real difference between Dutch canals and those in England, though, because through the green slime, I could see fish — lots of them. This took me by surprise. How could fish survive in these murky waters? I realised by my incredible powers of deduction that these canals were not as polluted or unhealthy as they first appeared to be. Yet, the 'clean' canals in green and pleasant England (or, at least, the ones I know) are home to very few fish.

I was, by now, quite inquisitive, so I stopped a friendly Dutchman to ask some questions. He didn't speak English, so I smiled, then went to ask another. Primarily, I wondered if the fish were placed there, as they are in many of Britain's waterways, to keep stocks high for anglers.

I received two answers in one go from my knowledgeable Dutch friend. These fish, it seemed, were by no means introduced, but very much at home in the canals — mainly because angling is prohibited. And sure enough, there wasn't a single angler to be seen. But what bothered me most was why



British canals are often so 'dead', while theirs, in a more densely populated and industrialised country, were so alive.

Alas, the Dutchman couldn't help me with this one, but my Sherlock Holmes instincts came to the fore once again. British canals and waterways (though I can only speak for the north of England where I live), have fallen victim to industry. They have been providing a convenient outlet for industrial waste for decades. Large companies that should know better, have been discreetly pouring thousands of gallons of pollutants into our canals and rivers for years, and it seems that they have made a great success of destroying our native aquatic life.

True, British canals have always been intended for transport purposes, whereas Dutch waterways were designed for the more natural draining of land, but even in the larger Dutch cities, where industry and nature live in close proximity, and where boatloads of tourists cruise the canals, fish abound. And you just try to find a single piece of litter floating in the water (besides a bicycle, that is!). No, it would appear that we

Brits have a strange attitude. The theme seems to be: "abuse now, conserve later", when it's often too late.

The Netherlands has its problems, like every civilised country, but nature and industry there live, albeit perilously, side by side with respect for each other. In fact, the Dutch, it seems, have a better perspective on wildlife than we do generally. Anyone intending to fish there will find quite strict regulations. Fishing passes are obligatory and permission must be sought from the water's owner. This system, which from what I have seen, is far better enforced than UK regulations, has led to an abundance of fish that is there for all to see. The fact that the Netherlands still has Wild Boar must surely add weight to the fact that conservation is higher on their list of priorities than it is on ours (when did you last see a Wild Boar in Britain...?).

As for Dutch fish, well they seem to have the best of everything. They have complete freedom of the country's waterways, they are safe from anglers, and as long as they're not herring, which these obviously were not (the fish I saw were mainly Roach), then there's not much chance of them ending up on the dinner table. And tell me, where else can one see fishes frolicking in the 'middows'?

So, I demand equal rights for British fish! Let's clean up our canals, and let's keep them clean. We can work together with industry to bring life back to Britain's waterways — it can be done; they've proved it in the Netherlands. For goodness sake, if we can't get our canals as healthy, if not healthier than theirs, then I'm a Dutchman... if you see what I mean...



## COVER STORY — ORANDA

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



**C**arassius auratus, the Goldfish, is reported to be the most popular pet in the world. That's not bad going for a species that is 'bald' (scaleless head), has no teeth and lacks a stomach!

The tremendous popularity of the Goldfish arises, not as a result of these unusual features, and not just from the sleek, uncomplicated lines of the Common Goldfish (the strong favourite among many long-established aquarists and pondkeepers), but also from the highly developed so-called 'man-made' varieties that have arisen over the years, and still continue to do so today.

Of the over 100 varieties which are recognised worldwide, the one depicted on our front cover, the Oranda, is, without doubt, one of the best-loved of all because of its attractive finnage, colour variations and unmistakable, impressive hood growth. Orandas are ideal fish for roomy, well-filtered aquaria, and should only be kept in ponds in countries that do not experience harsh winters.

## COMPETITION WINNERS EVERGLADES PLANT COMPETITION

We had nine lucky winners in our Everglades Plant Competition (April '91 issue of *A & P*)

FIRST PRIZE	John Green (Stoke-on-Trent)
SECOND PRIZES	(i) Nigel Carr (London, SW20) (ii) Mark Pearce (London, SW11)
THIRD PRIZES	(i) Jack Penley-Martin (Diss) (ii) Garry Smith (Norwich)
FOURTH PRIZE	John Farrow (Swindon)
CONSOLATION PRIZES	(i) Damian Cotterell (Willesley) (ii) Anne Bell (Sheffield) (iii) David Brook (Leeds)

Congratulations to all our winners, and a sincere vote of thanks to Barry James of Everglades Aquatic Nurseries for sponsoring the competition.



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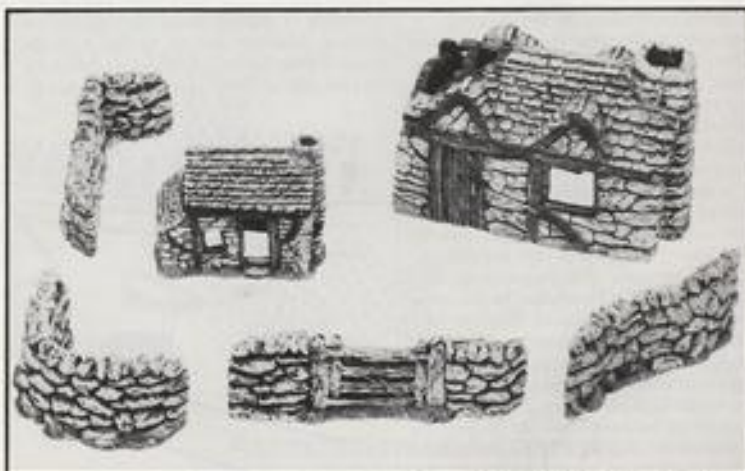
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**SW4** A selection of stone walls  
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for above

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cottage — (Length 27 cms)

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# Koi Calendar



## By David Twigg

Last month I mentioned Blanketweed and asked what could be done with it. An early comment received was from my wife, Lyn, who said she has heard that Blanketweed makes an excellent substitute for moss as used in hanging baskets! Apparently, it retains water and provides nourishment for the flowers in a way that is second to none. Well, what do you know? Any other ideas?

Another point raised by a reader was the difference between 'English' and 'Japanese' style shows. Briefly, the English style is when each entrant is allocated his/her own vat and the judges move around the vats to judge the fish. The Japanese method is one where the fish are moved from vat to vat as they progress successfully through the judging rounds. In this way the (say) 3 best fish in the show all end up in the same vat together.

## JOB OF THE MONTH

If your Koi haven't spawned yet, and some do, I am told, as early as April or May, then maybe you ought to consider preparing for this event. The main requirement for spawning is something for the female to lay her eggs upon.

Those acquainted with me will know that I am a great believer in Blanketweed being allowed to grow on the walls of my pond. I keep the bottom (fairly!) clean, but permit a growth of weed approx 15 cms (6in) to become established on the sides. Apart from giving

Koi something to spawn on, this growth of weed provides the cheapest food I know and acts as a good buffer between female and pond wall when the spawning frenzy starts, thus minimising damage to my fish.

Anyway, off my hobby horse and back to spawning! If you are one of those (un?)fortunate people who don't suffer the Blanketweed problem, you have to take a different line. There is a wide variety of spawning ropes on the market and I (belt and braces) place these into my pond at about this time of the year, the idea being that my fish become accustomed to them being there. Reference to those inevitable records of mine show spawning took place on 17 June last year and 30 June, with a second spell on 27 July in 1989. Water temperature on each occasion was greater than 21.3°C (70.3°F) and less than 22.7°C (72.9°F). That may or may not be the most significant factor. The June dates were just either side of the longest day and on none of those occasions did it rain (thought by some to start the process rolling).

## WHAT'S ON IN JUNE

### 1 Shows

Six shows this month; at least one each weekend, and spoilt for choice!

1/2 — Yorkshire Section BKKS English Style Open Show at Lotherton Hall, Aberford, Nr Leeds. This is a show of Koi and crafts and, going by last year's attendance of over 6,000 people, must be one of the largest in the country. All 20 expected Koi dealers and the craft stalls will be housed in marquees, and the organisers have arranged the usual bar and refreshment tent, ice cream vans, a Jumping Castle for the children and First Aid by St John's Ambulance Brigade. Show is open 10 am 'til 5.30 pm on Saturday and Sunday. For further details contact Sue Hill on 0226 743891.

2 — Lower Thames-side Section BKKS English Style Open Show at Eastwood Primary School (just off A127, Kent Elms Corner). 15 Koi dealers for the mums and dads, and a

Bouncy Castle for the children. A tombola, raffle and soft drink refreshments are also in this 'all-undercover' show. Contact Albert Radley on 0702 529675.

9 — Middlesex & Surrey Borders Section BKKS English Style Open Show at Hampton Football Club, "The Beveree", Beaver Close, Station Road, Hampton, Middlesex. The showground is close to BR station and local buses. Apart from the Koi dealers and craft stands, refreshments, bar and bar-b-que will be available. Ample car parking is provided. For further details and entry forms contact Steve Gould on 0932 848147.

15/16 — East Pennine Section BKKS English Style Open Show at Green Lane Farm, Tankersley Lane, Hoyland Common, Barnsley (off M1 junction 36). Although attended by over 6,500 people last year, the organisers plan that this year's event will be the best yet. Several large marquees will be erected to house some of the country's leading Koi dealers. Apart from Koi and associated accessories, there will be bonsai and arts and crafts stalls. Many other attractions, including helicopter rides, should make this a good time for all the family. For those interested in entering, Koi benching is from 5 pm until 9 pm on Friday 14, and 9 am until 12 noon on Saturday. Further details from George Money on 0226 756498.

22/23 — Lea Valley & Harlow Section BKKS Closed Show. Van Hage's Garden Centre, Ware, Herts. Another show catering for all the family. Train rides or a visit to the Mini Zoo are possible. Contact chairman on 081 5085155.

29/30 — Northern Section BKKS English Style 18th Open Show, Tatton Park, Knutsford, Cheshire. Tatton Park is a National Trust property and houses one of the finest stately homes in England, together with a superb Japanese garden, and is set in many hundreds of

acres of parkland. The Northern Section BKKS staged the first Open Koi Show in England way back in 1972 in Bury. Things have moved on since then, with the 2-day show attracting up to 20 Koi dealers (10 confirmed at time of writing). This Koi show always attracts an entry of, and I quote Chairman Tony McCann, "some of the finest 'mind blowing' Koi in the country, as well as the more budget priced treasures of many other Koi-keepers who are proud to bring them to a well run and well respected Show". The family and non-Koi-keepers are also well catered for by a splendid Craft Fair with a wide variety of local and traditional crafts, such as pottery, woodwork, lace making, and jewellery making being exhibited. Although the Northern Section have booked the sun for these last two days of June, I am told that all dealers and craft workers are to be housed in marquees. To make your visit complete, a refreshment and beer tent, Kiddies Fair and Giant Jumping Castle are provided. Further details from Tony McCann on 061 794 1958.

### 2 Meetings etc.

6 — Middlesex & Surrey Borders Section BKKS. Guest Speaker, Ian Watson on *Carp nutrition*. Contact Steve Gould on 0932 848147.

9 — Northern Section BKKS. Monthly meeting, Salford. Contact Tony McCann on 061 794 1958.

19 — Crouch Valley Section BKKS. Allan Rogers, Chairman BKKS Judging & Standards Committee leads an illustrated discussion on Koi appreciation, exhibition and judging. Meeting in Laindon, Basildon, Essex. Contact Allan Ward on 0268 543600.

19 — Mid-Staffs Section BKKS. Monthly meeting at R.N.A. Club, Elmore Green Road, Bloxwich. Contact Joan Rutter on 0543 876699.

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# Seaview

By Gordon Kay



## E.E.C. UPDATE

Another cornucopia this month, but first, an apology. Last month, I promised to let you know the outcome of the EEC Wildlife Trade Regulations meeting which was scheduled for 12 March. Unfortunately, absolutely nothing has filtered through to Britain yet (at least, not before we go to press), except for a letter to Richard Sankey from the Philippine Fish Exporters' Association. The letter said that it was understood that there was a 'positive' list (a list of species which people WOULD be allowed to keep) of around thirty species — which had originated in Germany — currently in circulation in this country.

Some of us have been aware of this list for some time — although no-one has ever seen it, let alone studied it! — so nothing was new. I do know, however, that the list (allegedly) contains 'cultured' species, that is, species which do not occur in the wild. As such, it contains seven or eight members of the goldfish family and, would you believe it, no marines. Rest assured — when I know, you'll know.

## CENTRE-PAGE DOLPHINS

Did any of you see the centre-page in the Mail on Sunday — on 24 March — about Missie and Silver, the two dolphins from Brighton, in their new home with Rocky? Absolutely terrific stuff!

I also received a newsletter from 'Into the Blue' the very next day. I read the print off both during the following

weeks — it really does look as though the whole thing is going to work. Wonderful! You will never know how happy this makes me. Incidentally, I shall be going up to Amble to see Freddy the resident dolphin soon. I'll tell you about that, if I can, in the near future.

## SEASCOPE SUCCESSES

SeaScope, the freebie from Aquarium Systems USA, carried two very encouraging articles in its winter '91 issue about captive breeding. The first told of work done with the Atlantic Spadefish (*Chaetodipterus fuber*) — which is the only Caribbean representative of the Batfish family — at Tulsa Zoo. The parents are housed in a 9.5 metre (31-2ft) long, 40,000 litre (c8,900 gal) aquarium filled with — you've guessed it — Instant Ocean (well, fair play, it is their magazine).



Clams are now being bred in captivity in Palau (see SeaScope Successes for further details).

What really impressed me was the amount of ingenuity, not to say engineering, that went into the project. To test the theory that most pelagic egg-layers spawn at dusk, the zoo simulated dusk-like conditions and, because the fish would be doing their stuff when everyone had gone home, invented a simple egg collector. This was achieved using a powerhead in conjunction with a sponge filter and proved extremely effective. The number of spadefish eggs collected each night varied between two and two hundred, but that possibly says more about the egg collector than it does about the fecundity of spadefish.

Wait a minute; I'm telling you the story here! You'll have to get hold of a copy of

SeaScope to get the full gen. Suffice to say that they have succeeded in raising eight batches to the juvenile stage so far.

In the same issue was a story about the culture of *Tridacna* clams at the Micronesian Mariculture Demonstration Centre in Palau. The centre has been successful in raising all seven *Tridacnid* species and has developed a unique method of rearing them. The main feature of their system is that the larvae are raised without any feeding. To achieve this, they start by stimulating mass spawnings in large groups of adult clams. The larvae are then inoculated with Zooxanthellae (symbiotic algae, essential to their livelihood), which — in the wild — 'infect' ciliate stage larvae and feed them naturally, with the aid of strong light and clear water, for the rest of their lives (just like anemones and corals).

Would you believe it, the

centre is producing tens of thousands of clams, and has over ten thousand adults 'in stock', allowing them to carry out genetic research? Brilliant, but as I said, you are going to have to get your hands on a SeaScope for the full story. Ask your dealer for a copy of the SeaScope, Winter 1991 issue.

## O.F.I. CIF LEVY

Ornamental Fish Industry (UK) held an Extraordinary General Meeting in Coventry during March, to discuss and vote on the proposal (presented by Keith Barraclough) that "... in order to raise sufficient finance so that the association can be professionally promoted and administered, a levy of 1% be charged on all fish and plants at

the time of import based on their CIF (carriage, insurance and freight) value as used for Customs purposes".

It was proposed that the freight agent/importer clearing the fishes/plants through Customs would calculate the levy and that OFI (UK) would then invoice separately. The proposal was carried unanimously and I couldn't be more pleased.

Admittedly, the fish will inevitably cost 4 to 5% more (by the time the wholesaler and then the retailer have both added their mark-up) but our hobby needs all the help it can get if it is to survive, and OFI (UK) are becoming a voice that is listened to. I'd be happy to pay an extra TEN% if it meant that I'd still be keeping fish in 2001!

## HOT-BLOODED TUNA

Did you know that tuna differ from all Teleosts in their ability to retain metabolic heat via a counter-current heat exchange system, which operates in their muscles and gills? Red muscle occurs in large proportions in tuna and this is highly vascular (well-supplied with blood vessels), so that the muscles are well supplied with oxygen and carbohydrate-enriched blood, enabling them to utilise a highly efficient, aerobic metabolism. This liberates energy to drive the muscle and heat, which is retained within the body by the counter-current heat exchange system.

In all other species, white muscle is present in large proportions. This has a very poor blood supply and carbohydrate is metabolised anaerobically, liberating just enough energy to drive the muscle. Still awake?

Fishes usually lose heat through their gills, but the tuna's heat exchanger ensures that metabolic heat is returned to the body. This means that the muscles operate at a higher temperature, helping the fish to achieve much higher speeds and allowing it to range much further north.

I'm afraid there's no room for Snippets again this time, but I will get back to them, perhaps, next month. Meanwhile, until the next time.

# Tomorrow's Aquarist

By David Sands



## ON GOLDEN POND

My request for some interesting 'pond' stories, or whatever, produced two complete opposites. The first, from Frank Dyson of Timperley, Altrincham in Cheshire, shows some of my readers have a super dry wit. He forwarded a photograph he had sneakily taken of Robert Williams, his next door neighbour, pondering over his pond.

Robert doesn't buy his own copy of the *Aquarist & Pondkeeper*, writes Frank, but borrows his, sometimes BEFORE he has read it himself...! It's a cheeky picture in more ways than one, not the least because Robert's trousers have strayed down a little as he crouched before his pond - watching and waiting for his fish to rise from wintry depths as per my comments.

Without doubt, Frank deserves his prize of a tub of Aquarian's new pond foodsticks, not only for his opportunism, but for his kindness allowing his bare-cheeked

neighbour a regular read of his *AQP*. And, who knows, as Frank writes at the end, maybe Robert will buy his own copy from now on!

The other beautiful letter which also wins a tub of Aquarian Pond Foodsticks, is from the five year old hand of Terri, from Sedgley, nr Dudley. Terri was in the throes of carrying the bricks for his dad as he builds a new pond... then we got the letter!

Not only is Terri my youngest-ever writer but, because I'd also like to christen Dad's new pond, I will send a big tub and a little tub of Aquarian pond food.

## ESCAPED YOUNG CONVICTS IN SCOTLAND

In March's edition of this column I explained that Miss Alison Ronald was struggling to obtain Convict Cichlids in Scotland. Well, Mr Ross from 68 Knockie Road, Turriff, in Aberdeenshire, has informed me that he has some golden albino forms and the normal-colour form Convicts, and that he would be only too happy to oblige, I hope Alison will drop Mr Ross a line (or call him).

I had another letter from Phil Hollings, aged 15, of 46 Vicar's Cross Road, Chester CH3 5NL, who would like an aquatic pen pal and would like to contact Louise Lilywhite, or the other way round!

Phil enjoyed a club lecture from Allan and Barbara Brown and took up Allan's suggestion that he should write an article. Phil's article is based on breeding the Dwarf Gourami. I thought it was excellent enough to win a prize which should be winging its way to him shortly.

## FISHY VETS

I would like to hear from any reader who has taken his/her fish to the vet. Did the vet respond well or did you feel the vet was not sure about the problem? Would you take a fish to the vet or would you hesitate? Has a vet ever visited your home to look at your pond or aquarium?

I would like to hear from any vets who consider themselves to be fish-minded so that I can keep a register and advise people to visit them when they have a problem with their fishes.

## CHILDREN AND FISH PHOTOGRAPHY TANKS DON'T MIX

I want you to picture this. I have set up a small tank in the back garden. Sand bottom, large boulder, sunshine beaming down, all in order to photograph one of my Peruvian catfishes.

Along comes the son, William Robert (I call him 'Atilla the Son') who, at 14 months old, shows more interest in fishes than I did in food at his age. Water changes are bad enough. Every bucket out has to be supervised by Robert, every bucket back in has to be poured with Robert's help! It makes water changes last two hours, instead of just half an hour.

Anyway, back to my story. I'm desperately trying to photograph this very shy and secretive catfish which does not want to be photographed in a month of Sundays... Suddenly along comes young Billy Bob, complete with fishing net (where on earth did he get it from??) and begins to 'fish around' into the tank.

So what, you might be thinking; let the youngster have his fun. I'm pulling my hair out as the glass streaks with

water and the catfish throws a star's wobbly and disappears under the stone.



'Atilla the Son' helping (?) Dad with his fish photography!

Then he grins, so I take his picture instead of the catfish's. Soon, it will be articles by Sands and Son. Do you have a young relative who just has to help in the fishy chores?

Tell me your story and I'll send something to everyone who writes in, with a special prize for the best letter.

## AND FINALLY

On a final point, if you want to have aquatic pen pals write to you, be sure to give your full name and address and I will try and add it into the column. I have been wondering if any of those who did express an interest in writing to other TA readers ever did so. Please let me know.

The first letter I wrote to a fish magazine appeared in Billy Whiteside's pages under the title of *What's Your Opinion?* I didn't always agree with his point of view (a school teacher's tone was always difficult for me) but I found the letters in his long-running column very lively (who can forget the episodes with parasites in liver??). I wish Billy much pleasure and success with his new series.

FOR NEXT  
MONTH'S HIGHLIGHTS  
SEE PAGE 114

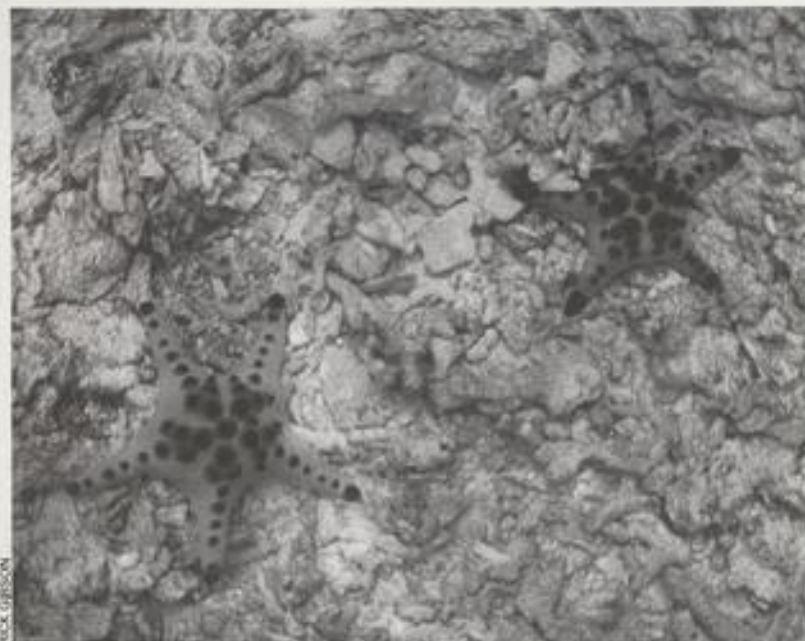


Robert Williams, caught 'pondering' by TA reader Frank Dyson.

# I AM A FRIEND OF THE EARTH ... AREN'T I? (Part 4)

Further forthright views from Underworlds' Dave Keeley in his analysis of the aquatic trade and hobby.

(Text based on a paper presented by Dave Keeley at the autumn 1990 seminar of the British Marine Aquarists' Association)



Chocolate Chip Starfish looking for a home among dynamited coral rubble on a Philippine reef.

**W**hat I have tried to do so far in this series is to list some of the attacks against my chosen trade, whether imagined or real, whether valid or scurrilous, which in any case cause me to feel under threat, and to look at the causes of my self doubts. It is very easy to become enmeshed by these thoughts, with a resultant negative outlook. On a more positive note, I think it would add balance to the argument if I were to look at some more, broader, views of conservation, including some more positive aspects of marine keeping. I will endeavour to do this in my next (and final) article. However, I would first like to discuss some of the 'other' factors that I referred to in Part 3 as affecting the 'health' of the world's coral reefs.

## THE PHILIPPINES

The Philippines are an obvious place to start, since they seem to encompass the whole range of ills which face the coral reefs. The Philippines consist of a large mass of widespread islands, some inhabited by

undernourished, barely literate peasants, whose number has doubled over the last twenty years. The country was, until recently, led by a dictator, whose rule was based upon personal greed and nepotism, leaving a legacy of ignorance, poverty and corruption with no room at any level for any environmental concerns.

There is little doubt that the aquarium trade within the Philippines is not without fault — the legacy of catching aquarium specimens by the use of dynamite and cyanide is well documented. But for a more balanced view point, it must be said that:

- a) much of the dynamiting was for food fish rather than for aquarium fish,
  - b) both these practices have been outlawed, if not completely eliminated, and
  - c) other destructive activities each appear, individually, to cause more damage to the reefs than collecting for aquaria.
- These other activities include:

**1** Large areas of deforestation for agricultural purposes, which has been necessitated by the dramatic population explosion in the Philippines. The deforestation has

resulted in land erosion and subsequent siltation of the river deltas, so that the inshore reefs are increasingly threatened with elimination.

**2** The doubling of the population, along with the political situation, has also resulted in massive food shortages, with the almost inevitable consequence of overfishing. As the numbers of fish get scarcer and more difficult to harvest, the peasants have to find new ways to gather the diminishing resources. This often means, besides the already mentioned dynamiting, both the accidental but uncaring destruction of the reefs by large weighted nets, as well as their deliberate destruction, as they are seen as the fishes' natural bolt hole, and thus a hindrance to catching the fish.

**3** Though the harvesting of, and trade in, coral heads has been illegal since 1977, container loads are still exported yearly. And, although I have to say that the aquarium trade in the UK has been mostly fairly responsible in its attitude to selling dead coral for aquarium decor in the last decade or so, a visit to any seaside town will soon reveal shops full of dead corals and shells. The curio trade seems to an outsider to have side-stepped any of these issues.

## SEA OF CORTEZ

It is very easy to point accusing fingers at Third World countries such as the Philippines, and somehow to half-ignore the problem because of its distance from 'civilisation.' But a glance through nature magazines shows that man seems intent on destroying habitats, even in our own backyards. I would like to quote from an article by marine photographer, Alex Kerstitch (published in *Freshwater and Marine Aquarium* in 1989), on the Sea of Cortez:

*"The Sea of Cortez, commonly known as the Gulf of California, is one of the richest marine environments on earth... This wealth of marine life has provided the Mexican economy with an important resource which has been heavily exploited by a well developed fishing industry. In the past 10 years there has been a decline in the abundance of marine animals. Sportfishes, turtles, bait-fish, some molluscs, even sharks, are becoming alarmingly scarce, and some severely threatened... Unless concerned efforts for combating illegal fishing practices in the Gulf are taken,*



and significant measures to properly manage its fisheries are adopted, the future of the Sea of Cortez as a producer of marine resources looks grim."

In this particular article, the author continues by listing abuses and illegal practices by the fishing industry, with the inevitable grim consequences, and finishes with a section on the shrimp boats. Again, I quote: "The commercial shrimp industry is a major economic resource which has steadily declined over the years due to its intensive fishing efforts. The number of shrimp boats is continually growing, thus dividing further the total declining shrimp yield between each vessel. The by-product of shrimp catches consists of large numbers of small fishes and invertebrates. For a few pounds of shrimp, hundreds of pounds of marine animals are destroyed. In the Gulf of Mexico alone, for example, over 1.5 billion pounds of fish a year are tossed through shrimp trawling operations. Along both coasts of the Gulf the inshore seabed is continually raked by hundreds of otter trawl nets each night. As a result, many of the once common bottom-dwelling organisms have virtually disappeared."

That is, 1.5 billion pounds, in weight, of waste!

### THE HOBBY AND THE TRADE

Back to our hobby now. I would next like to quote from an article published fairly recently in *Seascope*. It was written by Tom Frakes, editor of this publication.

"Over the past 30 years, the marine aquarium hobby has seen dramatic growth in size, diversity, and technology... With this growth has come the question of what effect continued collection of marine specimens will have on the delicate reef environments where most of the organisms are found.

"Marine hobbyists are sometimes made to feel guilty by elements in some of the environmental groups for the reported 'raping of the reefs'. Although there have been some instances of abuse due to cyanide collection, over-harvesting, and habitat destruction, in most areas the marine aquarium industry has played only a small part in the environmental degradation of the reefs. Other factors such as pollution and siltation due to over-population, dynamiting and other destructive food fishing methods, and coral collection for construction and curios have had far more serious consequences.

"Actually, the reef conservation goals of many of the environmental groups are embraced by responsible members of the marine aquarium industry as well. We must not lose sight of the fact that the growth in interest in public aquariums and the marine aquarium hobby significantly increase public awareness of reef ecology. Further, the technologies developed by marine aquarists constitute a major contribution to the scientific understanding of marine systems. Species that were virtually impossible to keep alive just 10 years ago are now routinely being cultured. New species are being spawned and bred. In short, the scientific understanding of marine tropical organisms has dramatically increased as a result of the efforts of marine aquarists.

"Still, our industry, from collector, to wholesaler, to dealer, to hobbyist, must behave responsibly if

we want to continue. Certain environmental and animal rights groups would prefer to see the collection and keeping of marine organisms stopped or severely limited. We do not want to let this happen as in Germany, where importation of Butterfly and Angelfishes was banned. The only way to defend our hobby is to eliminate the abuses and manage the collection and care of specimens professionally as a renewable fishery so that the supplies will continue indefinitely."

Tom Frakes then goes on to mention that at the Marine Aquarium Conference of North America held in Cleveland in April 1990, some protective measures were suggested. These included:

- 1) A boycott on the use of dead coral heads.
- 2) The idea of formulating a listing of fishes and invertebrates that should not be sold in the aquarium trade
- 3) Improved fishery management techniques so that over-exploitation will be avoided.
- 4) Work to improve the education of everyone in the industry, from collector to hobbyist, to eliminate unnecessary losses due to improper handling procedures.

Regarding species that are unsuitable, Tom Frakes proposes that a voluntary listing of unsuitable fishes needs to be developed and circulated so that hobbyists, shop owners, and importers can all be aware of which fishes and invertebrates to avoid. Included in that list would be:

- 1) endangered or threatened species;
- 2) dangerous organisms;
- 3) animals that do not survive in captivity due to dietary or other limitations.

These are the words of an American author employed in the trade. To me, it is remarkable how similar these comments are to those expressed by Dr Elizabeth Wood (see, for example, her article in the May issue

of *Aquarist & Pondkeeper*), an English writer, funded by a conservation group. It seems that the voices of calmed reason, even when standing seemingly poles apart, both geographically and politically, can come together to produce a sensible way forward.

Another point becomes apparent in Tom Frakes' article, and that is how the author places the trade and the hobby on an equal footing. I have been aware, at least in the UK, of a wide gulf between these two sectors, which makes no kind of sense. Traders and hobbyists are so interdependent, that it seems to me that the only progressive way forward is complete co-operation between the two sides.

Maybe I am talking too naively again, with what my wife calls my "60s hippy ideals". During my 20 years in the trade I have seen so many squabbles, not only between different factions, ie retailers, wholesalers, manufacturers and importers, but also between individual members of each faction. It is not an unfair comment to say that the history of even the BMAA, and indeed many of the other hobbyist bodies, have not exactly been roses, roses all the way, so it is probably totally unrealistic of me to expect future co-operation between all parties.

Yet, hobbyists are vitally important in the conservation debate. It has become very apparent from my research that the trade has many responsibilities to which it must aspire for the foreseeable future, if it is to survive, as outlined by both Elizabeth Wood and Tom Frakes. But since we are linking hobbyists and traders inexorably as one, I would like to hang three responsibilities on hobbyists, which I will broadly label:

- ① Education;
- ② Monitoring;
- ③ Breeding.

I will discuss these in the next instalment.  
**TO BE CONTINUED**



Even sharks are disappearing from the once-rich waters of the Sea of Cortez.

# Koi Talk

By John Cuvelier



## BLUHAKU MEMORIES

While I can't speak for the rest of you, it's going to take me, at any rate, some time to get over the shock of seeing Stephen Smith's Bluhaku decorating his *Coldwater Jottings* in the April issue! How could you do it to us, Stephen? Getting our hopes that, at last, we could custom-design our own Koi, decorated just as we wished. Oh well, I suppose that some fine day it WILL happen. At least, it would be better than nail varnish (yes, someone did do it once!)

That picture did bring back memories of one of the prettiest Koi we ever owned, a very colourful male which we bought from Transcontinental Goldfish Co. when they were at Shepley some 14 years ago. Patches of red and pale blue on a white background, most unusual and very rare. He was about 4 inches (10cm) in length when bought and over the years grew to perhaps 10 inches (25cm).

When the time came for us to move to Hereford, he, along with all his buddies, went into storage back with Lynne and Ian at Shepley where, unfortunately, he died before our new pool was completed. Lynne always felt that he simply pined away and, if you feel that's silly, just think of some of the characters in YOUR pool! I have never seen another Koi similarly coloured, but I'm always on the look-out.

## DUMMY HERON

Staying with tall stories, I've just heard a beauty. A Koi-

keeper was having trouble with herons (so what's new)? In desperation, he went out and bought one of the plastic varieties and stuck it near his pool. Sure enough, in due course, the real thing arrived and, after inspecting the dummy from a distance, approached it, and eventually he simply ignored it. After a few days, the real thing was observed trying to mate with the dummy!

Now, if you believe that, you'll believe anything, although the person concerned swears it really happened.

Mind you, our male tortoise continually used to try his luck with the dog's football, so I suppose anything's possible if the individuals are frustrated enough. Anyway, we seem to be approaching delicate territory, so a change of subject appears to be called for.

## ESSENTIAL PRE-FILTRATION

You've no doubt become aware in recent months of the appearance in the market place of various 'hi tech' filter media. Theoretically, whether it's sintered glass or some type of polymer material, they should all do a fabulous job in providing 'house room' for those friendly little bacteria which we all strive to encourage to grow in our filters, putting them to work converting the nasties into pure, clean water.

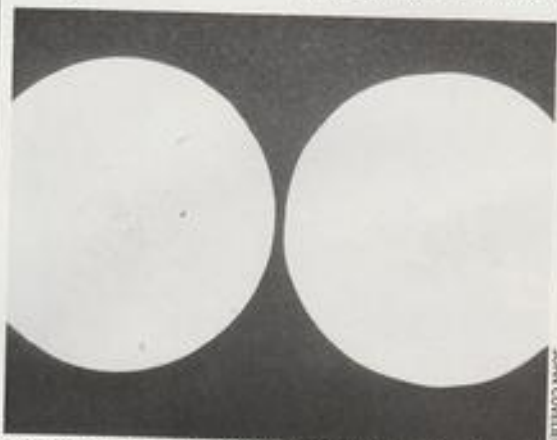
What I personally feel is understated in the advertising matter connected with these materials, is the great importance of correct pre-filtration when using these modern media. I'm prepared to stick my neck out in saying that, however effective the medium, unless the great majority of suspended solids are removed prior to biological filtration, it will eventually become clogged, leading to all kinds of difficulties. This removal does not merely concern the large 'lumps' of waste visible to the naked eye but, more importantly, the tiny invisible micron-sized particles. Filter bacteria work upon the CHEMICAL content in the water and do not care too much for the solid side of any input.

If you are not convinced

there is a problem, then I'd like to invite you to take a jug of unfiltered water from your settling chamber and allow it to trickle slowly through a laboratory filter paper for a couple of hours. In the absence of the real thing, a coffee filter paper is almost as good. I think you'll be surprised at the result. In some parts of the UK, a similar test carried out at the kitchen tap can be both revealing and worrying!

drum filled with hair rollers (illustrated in *Koi Talk* in the March issue) but nevertheless, there is still quite a build-up of sludge in the main chambers by the end of the season.

The accompanying picture shows the results of a test carried out on my pre-filter recently. The lefthand paper had half a gallon of raw pool water trickled through, while the righthand paper had the same but after pre-filtration.



Two filter papers subjected to different water samples. The pre-filtered water sample (on the right) shows a much lower concentration of suspended solids.

The choice of a pre-filtering system is fairly limited; either brushes or foam can be used, both requiring regular cleaning in order to prevent 'carryover' of suspended solids going around the barrier. The question of media blockage does not arise, of course, when large ring media, such as hair rollers, are used, but even so, pre-filtration is still essential to ensure correct biological operation.

One of the major stated advantages of the newer materials is that much lower volumes need to be employed because of their very high specific surface area. Another way of looking at this is that a much greater quantity of water (and suspended solids) is going to be passing through a smaller treatment area than was previously normal, hence the necessity for pre-filtration. My won set-up utilises one of those excellent Lotus foam blocks over the inlet of the filter feed, in addition to the old washing machine

Notice the dead mosquito larva among the junk. I think the picture proves my point!

## WELCOME ADDITION

David Twigg's new *Koi Calendar* is a welcome addition to our favourite mag, and I hope that many people will take up his offer to preview new products. The one thing I have missed since retirement hit me is the endless stream of manufacturers' literature which used to land on my desk.

Such things as Fibromix and Aquasol only saw the light of day on the hobby scene as a result of my perusal of trade magazines, and goodness only knows what other goodies have appeared on the scene since I cleared my desk for the last time! So many of the products used in the water industry have very useful applications within our own circle, and I feel certain there are many more just waiting to be discovered.

# FLORIDA'S CREAM OF

A & P editor John Dawes selects some of his favourites out of the 508 entries that constituted this year's outstanding Florida show.

(Photographs: Harry Grier/Florida Tropical Fish Farms Association)

I've never been particularly keen on albino fish. I have always found them interesting, of course, but, usually, that's about as far as I've gone. It now seems that I will have to qualify my views. Two stunning fish have seen to that.

## PRIZEWINNING ALBINOS

Both 'opinion changers' were prize-winners at this year's Florida Tropical Fish Farms Association show, held at the brand-new (and very expensive) Convention Centre in Tampa in March.

One, a *Pseudotropheus zebra* Cobalt Albino male produced by Schmalbach Aquaculture Inc., won the second prize in the Best New Freshwater Egglayer Variety category, being narrowly beaten by a superb *Labotropheus trewavasse* Red from International Fish Hatchery. Unlike other albinos, this *P. zebra*'s body had the merest hint of a bluish/cobalt haze and very dark eyes that could only be seen to be red when the light struck them at a particular angle. This impressive variety is already under limited commercial production and should prove to be a useful and popular addition to the African Rift Lake hobby.

The second fish was an Albino Red Tiger from Tropical Gardens, Inc, the outright, and deserved, winner of the Grow-out (10 + in) Class — an albino unlike any other I have ever seen anywhere. Being in one of the 'Grow-out' classes, this particular fish was raised, though not bred, in Florida.



Tropical Gardens' stunning Albino Tiger Oscar took top honours in the Grow-out (10 + in) class.

However, it very soon will be. And, if you think that the photograph accompanying this article is spectacular, just wait till you see our free July poster!

## OTHER HIGHLIGHTS

Away from these, and other, albinos, the 1991 F.T.F.A. show produced its eagerly expected crop of new fish, along with its customary display of the very best of all the other numerous fish and aquatic organisms bred in the State.

Last year's show had been preceded by a severe freeze, yet the fish were there in all their glory by 'showtime', albeit in slightly reduced numbers. Shortly after the 1990 event, Florida experienced a severe, prolonged drought that caused considerable problems within the industry. Yet, once again, the response was typically gritty, resulting, this March, in one of the largest displays of Florida-produced fish ever staged.

## Livebearers

As ever, the livebearers were magnificent, confirming Florida's formidable reputation as the leading livebearer producer in the world. What was particularly pleasing to some of us was that one of the awards (second prize) in the Molly category went to a simple, basic Liberty Molly entry from Quality Critters, Inc. The top award here went to a Black Sailfin exhibit entered by the appropriately named farm, Sailfin Tropicals.



# THE CROP

Top, it may not have fancy fins, but this excellent Sunset Variatus from Ed Parker Tropical Fish won both the Variatus and Best Fish in Show (Freshwater Livebearer) categories.

Centre, a Gold Dust Lyretail Molly (with little 'dust') — but exceptional nonetheless. This fish — from Summerland Tropical Fish Farm — won the Fancy Molly trophy.

Bottom, Pataky, Inc. produced this superb *Copadichromis (Haplochromis) chrysonotus* — winner of the Haplochromine and Best in Show (Freshwater Egglayer) classes.



Also hugely welcomed was the top Best in Show Freshwater Livebearer trophy which was won by a beautiful short-finned Sunset Variatus Platy (Ed Parker Tropical Fish).

For some years now, Florida's Gold Dust Mollies have been 'evolving', with the 'gold dust' becoming more and more like 'gold plate' and less and less like 'dust'. This year was no exception, as the picture of the winner of the Fancy Molly class — a great Gold Dust Lyretail produced by Summerland Tropical Fish Farms — brilliantly shows. We must surely be getting to the stage where the Gold Dust label will either have to be re-defined, or not applied at all to such 'non-dust' strains as the one shown, exceptional though the fish undoubtedly is.

## Egglayers

Cichlids have also featured prominently in recent shows, as Florida has gradually and inexorably adopted the mantle of being the

largest centre in the world for captive-bred African Rift Lake Cichlids. When you see fish like the one which took the top honours in both the Haplochromine and the Best Freshwater Egglayer categories (a *Copadichromis (Haplochromis) chrysonotus* from Pataky, Inc), you can begin to see why.

Ekk Will Waterlife Resources (formerly Ekk Will Tropical Fish Farm) was, once more, the exhibitor winning most prizes, walking away with no less than 26 awards, including the highly-coveted Breeders' Award, for their... wait for it(!)... Redtail Eight Line Rainbow (*Melanotaenia splendida australis*).

Long-finned varieties of numerous species of danios, barbs and tetras are almost



Long-finned tetras are a Florida speciality. This Hi-fin Serpae from Sunrise Tropicals was the winning Fancy Tetra at this year's show.



Among its many trophies, Ekk Will Waterlife Resources won the Breeders' Award with this Redtail Eight Line Rainbow.

synonymous with the Florida ornamental fish industry. These fish may not be everybody's cup of tea, but they are certainly popular among hobbyists in many countries. If I had to pick out the best of this year's crop, it would have to be the Hi-fin Serpae bred and raised by Sunrise Tropicals, Inc, the deserved winner of the Fancy Tetra trophy.

### TOP QUALITY FISH

The problem, I find, in writing about the best fish that are exhibited at events such as

the F.T.F.F.A. show is that there are only so many examples that you can mention. There is therefore a risk that some people might think that these are the only fish of real quality. Nothing could be further from the truth.

Having enjoyed the challenge of judging at this prestigious event for the past four years, and having examined every single one of the exhibits that have been displayed over this period, I can honestly say, with hand on heart, that it would take something very special indeed to beat the best of what the

Floridians produce year in, year out, at least, over the broad freshwater tropical front.

Other countries excel in one, or a few, types of fish. Take, for example, Japan's justified reputation for pedigree Koi, or Germany's high standing in the Discus world, or Singapore's reputation for a wide range of the best-known aquarium fish. However, when it comes to excellence right across the board, from Guppies to Gouramis, and Mollies to Minnows, then Tampa, every March, is the place to be.

## 1991 F.T.F.F.A. SHOW WINNERS

### BEST IN SHOW: FRESHWATER LIVEBEARER:

Sunset Variatus Ed Parker Tropical Fish

### BEST IN SHOW: FRESHWATER EGGLAYER:

*Copadichromis (Haplochromis) chrysonotus* Pataky, Inc

### BEST IN SHOW: AQUARIUM LIVESTOCK OTHER THAN FISH:

*Aponogeton madagascariensis* Florida Aquatic Nurseries

### BREEDERS AWARD:

Redtail Eight Line Rainbow Ekk Will Waterlife  
*Melanotaenia splendida australis* Resources

### BEST NEW FRESHWATER LIVEBEARER VARIETY:

Black Wag Sword Ed Parker Tropical Fish, Inc

### BEST NEW FRESHWATER EGGLAYER VARIETY:

*Labotropheus trewavasae* Red International Fish Hatchery

### SWORDTAILS:

Marigold Wag Sword Blackwater Fishery, Inc

### FANCY SWORDTAILS:

Marigold Lyretail Sword Blackwater Fishery, Inc

### MOLLIES:

Black Sailfin Molly Sailfin Tropicals

### FANCY MOLLIES:

Gold Dust Lyretail Molly Summerland Tropical Fish Farms

### VARIATUS PLATIES:

Sunset Variatus Ed Parker Tropical Fish, Inc

### PLATIES:

Red Tux Platy Tropical Gardens Fish Farm

### FANCY PLATIES AND VARIATUS:

Hi Fin Sunset Variatus Blackwater Fishery, Inc

### GUPPIES:

Opal Guppy Mako Tropicals

### ANY OTHER TYPE OF FRESHWATER LIVEBEARER:

Asian Half Break Tropical Gardens Fish Farm

### KILLIFISH:

Bluefin Killie Ekk Will Waterlife Resources

### DWARF CICHLIDS:

*Neochromis nigricans* Old World Exotic Fish, Inc

### AEQUIDENS & GEOPHAGUS CICHLIDS:

*Aequidens pulcher* Sailfin Tropicals

### SOUTH AND CENTRAL AMERICAN CICHLASOMA AND OSCARS:

*Cichlasoma lentiginosum* Don Conkel's Tropicals

### ANY OTHER CICHLIDS:

*Chaetobranchius (Chaetobranchopsis) australis* Don Conkel's Tropicals

### MBUNA CICHLIDS:

*Pseudotropheus sp Zebra* Don Conkel's Tropicals

### HAPLOCHROMIDE CICHLIDS:

*Copadichromis (Haplochromis) chrysonotus* Pataky, Inc

### TANGANYIKAN CICHLIDS:

*Ophthalmotilapia ventralis* Old World Exotic Fish, Inc

### COMMON ANGEL FISH:

Silver Angel Bethsaida, Inc

### VEILTAIL ANGEL FISH:

Marble Veil Angel Quality Critters, Inc

### TETRAS:

Congo Tetra Aquatica Tropicals

### FANCY TETRAS:

Hi Fin Serpae Tetra Sunrise Tropicals, Inc

### BARBS:

Rosy Barb Ekk Will Waterlife Resources

### FANCY BARBS:

Long Fin Rosy Barb Silver Dollar Enterprise, Inc

### DANIOS AND MINNOWS:

Giant Danio Ekk Will Waterlife Resources

### FANCY DANIOS AND MINNOWS:

Long Fin Zebra Danio Ekk Will Waterlife Resources

### RAINBOW:

Yellow *Melanotaenia herbertaxelrodi* Ekk Will Waterlife Resources

### RASBORAS:

Scissortail Rasbora Ekk Will Waterlife Resources

### PLECOSTOMUS:

Rhino Pleco (*Pterygoplichthys*) Tropical Gardens Fish Farm

### CORYDORAS AND OTHER CATFISH:

Royal Farlowella Rawlins Tropical Fish Farm

### BETTA SPLENDENS:

*Betta splendens* Dade City Tropicals

### ANABANTOIDS:

Lavender Gourami Imperial Tropical Fish Farm

### GOLDFISH AND KOI:

Redcap Gordon Aquatics, Inc

### SHARKS, LOACHES AND BOTIAS:

Red Tail Shark Ekk Will Waterlife Resources

### ANY OTHER TYPE OF FRESHWATER EGGLAYER:

Metynnis Silver Dollars Silver Dollar Enterprise, Inc

### AMPHIBIANS:

Dwarf African Frogs Sanchez Bros Tropical Fish

### MOLLUSCS:

Ivory Snails Sanchez Bros Tropical Fish

### CRUSTACEANS:

Electric Blue Crawfish Tropical Gardens Fish Farm

### BUNCH PLANTS:

*Hygrophila difformis* Florida Aquatic Nurseries, Inc

### FRESHWATER FANCY PANTS:

*Aponogeton madagascariensis* Florida Aquatic Nurseries, Inc

### POOL PLANTS:

Duck Potato *Sagittaria lancifolia* Luster Aquatic Nursery

### GROW-OUT 0-4in:

Bleeding Heart Tetra Buzbee Aquatics

### GROW-OUT 4-10in:

Asian Bumblebee Catfish Rawlins Tropical Fish Farm

### GROW-OUT 10in + :

Albino Tiger Oscar Tropical Gardens Fish Farm



# Spotlight

## MUDSKIPPERS

Looking for something really different?  
Why not try these fascinating amphibious gobies?

Gordon Kay provides all the details you need.

(Photograph: Jane Burton/Bruce Coleman Ltd)

**T**he main attraction which the sea holds for me is the fact that every species living within it has a life-style so interesting as to make it unrivalled by any creature living on the land. To me, one of the kings of this phenomenon is the Mudskipper. After all, what other fish walks on its fins over exposed mud, builds mud houses and carries its own water supply?

### MUDSKIPPER ZONES

The Mudskipper is essentially a marine creature which has adapted itself to a life partly in water and partly out of it. It lives in mainly brackish water in mouths of rivers but, more commonly, in mangrove swamps. It comes from all over the Indo-Pacific region, from East Africa as far as Australia, being very abundant in many areas.

Each mangrove swamp is usually inhabited by three species of *Periophthalmus*. The smallest stays in water for the longest time, only venturing out at low tide. Shoals of them wriggle through the liquid mud at the water's edge, sifting for small worms and crustaceans.

The mid-tide area of the swamp belongs to a much larger species, which is a vegetarian that collects algae and other microscopic single-celled plants. This species feeds alone and is very territorial, digging a hole for itself and patrolling the mud around it. It sometimes builds low mud ridges, several metres long, around its boundary to keep its neighbours out and to prevent the mud from draining completely. In areas of high population, these territories join one another and the mud flats become divided by the walls into polygonal 'fields', each with its owner presiding over it rather like a bull in a paddock.

The third species of Mudskipper occupies the highest part of the swamp. It is a carnivore, preying on small crabs. This species also burrows, but is not so preoccupied with keeping its neighbours out. In fact, it tends to share its hunting grounds.

### UNIQUE FEATURES

As I said earlier, Mudskippers have evolved over the years to a life partly out of water. In order to breathe out of water, this animal

fills its gill chambers before venturing onto the land, regularly returning to the water to renew its supply. *Periophthalmus* can also breathe cutaneously — that's through the skin, to you and me! — and has a highly vascular mouth and pharynx, through which gaseous exchange can take place. In this way, they are often seen to sit with their mouths gaping open while sitting out of water.

Another result of evolution is the Mudskipper's bulbous eyes. These tend to be towards, or on the top of, the head, allowing the animal good all-round vision. The eyes also have a thick layer of clear skin to protect them from physical damage. To keep them moist, the fish occasionally roll them back into their sockets.

Mudskippers spend a good deal of time walking around on the mud flats and climbing tree roots to bask in the sun. Their method of locomotion is comical, to say the least. To propel themselves, they 'crutch' themselves along with their two pectoral fins. These are strengthened internally with bony struts, which are well-muscled and are jointed halfway down. This makes the animal seem to heave itself around on its elbows.

When threatened, or wanting to move at speed to catch food, however, Mudskippers curl their tails and flick so that they shoot across the mud. Most of the time, though, they move by swinging the pectorals forward while the weight of the body is supported by the pelvic fins. Then, by pressing downwards and backwards with the pectorals, the body is both lifted and drawn forwards. At the end of the movement, the body falls and rests again on the pelvic fins. All of this appears very cumbersome, although, when requiring to move quickly, the Mudskipper can jump up to two feet (60cm) in one go.

### BREEDING

Not only do Mudskippers feed out of the water, but they also do their courting there. Like most fish species, they display by flexing and quivering their fins. Because both of their sets of paired fins are engineered for locomotion, they have to display with their dorsal fins. These normally lie flat but, when courtship starts, the male carries them erect, showing them to be brilliantly coloured. However, mud flats are

just that, and only females in the immediate vicinity can see him, so — in order to reach a wider audience — the male flips his tail and leaps into the air, banners erect.

As far as we know, the low tide species do not care for their young. The hatchlings are swept away to join the community of larvae in the surface water, the vast majority of them being eaten or carried into the open sea where they cannot survive.

However, the mid-tide species are better parents. The male constructs a burrow in the centre of the walled territory and builds a circular rampart around the mouth of it. The mud here is so close to the level of permanent ground-water that this creates a little walled pond. The male lounges on the wall of his 'swimming pool', where the female joins him. Mating occurs in the burrow at the bottom of the pool, where the eggs are laid. Here, the young will stay, even when the tide is in, until they are quite well developed and not totally helpless.

The third type of species, at the uppermost level, does not build a pond, but burrows very deep into the mud — as far as a metre deep, where there will always be some water so that the offspring are protected during their early stages.

### AQUARIUM CARE

Keeping Mudskippers happy in the aquarium is a relatively easy task, provided that their natural history is borne in mind. One important factor to remember is that they are essentially brackish water fish which live in the margins where the land meets the sea. A specific gravity of between 1.005 and 1.010 is about right, certainly no higher than the latter. Ironically, because they live in areas where influxes of fresh water from the land occur quite regularly, absolute consistency in SG is not as critical as in a normal seawater aquarium, although rapid and large fluctuations should be avoided.

As with all fish species, the aquarium should be as large as one can afford or has space for. The larger the tank, of course, the lesser the effects of worsening water quality. The aquarium should be up to half 'dry' to give the Mudskippers the opportunity of coming out of the water to bask and ferret around.

To achieve this 'dry land' creates a bit of a

problem. It is never a good idea to have gravel or coral sand in an aquarium without passing water through it, as pockets of anaerobic bacteria build up, producing a horrible smell of rotten eggs. It is much more effective to search for large clumps of bogwood which have a tendency to become slimy and very natural-looking after a short while. What's left of the aquarium floor space after this bogwood has been installed should be made up of water no more than six to eight inches deep (15-20cm). It is far better to leave the aquarium floor under water without any form of sand or gravel, to ensure that no pockets of the aforesaid anaerobic bacteria develop.

In order to filter the aquarium water, an air-operated sponge filter can be used to great effect, although a much better idea would be to use an external canister filter with the outlet pipe attached to a spray bar which will, when hung as high as possible above the water level, create a waterfall effect — thereby duplicating, to some extent, a little more of their natural habitat. Decoration can be by way of Java Moss (*Vesicularia dubyana*) which will grow quite well out of the water, provided it is kept moist.

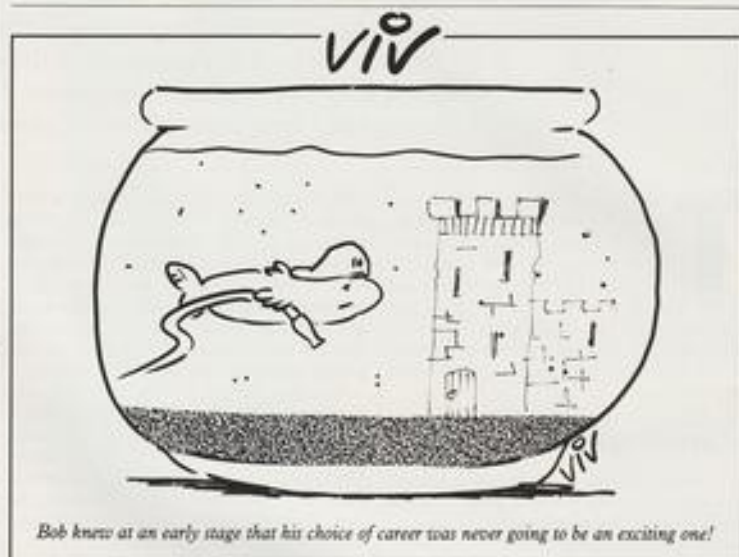
All that is required now to complete the Mudskipper's home is light — a single tube of the 'red' variety will suffice — and a tight-fitting cover glass, to prevent the fish from jumping out. **WARNING!** If Mudskippers do jump out of the aquarium, they are next to impossible to recapture and this will result in them drying out and dying.

There is one little problem with keeping Mudskippers in the aquarium, the answer to which I do not have. If an aquarium is only half full, a great amount of condensation will occur on the front glass. Unfortunately, how one gets around this problem is beyond me.

Mudskippers are quite happy to eat any of the normal aquarium fare and can sometimes even be persuaded to eat flake food.

Who knows, it might even be possible to get yours spawning, thereby ensuring your own little place in aquarium history.

Mudskippers must be the most interesting and entertaining of all aquarium inhabitants. They do not turn up in aquarium shops very often though, but I feel that they are well worth tracking down.



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# OUT AND ABOUT

## KOI REARING IN KENT

By Nigel Caddock

(Photographs by the author)

One of the major challenges in Koi-keeping is how to start off with baby Koi and grow them into Jumbo Koi while, at the same time, retaining their quality. With the possible exception of actually producing Koi, this challenging area has to be one of the toughest to crack.

Walking a path that angels and, indeed, many others fear to tread, Simon Hughes and his Riverfield Koi farm team have built a Koi farm in Kent to tackle this problem.

Most Koi-keepers have the dream of selecting a baby Koi from a pondful and then growing it on to become a show winner. This very concept, but on a previously undreamt of scale, was the inspiration that has turned Riverfield from a stubble field to one of the U.K.'s largest Koi-rearing facilities in less than twelve months flat!

There is, of course, nothing new about the prime objective of growing-on and developing baby Koi to maturity, while retaining good quality. What is, however, quite new is that, rather than talking about it, Simon Hughes and his Riverfield team have done it, and on a really large scale. Add to this, a totally relentless degree of commitment, significant expertise and an inexhaustible amount of true grit, and you have the makings of success.

The degree of application demonstrated by Simon and his team in completing the project is almost as impressive as the scale of the Koi farm itself. The results of their intensive planning and genuine hard work are now coming to fruition with the completion and coming on-stream of Riverfield Koi farm.

To put the scale of this operation into perspective, Riverfield is a 53-acre Koi farm which has 28 growing-on lakes which hold in excess of fifty million gallons of Koi-rearing water! The size of the operation is breathtaking and the 53-acre site is literally

full of lakes specially designed for Koi rearing and built to be fully drainable for harvesting.

The original site was a totally uncontoured stubble field which has now been totally transformed into a fully operational Koi farm. The 28 lakes vary in size, but are all eight feet deep. The aerial photograph taken recently, indicates the degree of transformation that has taken place.

The scale of the excavation phase was quite awesome and kept a full team of heavy earth moving equipment fully occupied seven days a week for a period of almost five months!

In addition to man-made assistance, significant natural advantages help Riverfield enormously. All the rearing lakes are carved out of the natural Kent blue clay on which

the Riverfield site sits. The blue clay is completely watertight, and also offers an excellent source of supplementary and beneficial minerals ideal to optimise Koi development and growth. To complement the blue clay, the entire complex is supplied with superb water which feeds all the Koi lakes.

As we are painfully aware, the U.K. Koi industry is still almost totally dependent on (largely) Japanese suppliers; the cost of good grade stock and lack of really large scale holding facilities, compound this reliance. This dependence emerges especially every summer when stock of the type and quality that top hobbyists want are often difficult to get hold of.

Until the U.K. develops a consistent ability to produce high-grade Koi on a major

scale, this situation is unlikely to change and we will continue to be reliant on the Japanese. However, the availability of a facility like Riverfield will enable very large stocks to be brought into the U.K. and then held and grown-on, to be made available to the domestic and European market as and when required. This will certainly reduce the current Japanese stranglehold on supply and availability of top-quality Koi, at least to some extent.

When fully operational, Riverfield's fifty million gallons will hold more than half a million Koi in various stages of development and, in addition to making Riverfield one of Europe's largest Koi wholesalers, this will, hopefully, also ensure that stocks of Koi in all sizes and varieties are available for sale whenever they are required.

In addition to the wholesale operation, Riverfield have a large indoor retail outlet on the Marden site, which offers a wide range of dry goods and, of course, an extensive selection of Koi for sale in 14 retail tanks which hold a further 30,000 gallons. Because of economies of scale enjoyed in their initial purchasing policy, Riverfield's retailing price structure is also extremely competitive and offers individual Koi buyers major discount opportunities.

Nestling in superb Kent countryside at Marden, which is located on the main A229 Hastings road, in between Staplehurst and Maidstone, Riverfield, in addition to being a fascinating place to see, is a superb venue for a day out, as the extensive site is a delight to wander over, making it an ideal location for sections, clubs and individual visitors alike.

For further information and visit availability and reservations contact: Simon Hughes, Riverfield Koi Farm, Marden, Kent TN12 9BU. Tel: 0580 891474; Fax: 0580 891201.



Aerial view of Riverfield's impressive facilities.



From ground level, the immense size of some of the growing-on ponds can be fully appreciated.

## AN EXCEPTIONAL GOLDFISH BOWL

By John Dawes

(Photographs by Max Gibbs)

As *A&P* readers have been regularly witnessing for some time now, Max Gibbs is a superb photographer (see, for example, this month's excellent cover picture). What not every reader might know, though, is that Max is also the proprietor of an equally superb shop, the Goldfish Bowl, in Magdalen Road, Oxford.

This large, longstanding retail outlet has recently undergone a major 'overhaul', during which Max's own 35-years' experience, added to Barry Allday's (Max's partner) 20 years of 24 hours/day involvement, plus Richard Dickson's (the Goldfish Bowl's hardworking manager) efforts, have produced an end result that will be the envy of many a retailer up and down the country, and will form an irresistible 'waterhole' for hobbyists from far and wide.

I could, of course, easily go through a long list of coldwater, tropical, brackish and marine fish species, then add another consisting of invertebrates, ending up with yet another two lists, this time of aquatic plants and dry goods. However, this would only serve the limited purpose of impressing readers with the range of species on offer at the Goldfish Bowl. It would say nothing of their quality which, to the vast majority of us, is even more important.

I will therefore leave the matter of quantity aside, merely pointing out that, if there's a fish, or plant, or invertebrate, or book, or piece of equipment that you want, then the Goldfish Bowl stands a pretty good chance of having it. If not,

it's very likely to be able to obtain it.

As regards quality, I must say that I was hugely impressed during my visit. Experience in handling fish on a commercial scale is, of course, an essential ingredient of every self-respecting, successful enterprise. However, for any number of reasons, it is not always possible to back this experience up with appropriate facilities and services. In this respect, the Goldfish Bowl can proudly claim to be able to provide all three in full measure, allowing it more than to hold its own alongside the very best outfits in the country.

The heart of any aquarium or pond is its water management system, something that we



If you've got it, flaunt it! The nerve centre at the Goldfish Bowl is in full view of the public.

water, then the water will look after our fish, inverts and plants (with due regard to compatibility, etc, of course).



To the left — behind the Marine Invertebrates — is the coldwater section. A few of the marine fish aquaria can be seen at the far end and left foreground. The tanks running down the right represent about one third of the tropical freshwater section. All in all, there are aquaria for every type of hobbyist.

repeatedly refer to in *A&P*. We often also go to the point of saying that we are (or should be) predominantly water keepers, and that, if we look after the

Clearly, Max Gibbs and Barry Allday share this view, because, when they launched into their overhaul, they handed over the design and installation of the four separate water treatment systems (one each for tropicals, coldwater, marine fish and marine invertebrates) to aquacultural engineering expert, Philip Mayfield, who has come up with a tailor-made arrangement to cater for the shop's current and projected demands. Settlement reservoirs, floatation towers, trickle towers, cartridge filters, UV sterilisers and ozonisers, all backed up by powerful, reliable Marlow pumps, linked up to alarm systems, together form a 'nerve-centre' that one could easily spend hours discussing (we did!).

A very nice and welcome feature of the main filtration room is that it has a glass door which allows customers a view of the water treatment system that is used to ensure that the fish and other living creatures they buy at the Goldfish Bowl are in tip top condition.

At the time of my visit, the last bits of link-up were also being installed on the large quarantine/acclimatisation facilities, yet another reflection of Max's and Barry's total dedication to the welfare of the fish and invertebrates they offer the public. By the time we go to press, these facilities will be fully operational, behind the scenes.

If you've never been to the Goldfish Bowl before, I would highly recommend a visit. If you are among the many thousands of aquarists who have visited the shop in the past, then go back now. I think you'll find the latest spanking-new version very much to your liking.

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Looking back towards the dry goods area, with plant display unit in the foreground.



A Fish TB granuloma (solitary module) on an affected aquarist's thumb.

## FISH TB IN HUMANS (Background, Prevention and Cure)

Mel Jones, orthopaedic surgeon at the Royal Liverpool Hospital, offers expert advice on the prevention and treatment of this rare, painful, but perfectly curable, disease.

(Photographs by Dr R. R. M. Harman — see Acknowledgements)

**T**uberculosis is quite widespread in nature and there are several types of the germ which causes the disease. Humans, animals, birds and even fish (as most aquarists are fully aware) can be affected. The bacterium that affects fish is called *Mycobacterium marinum* and is commonly found in aquatic environments.

On rare occasions, the germ can cause skin or hand disease in humans. By the very nature of their hobby, the readers of this magazine are at higher risk than the general public from this germ. However, the purpose of this article is not to alarm people unduly (since prevention is easy); my main intention is to draw readers' attention to the existence of the disease, and to give a description of the problems which can occur so that they can be recognised early. Treatment is both simple and effective.



If the disease spreads along the lymph vessels, it eventually develops into its sporotrichoid form.

## BACKGROUND

The bacterium *Mycobacterium marinum* can be found anywhere in the world where there is water. Infected fish develop a chronic wasting disease for which there is currently no effective treatment, at least, not if the disease is in an advanced state. The fish eventually die, but this may take up to a year. The water in which these fish are kept is, obviously, contaminated with the germ and, if the disease occurs in a pond or aquarium, humans are at some risk of being infected.

Firstly, though, it is important to get a few facts straight and the matter in perspective — I do not wish to be a second Edwina Currie!

- 1 The germ does not cause a fatal disease in humans.
- 2 The disease is usually confined to the skin of the hands and forearms. It can very rarely affect the underlying joints.
- 3 Human disease due to the organism is very uncommon.

## THE HUMAN DISEASE

The fish TB bacteria gain entry into the skin when cuts and abrasions come into contact with contaminated water or infected fish. A painful red plaque then develops around a cut or abrasion. Pus may subsequently be discharged.

Occasionally, other plaques may appear along the arm as the germ spreads slowly

along the lymph channels in the skin. Left untreated, these plaques can become chronic and last for several months.

## PREVENTION

Prevention is, obviously, better than cure, and this is certainly true for Fish Tuberculosis affecting humans. The cuts and abrasions through which infection may occur can be quite small and go undetected. It would therefore seem to be a wise precaution always to wear rubber gloves when immersing the hands in ponds or aquaria.

If there are obvious cuts on the hands, or if dead fish are being handled, this practice would appear to be obligatory. However, this is not being widely practised at present, even by experienced people.

A recent article in the *British Medical Journal* quoted the findings of a questionnaire completed by 40 members of tropical fish clubs in the Bristol region. Only 2 (5%) ever used gloves; 12 (30%) were aware that skin infection was a risk after contact with fish and 30 (75%) said they would handle dead fish with their bare hands. These figures clearly outline the ignorance about Fish Tuberculosis among enthusiasts.

## TREATMENT

Except for skin specialists, most doctors are completely unaware of the germ and the disease it can cause in humans. I do not feel that I'm being critical of my medical colleagues

when I say this because until I, myself, came across a patient, I was completely ignorant of the germ.

If any readers suspects that he or she may be infected by Fish Tuberculosis, a visit to the family doctor is needed. It is important to point out what your hobby is, and that you are aware that Fish Tuberculosis can affect humans, as your doctor may be unaware of this. If need be, show this article to your doctor who may find it helpful.

If infection with *Mycobacterium marinum* is suspected, your doctor will probably refer you to a skin specialist. In order to confirm the infection, a very small sample of the affected skin is needed for analysis. This can be done painlessly using local anaesthetic in the clinic without the need to come into hospital. A course of antibiotics will then cure the problem.

## ACKNOWLEDGEMENT

The illustrations have been reproduced by kind permission of the editor of the *British Medical Journal*. They originally appeared in a paper entitled *Fish tank granuloma* by S F Gray, R Stanwell Smith, N J Reynolds and E W Williams (1990; 300:1068-70) and some of the facts used in this article have been derived from this. The photographs were taken by Dr. R R M Harman of the Department of Dermatology at the Bristol Royal Infirmary.

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# Naturalist's notebook By Eric Hardy

## COLD BLOOD AND SPERM STORAGE

Cold-blooded animals can be hot as often as cold. They have a body temperature that changes according to their surroundings, unlike so-called warm-blooded animals which never get very cold as they are more 'constant-temperated'. Therefore, there's little surprise in the discovery by Miami University researchers of a super cooling and freezing tolerance of the European Wall Lizard.

Bats are not the only animals to store their sperm before delayed fertilisation. Longterm storage is also a feature of Pit Vipers, with competitive advantages in their mating strategies.

## ELVER DECLINE

This past season saw a marked and mysterious decline in the number of elvers ascending the River Severn, their major British haunt, which was down to a fifth of its normal catch.

Similar declines were reported in Scandinavia, where elvers became too valuable to eat and were used for restocking.

## PLANS FOR NEW AQUARIUM

A recent announcement of plans for a grand new aquarium by the Mersey at Wallasey's Seacombe Ferry, to bring "a flood of tourists" prompts caution after what happened to Merseyside Development Corporation's grandiose press announcement in the summer of 1986 for a super aquarium, with Japanese sponsors, at Liverpool's Albert Dock, challenging the famous Sea World in Florida.

I interviewed the chief executive and the instigator of the plan at the time. They told me it was certain, yet it proved to be pie-in-the-sky. The only 'aquarium' brought to Albert Docks have been the small local marine tanks in the Maritime Museum there.

The late Fred Jefferies had great plans for a public aquarium, Brighton style, at New Brighton on the Mersey in

1935; but this got no further than an old conservatory full of small tanks on bedstead-stands in a very amateurish show.

Liverpool Museum has a good aquarium. A small commercial tropical aquarium lasted a few postwar years on New Brighton prom, but plans for ones at the old Perch Rock Battery and an old Leasowe Lighthouse never materialised. Money was always missing.

## OTTER STATUS

The most aquatic of Britain's freshwater mammals, the otter, became an endangered species a decade ago and hunting it was banned. It has now recovered 3% from that crisis, and a recent 67-page survey from the Nature Conservancy Council (D8) shows it occupied 284 out of 3,188 sites surveyed in England. It lost ground in East Anglia, with only eight positive sites, Essex and the Thames Valley (with none found). It increased most in Cornwall, Devon and the upper Wye Valley. Taw, Torridge and Tamar hold healthy populations near their maxima, with up to 38 spraints (faeces) in 600m of riverbank. Exe, Fowey, Seaton, Lynher and Fal have expanding populations because of good bank coverage which otters require.

Because of their secretive, nocturnal habits, otters are seldom seen, though tracks and spraints are noticeable. There have been some successful releases in Suffolk, at Minnere, adding 25 cubs to the East Anglian population, and on the Waveney, the River Thet and the Black Bourne. One of their dangers is being caught in underwater eel or crayfish traps not fitted with otter-guards, or captured in eel fyke-nets which can now be fitted with a guard across the entrance.

## GULF OIL SLICK

By the time this article appears, the world's biggest oil slick in the Arabian (or Persian) Gulf will have worked its havoc. At present, we are concerned about its Mudskippers, the Seagrass haunts of Dugong, Greyish-green and Black-banded Sea Snakes, Green Turtles and



Butterflies are among the many species of marine creatures threatened by the recent massive Gulf oil slick.

Rabbitfish. The area has probably the best Pearl-oyster beds and its coral reefs are the home of butterfly fish (*Chaetodon* spp) including the Black-banded, angel-like Bannerfish or Poor Man's Moorish Idol, *Hemiochus acuminatus*, of Blue Tangs which feed on the coral algae and several Parrotfish.

Oil spills have long been an ecological problem in the Gulf, and a few years ago they nearly exterminated the Dugong there.

## HERPTILE MIXED BAG

Among recent interests, Marwell Zoological Park at Golden Common, Winchester, appealed for sponsorship for a captive breeding and release programme for Sand Lizards and Natterjack Toads. We used to do this voluntarily in west Lancashire before the war, creating a number of isolated haunts, but none of the recording bodies was interested.

Israel is making a reserve for the endangered Egyptian Tor-

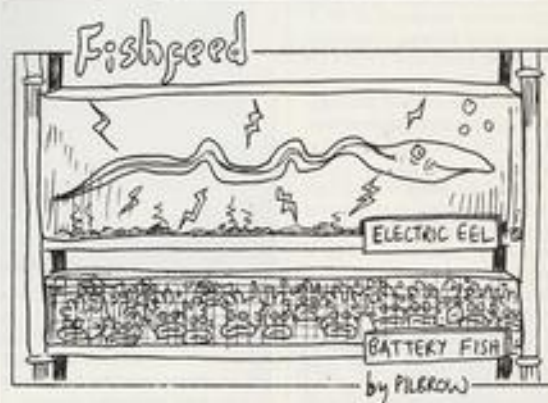
toise, *Tamias klanmansi*, in the western Negev Desert, at Holot Agur.

A blue variation of the Stripeless Tree Frog, *Hyla meridionalis*, has been found in Portugal. This is usually bright green, sometimes spotted and occasionally with brownish or yellowish variations.

Neoteny, maturity in the larval stage, was found in a Smooth Newt in Cambridgeshire.

Ticks sometimes trouble reptile pets, causing scratching or rubbing against their cage. They require treatment with ether, oils of petroleum jelly, even forceful removal. In Pakistan, a tick, *Aponomma gresseri*, has been found parasiting the large monitor lizards, *Varanus bengalensis* and *V. flavescens*.

In Colorado, the Southern Death Adder has been found to use its tail to lure prey. Twinning occurred in a Leatherback Turtle off California and more new frogs are described from Peru.



## YAF GOES FROM STRENGTH TO STRENGTH

By Stephen J. Smith



STEPHEN SMITH

Tableaux are at last beginning to bear some relationship to the aquatic scene, and this winning example from Bradford and District AS really sets the standard for future entries in this popular class.

The only way is up! And, after last year's success, the 1991 Yorkshire Aquarist Festival was an even greater triumph for the dedicated small team of organisers who, every year, stage one of the fishkeeping calendar's leading events.

The number of trade stands was up; the number of entries was up; the number of classes was up; and the number of visitors was up. Despite a raw April weekend, no less than some 12,000 visitors turned out to Doncaster Racecourse to witness a show which gets better every year.

"We seem to have got the balance right," remarked organiser Marie Harrop, from the Yorkshire Association of Aquarist Societies. And no-one can disagree with that, with a fine mixture of trade stands, information stands, and aquatic society tableaux, coupled with a first-rate series of lectures from experienced speakers, *A & P* editor John Dawes, 'Aquarian' Dr David Ford, and Tetra's Dr David Pool.

Surprisingly, one of the highlights of the show this year was, for me, the first-class display of tableaux.

Now, I am not a tableau fan: while I appreciate that they are a lot of fun and require a lot of hard work to produce, rarely, if ever, do tableaux, in my own opinion, have a great deal to do with fishkeeping.

This year's event provided a notable exception, and one which I hope will set a lead for future tableau entries. The win-

ning tableau was produced by Bradford and District AS, designed in the form of a Chinese tea-house, complete with garden and ornamental pond. (Incidentally, this was a miniature replica of a full-size display presented by the same society at last year's event).

A further tableau which really caught my eye was that produced by Manchester North-West Aquarist Society, and designed in the form of a giant polyfoam filter. Let's hope that future tableau

designers can produce some original ideas, in keeping with the aquatic theme.

Once again, a magnificent Fish of the Year display of some of the best fish in the country, all winners of Best in Show awards last year, was a major attraction. This year's winning entry, for the second year running, was a Common Atlantic Eel (*Anguilla anguilla*), owned by Robin Day and Marian Wright, of Caister and District AS (featured in *Coldwater Jottings*, June 1990).



Long-serving champions of the aquatic industry and speakers at Yorkshire Aquarist Festival for several years, *A & P* editor John Dawes, left; David Pool, consultant to Tetra, centre; and Dr David Ford, senior consultant to 'Aquarian', were each presented with a crystal decanter by the organisers of YAF '91 as a mark of appreciation for their dedicated service.

A superb collection of children's work on an aquatic theme provided a great deal of hope for the future of the aquatic hobby, and I was particularly impressed by the aquatic photography section, which produced some first-class results from junior aquarists.

Congratulations to the organisers of YAF '91. Once again, this was a superb exhibition, in a superb venue, and with a superb complement of exhibitors.

### MAJOR RESULTS

#### Best Five Tableaux:

1. Bradford and District AS
2. Nottingham AS
3. Glanford and District Aquarist Society for Conservation
4. SODIT (Species Of Determinate and Indeterminate Types) — (Wombwell AS)
5. Hobby Centre Aquarist Group.

#### Fish Of The Year:

1. Miriam Wright and Robin Day — Select AS  
*Anguilla anguilla*
2. "Nipper" and Lorna Byrom — Ashby AS  
*Cichlasoma fasciatum*
3. Terry and Shirley Nelson — Ashby AS  
*Chana bustriata*
4. R. C. Woods — Lincoln AS  
*Nannacara anomala*
5. Alan and Sue Parsons — Malvern AS  
*Vainella crepaura*

#### Best Exhibit:

1. "Nipper" and Lorna Byrom — Ashby AS  
*Sturisoma panamense*
2. Leslie Gash — Huddersfield Tropical Fish Society  
*Nematobrycon palmeri*
3. Bonny and Keith Myers — TAS  
*Priapella intermedia*
4. Rob and Karen Thompson — Rainbow Society  
*Melanotaenia* sp.

#### Best in Show:

- Terry and Doris Cruickshank — St. Austell  
Gelius Barb

# Letters

## Historic OFI (UK) Appointment

OFI (UK) has just appointed me as their first full-time employee. This is regarded as a significant step forward and is intended to benefit all sectors of the trade and hobby.

OFI (UK) was established 18 months ago as a national body to unify, promote, protect and enhance the prosperity of all interests within both the trade and hobby. To this end, wholesalers, retailers, consolidators, breeders and a hobbyist are among those to be found on its committee.

The further aims of OFI (UK) in broad terms are to:

- Act as a point of reference and source of information to government and other organisations involved in and researching the industry.
- Promote the welfare and conservation of all livestock, whether fish, invertebrates or plants.
- Promote training, both for those in, and those wishing to join, the industry.
- Promote captive breeding programmes.

To date, much of the work involved in representing and administering OFI (UK) has fallen, principally, to a small number of people who also have businesses to run. The number of issues facing us — 1992, fish diseases, conservation, animal welfare and safety and registration, to name but a few — has made their workload impossible to carry out unassisted.

To fund my appointment and allow me fully to fulfil the aim of OFI (UK), a 1% levy on imports has been used. Dry goods wholesalers and manufacturers join by subscription, as can hobbyist societies and clubs.

In this post, I shall, working closely with the committee, represent the industry in a positive way. Its record in many areas is one of well considered, forward thinking. The help given to Sparsholt College, Hampshire, in establishing the National Aquatic Training centre and its full-time and part-time courses, sets an

example that many industries would do well to follow. It is also important that industry continues to be proactive in all matters.

Already, codes of conduct are being considered for many areas of operation. These will represent the members' views, so, obviously, the more members of the industry who contribute to these, the more comprehensive and creditable will be the result. I look forward to seeing active participation by all members of the trade and hobby through their societies and federations.

OFI (UK) can take account, in a democratic fashion, of the views of the whole industry. Government and other organisations cannot possibly canvass all hobbyists, or all 2,000 retailers, for their views on individual topics. They would, however, listen to a well supported organisation such as OFI (UK).

Finally, it may be useful for me to give *A&P* readers a brief resumé of my career to date.

I have a degree in Marine Biology and Zoology from Bangor University. Subsequently, I spent four years in contract research, three years in marine fish farming and seven years at Sparsholt College, Hampshire.

I am really looking forward to meeting and working with as many interested parties as possible at an exciting and challenging time for the industry. For the moment, I may be contacted at OFI (UK), 103 High Street, Bedford. Tel: 0234 355315; Fax: 0234 273550.

Keith Davenport  
OFI (UK)



## Waterfowl and ponds

I read with interest your March edition (Vol. 55/12) of *A & P* and welcomed, in particular, your **Spotlight Special**, *Choosing a Pond*. In the conclusive checklist of early steps and considerations (Point 5), you invite the reader to reflect on "... the range of plants, fish and other organisms the pond will be

mini-series of articles highlighting the general theme of waterfowl and the pondkeeper (*Duck Ponds by Design*) may be of wide interest to your readers in a future edition of *A & P*. Incidentally, it is possible, with careful special selection, to maintain fish, plants and waterfowl in balanced harmony.

Malcolm Rymer,  
Tilton-on-the-Hill,  
Leics.



Red-breasted Geese and Brents in one of Malcolm Rymer's ponds.

stocked with ...". It struck me that my particular 'organisms' and reason for pondkeeping, are rarely/never acknowledged in your publication.

I keep and breed ornamental waterfowl. I'm not referring to the large, quacking farmyard varieties, but to diminutive, elegant, fascinating creatures which add colour, charm and movement to my ponds throughout every season of the year. I have a series of 12 inter-linked butyl-lined ponds and streams, all within a 'landscaped' (incomplete but evolving) three-quarter-acre garden.

Even in your editor's comprehensive publication *John Dawes's Book of Water Gardens* (1989), a marriage of watergardening and waterfowl is not considered seriously. Admittedly, a few shots of black swans and huge domestic ducks in a large setting do appear on page 73, but waterscapes on this scale are beyond the dream of the majority of your readers.

Perhaps a one-off feature, or a

## Majestic (?) hybrids

Regarding John Dawes' question in his editorial on hybridisation and deliberate mutation by man of species (April '91), I unreservedly condone the practice.

Those beautiful goldfish with tumour heads and impressive spine curvatures; what majesty!

Why, at this very moment I am raising several fine specimens of *Leptodoras kindtii* x *Gnathonemus petersii*!

Shannon Cream,  
Leighton Buzzard.

## Save our Zoo

I am sure you will have seen the TV and newspaper stories about the problems we are facing at London Zoo. As a result, we have been overwhelmed by the sheer volume of public support.

Continued on page 36

# Letters

Continued from page 32

We have also been greatly encouraged by requests from people who wish to help the zoo and its animals. This is why I am writing to you now.

As you may know, London Zoo is a registered charity, so we have decided to launch a fund-raising campaign under the banner SAVE OUR ZOO, with the aim of generating funds to help the Zoological Society of London maintain a presence at Regent's Park.

With your help, we can succeed at Regent's Park, continuing to present the broad work of the Society at a time when conservation of the environment is of great importance to us all. It is essential that the full range of the Society's expertise remains available for the global preservation of endangered species. Central to the SAVE OUR ZOO campaign is the spirit and purpose of the Zoological Society's activity here at

Regent's Park: to conserve and preserve rare and endangered species; to contribute to zoological science and research; and to educate and enlighten the country's children.

Most important, London Zoo — the oldest-established and most famous zoo in the world — provides a unique and stimulating place of relaxation and pleasure for its 1.3 million annual visitors, who come to 'meet' animals and learn about their world.

The Society has never launched a public appeal for support but now is the time when we need everyone to show how much they value and care for London Zoo and its work. Every donation is valuable, whether it is £5 or £5,000, so please give whatever you can.

Thank you, in anticipation of your help and support.

David Jones,  
Zoo Director  
Regent's Park,  
London, NW1 4RY

## Dave Keeley's fair analysis

I have been reading with great interest Dave Keeley's informative (personal opinion) articles on conservation and welfare issues.

My standpoint comes from an interest in marine wildlife and ecology; I have no part in the trade. I view his summary as a fair and accurate analysis of the facts, in a world full of rhetoric and righteous indignation.

All fisheries resources, for food or for decoration, need to be under some form of control (in the country of origin) because the yield is finite. Overfishing even some of the most prevalent fish of the oceans is now a real possibility. My research on the fauna of British shores indicates that unlicensed collection of the Periwinkle, *Littorina littorea*, for sale has caused a reduction of numbers in some areas to a level

below which it is an uneconomic proposition to harvest them on a sustainable basis.

The moral of this story is that a controlled and sustainable yield can, and should, act in everyone's interest, preventing overcollection, and ensuring a supply of wild animals in future years. On the debit side, restrictive practices can develop, resulting in higher prices.

The Great Barrier Reef is a collection of corals exceeding England and Wales in total area. Pollution is the greatest destroyer here, and in this respect, the 'greenies' and aquarists are on the same side!

Concerning the welfare of the various animals, the RSPCA aim for the licensing of traders in exotic pets. The question to ask is:

"Are you happy with the condition of the fish/invertebrates/tetrapods on sale?"

Andy Horton,  
(British Marine Life Study Society.)

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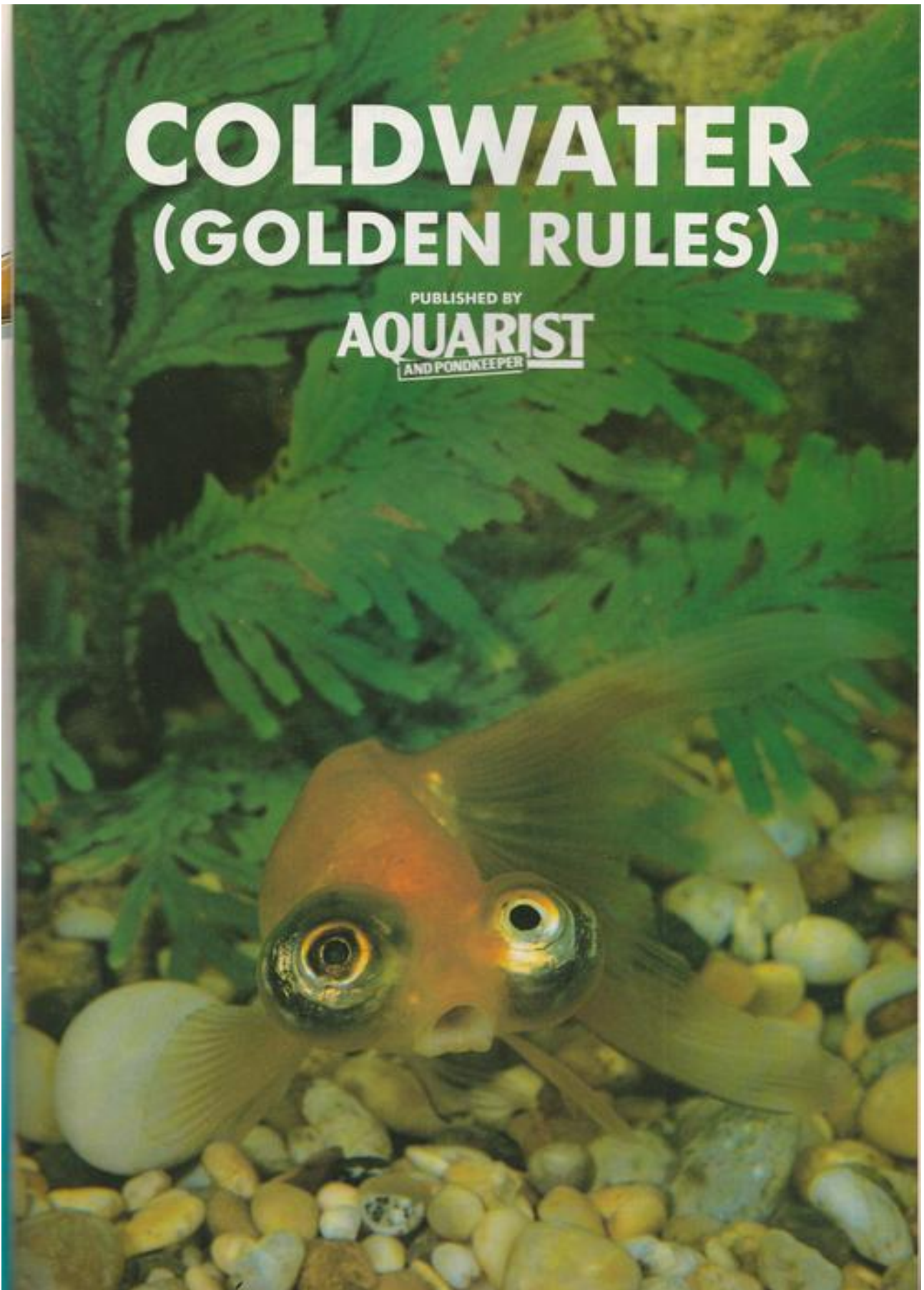
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# COLDWATER (GOLDEN RULES)

PUBLISHED BY  
**AQUARIST**  
AND PONDKEEPER



# COLDWATER SUPPLEMENT AQUARIST AND PONDKEEPER



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*(Cover photograph of a Celestial Goldfish — Max Gibbs, the Goldfish Bowl, Oxford)*

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## HOW TO GET THERE



# THE GOLDEN RULES OF COLDWATER FISHKEEPING (Questions & Answers)

DR DAVID POOL, Tetra Information Centre  
(Photographs courtesy of Tetra)

**C**oldwater fishkeeping in general, and pondkeeping in particular, are now enjoying a boom in popularity, with more and more people keeping a coldwater aquarium or installing a pond in their garden. The reasons for this greater popularity include the increased leisure time available, better equipment, healthier livestock, etc.

When starting in the coldwater hobby, there are a number of factors which should be considered in order to avoid the early pitfalls. These could be described as the Golden Rules of Coldwater Fishkeeping and, if followed, will allow one to get the maximum enjoyment out of this fascinating hobby. In this article, I will concentrate on keeping coldwater fish in aquaria, although many of the points raised are also applicable to pond-kept fish.

## THE EQUIPMENT REQUIRED

**Q** Should I choose an aquarium or bowl, and of what size?

**A** Goldfish bowls are far from ideal for keeping fish in. They provide very little space for the fish and, in addition, the surface area in relation to the volume of water is very small, resulting in low oxygen levels.



An aquarium allows even the new fishkeeper to start off with a collection of fish, rather than a single one.



Koi are great — but they are not ideal aquarium fish.

It is far better to use an aquarium to house your fish. In general, the bigger the aquarium the better. A large tank has many benefits over a small one, including being able to accommodate more fish, allowing them to grow to a larger size. Large aquaria are also easier to maintain.

This latter fact may come as a surprise to any newcomers to the hobby — but the larger volume of water takes longer to become polluted, giving you more time to put things right before the fish are adversely affected. As a guide, an aquarium which is 45 x 30 x 30cm (18 x 12 x 12in) should be regarded as the absolute minimum size in which to keep coldwater fish.

**Q** Is a filter necessary and, if so, what type should I use?

**A** A filter is not absolutely essential in any aquarium, but it does make looking after the tank and maintaining suitable conditions considerably easier. A suitable filter will reduce the frequency with which the aquarium needs cleaning, maintain clear pollutant-free water, and allow you to keep more fish in the tank.

The type of filter depends on the fish you keep, how much you wish to spend, and the space available. In general, a sponge filter powered by an air pump, or an internal or

external power filter, are the best buys. These filters mechanically sieve the water, keeping it clear and allowing helpful bacteria which remove organic pollutants to grow. A point of particular importance in a coldwater tank which contains Goldfish or Koi, is that these filters remove particulate matter out of harm's way — where it cannot be disturbed by the fish.

Undergravel filters are not ideal for coldwater aquaria which house Goldfish and Koi. Such filters draw debris into the gravel, where it is slowly decomposed by the helpful bacteria. However, Goldfish and Koi dig continually in the gravel in search for small food particles. In doing so, the debris is disturbed and will cloud the water, making the aquarium look unattractive.

**Q** Is a light necessary for the fish?

**A** Lighting is not necessary if you only keep fish in the aquarium. However, some lighting will allow you to view the fish more easily. If there are no plants present, one fluorescent tube, slightly less than the length of the aquarium, will provide suitable illumination. Most aquarium hoods have fittings which will take a fluorescent tube, but remember that you will also require a starter unit. A tube providing white light or 'day' light is, perhaps, the best, as it allows you to

see the natural colours of the fish.

If plants are to be grown, more light is required. As a guide, you should allow 12 watts of lighting for every square foot (900 sq cm) of water surface.

Avoid placing the aquarium on a window ledge, or in a position where it will receive direct sunlight. Sunlight will encourage the plants to grow, but also causes dense algal growth and will result in the aquarium overheating.

## THE LIVESTOCK

**Q** What types of fish can be kept in a coldwater aquarium?

**A** Most coldwater fishkeepers will place some of the many varieties of goldfish into their aquarium. The 'less fancy' varieties such as Comets, Shubunkins, Fantails and Orandas are ideal for most aquaria and particularly for children, since the fish are relatively hardy and forgiving of any mistakes.

For the more adventurous and experienced fishkeeper, there are a number of 'fancy' varieties such as Pearlscales, Bubble-eyes, Ryukins and Lionheads. These varieties are more sensitive to unsuitable conditions, and so require more care.

Other more unusual fish which can be kept in the coldwater aquarium include Bitterling, Ricefish, American Sunfish, Gudgeon and Shiners. All add variety and considerable interest to the aquarium. They also tend to be less destructive of any plants, and so can be kept in a well-planted aquarium.

**Q** Can Koi be kept in an aquarium?

**A** Koi can be kept in an aquarium, but they are not ideal fish for it; they are better suited to ponds. The simple reason is that they grow too big and therefore will require a large aquarium when they reach maturity. In addition, they tend to be messy feeders and will quickly disturb any debris in the aquarium. As a result, maintenance can be more time-consuming. Having stated this, many people successfully keep Koi in aquaria, as fry, when the fish are ill, or until they outgrow the tank.

Using a coldwater aquarium as a nursery can prove very interesting and educational. In fact, every pondkeeper should have one. When the Koi (or Goldfish, Orfe, Tench, etc) spawn in the pond, the aquarium can be filled with pondwater and a piece of aquatic plant or clump of algae covered in eggs introduced.

This will allow you to watch the eggs as they hatch and the fry as they grow. Feed the fry initially by adding matured pondwater which will contain microscopic organisms. After 3 to 4 days, the fry will feed on powdered baby fish foods and, once they are 1 to 2 cm long (0.4 - 0.8 in), on finely crumbled flaked food. Once the fry are more than 4 cm (1.6 in) in length they can, if necessary, be re-introduced into the pond.

**Q** What about tropical fish?

**A** Certain species of 'tropical' fish can be



Cloudy water — a sign of mismanagement — needs immediate remedial action.

kept in a 'coldwater' aquarium, providing the water temperature does not get too low. In a normal, centrally heated room, the water temperature should not drop below 16°C (61°F), and so would be suitable for fish such as Guppies, Platies, White Cloud Mountain Minnows and Paradisefish. These fish should be gradually acclimatised to the lower temperatures and not subject to any sudden drop.

**Q** Are plants necessary?

**A** No, but they look attractive. If Goldfish and, particularly, Koi, are kept, growing plants may prove difficult, if not impossible, owing to the fish eating any fresh shoots and uprooting the remainder. Protecting the base of the plants using a stone will help to reduce uprooting. To prevent the fish eating the plants, you should select hardy varieties such as Vallneria, or rapidly growing species such as Canadian Pondweed (*Elodea*).

The plants, themselves, provide a natural background against which you can view your fish. They also absorb large quantities of pollutants which would otherwise adversely affect the fish and encourage unsightly green algae.

**Q** How many fish can I keep in my aquarium?

**A** There is a great tendency to overstock a coldwater aquarium. This results in more fish waste being produced than the filter can decompose, thus causing dangerous water pollution.

As a very approximate guide, you should allow 1 inch (2.5cm) of fish length for every 24 square inches (c150 sq cm) of water surface. The water surface area is important because it is from there that oxygen is absorbed into the water.

The above guide would allow some margin for growth. So, for example, in a 24 x 12 x 12 inch (60 x 30 x 30 cm) aquarium you can add 12 inches (30cm) of fish length. This could be twelve 1-inch (2.5 cm) fish, but they would quickly grow and overstock the tank. Instead, I would suggest you should add 2 or

3 fish. Each fish would then have plenty of space to grow and would probably reach a length of 4 to 6 inches (10 - 15 cm).

## AQUARIUM MAINTENANCE

**Q** What maintenance is necessary to keep the fish in good condition?

**A** Regular aquarium maintenance is, undoubtedly, the secret to successful fishkeeping. The tasks involved are simple and not time-consuming, yet, without them, your aquarium will quickly degenerate into an unattractive and unhealthy place for the fish to live.

The tasks that need to be undertaken can be divided into those which should be undertaken on a daily basis, every two weeks and only occasionally. These are as follows:

**Daily** Check the filter and air pump (if used) are working effectively.

Check the fish numbers.

Observe the fish for unusual behaviour which would indicate poor health.

Turn aquarium lights on/off.

Feed the fish twice daily.

**Two-weekly** Undertake a 25% partial water change.

Clean the filter.

Remove any algae from the aquarium glass.

Clean the condensation tray (if used).

Measure the water quality using a reliable test kit.

**Occasionally** Prune the plants and remove any dead leaves.

Replace fluorescent tubes.

Check electrical apparatus.

**Q** What is the best way to clean the aquarium and filter?

**A** Once established, it is rarely necessary to empty and clean out an aquarium completely. However, regular partial water

changes and cleaning are important to ensure that the fish and plants remain healthy. The fish, in particular, can often be seen to be more active, and show better coloration, following the introduction of clean water.

Adding fresh water to the aquarium dilutes any pollutants (such as nitrates) which may be present. While the nitrate concentration within an aquarium will rarely reach lethal levels, it can retard the growth and fin development of the fish and make them more lethargic, even at relatively low levels (40 mg nitrate per litre of water).

Removing water from the aquarium should be combined with a general clean-up and, particularly, with the removal of any debris or uneaten food. Using a gravel cleaner (such as the Tetra HydroClean) will allow you to remove any debris from the gravel without clouding the water. Regular use of a gravel cleaner also prevents the gravel from becoming clogged with debris and allows the undergravel filter, if used, to

function more efficiently.

If you use an undergravel filter, it is advisable occasionally to place the siphon tube down the filter uplift tube and remove water from under the filter plates. It is remarkable how much debris accumulates there.

Removing about 20-30% of the tank volume is sufficient. With the water level reduced, this is an ideal opportunity to undertake any other routine maintenance tasks that might be necessary.

Remove any algae from the front glass of the aquarium. This can be done using commercially available algae scrapers, although I have found a piece of filter wool or, better still, a piece of net curtain, to be more effective, with less chance of damaging the aquarium sealant. Only clean the front glass of the aquarium. The algal growth on the back and sides not only looks natural, but it also provides valuable food for the fish and removes large quantities of nitrates from the water.



Fancy Goldfish — or the plainer varieties — do well in aquaria that are properly maintained.



Feeding one's fish provides one of the many daily highlights.

Your filter will also need cleaning to remove any debris that it may have trapped. I have already mentioned how undergravel filters should be cleaned. The filter media in box or foam filters should be removed and rinsed in lukewarm water. Do not use hot or very cold water, as this will kill many of the beneficial bacteria that are present, thus reducing the effectiveness of the filter.

When replacing the water, it is important to ensure that it is at the same temperature and of the same quality as the water in the aquarium. Any large changes could stress the fish, making them more susceptible to infection by disease. The addition of a good quality water conditioner (eg AquaSafe) before replacing the water is a good idea.

Tapwater is specially treated to make it suitable for human consumption. This includes adding substances, such as chlorine, to remove any potentially harmful organisms. Chlorine is also toxic to the fish. Therefore, to prevent any harm occurring, it needs to be removed using one of the proprietary products available.

When replacing the aquarium water, again use a siphon. Direct the water flow along the length of the aquarium, rather than at the plants or gravel. In this way you avoid disturbing any debris in the gravel or uprooting any plants.

**Q** What should I feed fish on?

**A** Feeding the fish is, perhaps, the most enjoyable and most important task that needs to be performed on a daily basis. The fish should be fed once or twice each day, but only with as much food as they will consume in a few minutes. Any uneaten food should be removed, as it will otherwise quickly pollute the water, causing problems for the fish.

Coldwater fish should be fed on a good-quality flaked or stick food. As a guide, fish under 8 cm (3 in) in length should be given a flaked food, while larger fish will accept a stick food. Stick foods are ideal for larger fish, as it comes in bite-sized pieces, with no small particles which could remain uneaten.

For Goldfish and Koi, a food containing a natural colour enhancer is advisable. Fish do not manufacture their own colour pigments and need to get them from their diet. By feeding a food with natural colour enhancers, the coloration of the fish will be maintained and, in many cases, improved.

While feeding your fish, you will soon get to know the normal behaviour patterns of each individual, and so will immediately be able to recognise fish that are behaving unusually.

Such behaviour is often the first indication of an unhealthy fish, or a problem with the aquarium. In both cases, it should be examined more closely.

#### FURTHER INFORMATION

Further information and free leaflets on all aspects of coldwater fishkeeping, in both aquaria and ponds, are available by writing to The Tetra Information Centre, Lambert Court, Chestnut Avenue, Eastleigh, Hampshire SO5 3ZQ, or by telephoning the Tetra Leaflet Line on 0703 643339.

# SETTING UP A COLDWATER AQUARIUM

If you are thinking of setting up an aquarium for temperate freshwater species of fish, go no further until you read **Pauline Hodgkinson's** sensible advice on how to get things right

**S**uggest a set-up for coldwater fish and most people immediately think of Fancy Goldfish. In fact, there are many fishes — in addition to Fancy Goldfish — that are only able to survive at cold or cool water temperatures. Many of these species are colourful and interesting subjects worthy of a place in our aquaria so that they may be studied and enjoyed. We, in turn, must therefore provide the best possible habitat for their existence.

In recent years, we, the hobbyists, have been enjoying the benefits of a wider choice of fishes than ever before, and this season should prove to be no exception. Already this year, most of the shops I have visited have had a few of the species we might consider keeping in our coldwater displays. These include Bitterling, Rainbow Dace and the White Cloud Mountain Minnow. Others we possibly will also be able to find are Gudgeon, Killifishes, Loaches — such as the Weather Loach, Medakas or Ricefishes, Sunfishes and the Red Shiner. Of course, there will also be members of the carp family and catfishes, such as the Channel Catfish and Bullheads, but when choosing fish for aquaria, it is important to consider the eventual size the fish might attain before going ahead and making a selection. If this is ignored, problems will undoubtedly arise later when these large, and in some cases predatory, species are housed in aquaria which they rapidly outgrow.

## AQUARIUM SIZE

The first thing to consider is the aquarium and its size. The practical thing to do is to start with the largest aquarium you can afford, or the largest which is able to fit in its chosen location. In any case, it is not a good idea to use an aquarium smaller than 24 x 12 x 12 in (60 x 30 x 30 cm) because small volumes of water can have dangerously rapid temperature fluctuations. In such aquaria, the water can become much too warm for the type of fish being kept there to tolerate during warm weather spells. Many of our own native pond and river fish cannot survive for long at high temperatures.

Some coldwater fishes also consume more oxygen than tropical types so this is another reason to avoid small aquaria. Aquaria are readily available in a range of standard sizes but, in fact, most retailers are able to offer their customers a made-to-measure service, so you can have a tank specially constructed



Coldwater aquaria can be every bit as luxuriant as their tropical counterparts — but they need careful planning and proper management. This particular set-up was a prize winner at the 1990 Yorkshire Aquarist Festival.

to fit into most locations. I have seen several outstanding displays set into a wall recess, in the dividing wall of two rooms, in the chimney breast of a room which had long ceased to be warmed by a coal fire and many more odd-shaped locations brought to life with the aid of a beautiful aquatic display.

## SITING THE AQUARIUM

Unsuitable locations are those in direct sunlight from a window, in close proximity to a room heater, or close by a doorway where it would be in a direct draught. All such

places could mean that the water temperatures within the tank would be likely to suffer rapid changes or, indeed, high temperatures which, of course, must be avoided.

The aquarium must sit on a surface which is both level and strong enough to withstand the weight of the completed set-up. The overall weight with gravel, rocks, and water can be considerable, so it is essential that the tank housing must be capable of taking such a strain. There should also be enough room around the tank so that it can be set up on site and maintained without obstructions and in complete safety. Never attempt to move the



The Red Shiner (*Notropis lutrensis*) is just one in an ever-growing range of coldwater species suitable for home aquaria.

tank once it contains gravel and rocks; the strain could be too much for the glass and those lifting it. It is also an advantage to have power points close by so that wires connected to pumps, filters and lights are confined to a safe distance, yet convenient enough not to have them where they may cause an obstruction or be unsightly.

Sit the aquarium directly on a sheet of polystyrene which will absorb any unevenness in the surface below. This is quite an important procedure, as an uneven surface could cause stress to parts of the glass. Should this happen, it could result in cracking and leakage.

#### SETTING UP

Once you have your tank in position, make sure that you are satisfied that it is level (you can check this with a spirit level). This is another important consideration because, once the aquarium is filled, a sloping water line will considerably spoil the look of the set-up and probably make it necessary to strip it down and begin again.

#### Filters

The next step will be to fit the under-gravel filter plates into position, should this be the type of filter system you have chosen.

Filtration is not absolutely essential, but it is a great aid in assisting the fishkeeper in maintaining good and healthy water conditions. The novice fishkeeper will find a filter a most useful aid while he/she is learning the basic principles of fishkeeping. Good water quality is vital for the fishes' survival.

There are several types of filter systems available, from the cheapest, simple sponge type, through to the much more expensive canister units with their own built-in motor.

One of the purposes of the filter is to remove particles from the water. These are collected within the filter in the medium

which may be filter wool, foam, gravel, carbon, ceramic chips, or some other suitable alternative. It can also be a combination of some of these, depending on the type of filter being used. A second very important part a filter plays is to create an area for bacteria which will break down harmful elements that could be detrimental to the wellbeing of the fish.

A filter should be left running 24 hours per day. Periods when it is not running lead to the bacteria within the filter being starved of oxygen and, eventually, dying. That, in itself, would create a pollution problem which would have a bad effect on the whole

tank environment.

Which type of filter to use is, of course, up to the individual. Everyone has their own opinion as to which system is the best, but just how efficient each system will be will depend on whether it is large enough to cope with the volume of water it is to filter, on the stocking levels and on the maintenance regime adopted.

#### Box/sponge/foam filters

Box filters and sponge filters are inexpensive. In many set-ups, they are pretty efficient, but they do need regular maintenance.



Few home aquaria can be large enough to house a collection of coldwater fish such as this one. An excellent filtration system is absolutely essential for such aquaria.

# GOLDEN RULES FOR GOLDFISH KEEPERS

Goldfish may be hardy, but they still demand as much care as any other type of fish. Stephen Smith lays down all the basic rules.

**T**he attraction of Goldfish-keeping as a hobby is its simplicity. Isn't it . . .? After all, what could be simpler than a Goldfish in a bowl or a garden pond? According to many people, the pond never needs to be kept clean; while the Goldfish bowl can be swilled out every so often . . .!

If only it were quite that simple. However, if you are going to get the most from your hobby, commonsense will guide you through most of the basic requirements of keeping a fish happy and healthy, and it need not be that difficult or time-consuming.

My own basic rule — especially to newcomers to the hobby — is, simply: "Keep it simple!"

There is little point in embarking upon any hobby which is going to become a millstone around your neck. OK, so there may be hundreds of hobbyists with scores of ponds and aquariums and thousands of fish, but can you imagine yourself cleaning all those ponds or tanks, let alone coping with a mammoth task of feeding the fish?

Like the Forth Bridge, no sooner will you have finished all those chores, than you will have to start all over again.

## GRADUAL DEVELOPMENT

One of the most common causes of people 'dropping out' of the fishkeeping hobby stems from them taking on too much. The hobby need not be so complicated — unless you want it to be. So, pitch yourself at a level to suit you, and let things develop gradually.

One tank is quite enough to start with, thank you. And if you enjoy all the fun (and it is fun) of keeping a couple of pet Goldfish, you may, possibly, stand a chance of becoming more involved in some of the weightier issues of Goldfish-keeping, some of which will be discussed in this article.

The first Golden Rule which was drummed into me by my mentor and fellow hobbyist, the late Tommy Sutton, will be familiar to all who knew him: "Cleanliness is next to Godliness".

Would you keep a rabbit in wet, smelly straw, without changing it for weeks, or even months? It may surprise you that this is exactly the way some folk have admitted that they have kept their fish.

Think about it . . . We, as humans beings, enjoy the luxury of (almost) unlimited supplies of oxygen, which is continuously replenished by the action of photosynthesis



This telescope-eyed twin-tail Goldfish variety is one of the many types developed in the Far East and currently available in the UK.



Choose your varieties carefully. This is an Oranda — fine for an aquarium, but not for a pond.

throughout the globe.

The Goldfish's 'globe' is often just that: a spherical glass chamber which, if it receives the assistance of those who know no better,

rapidly becomes a torture chamber. Buy a small aquarium, measuring approximately two-feet by one foot by one foot (60 x 30 x 30cm) in which you will accommodate no



more than two attractive pet Goldfish.

Only two? But, of course. Remember the pet rabbit? As well as regular clean straw, didn't it have space in which to move around and to grow? Likewise, your favourite fish need space to reach their full potential.

## STOCKING

Therefore, however small you think your fish may appear to be in their two foot aquarium, stick with it. They will soon be not so small and, eventually, surprisingly large.

My own Golden Rule for stocking fish is to allow no more than one fish per square foot (900 sq cm) of surface area — whether an aquarium or pond. So forget all those complicated formulae, and those gallonages; simply multiply length times breadth and there's your maximum number of Goldfish (ie: in a two-foot by one foot, no more than two fish; in a 10 foot by five foot pond, no more than 50 fish). Naturally, this is intended only as a general guide; if your fish is greater than 4.5 inches (10-12.5cm) in length (nose to tail), then each fish will need a larger surface area, and the general formula then is accepted, ie, about 1in (2.5cm) of fish per 24 sq in (150 sq cm). After all, isn't it far more enjoyable to have two healthy fish happily dominating an aquarium, than two dozen ailing specimens which will only end with their own demise and that of any interest the hobbyists might have had in the first place?

Remember, too, that the water is the fish's total environment. The greater the volume of water, the less polluted it will become between water changes. But that is no excuse for leaving the water changes for yet another week. I undertake a water change of no less than 30-50% in each of my aquariums at least every two weeks — sometimes more often. Thus, harmful waste toxins can be flushed away (down the drain — not the kitchen sink!) and provide the fish with a cleaner, healthier environment in which they will continue to thrive. This is, providing you feed them properly, of course.

Having got everything else right, why do people assume that a fish requires three square meals a day, just as we do? Here, the Golden Rule is: "feed little and often and, if in doubt, not at all".

Goldfish do not have the digestive capacity for which they are often given credit. They have no stomach, and digestion takes place as the food travels along the gut. Any food which isn't digested is simply discarded at the other end, along with other waste matter. Therefore, constant feeding will only do harm to the fish, and all that research which manufacturers of today's proprietary fish foods have done will have been completely, and quite literally, wasted.

In general, a normal-sized pinch of flake food, for example, will provide enough nourishment for one fish for a day. What more can the fish want? When feeding your Goldfish, drop just a few flakes onto the surface of the water and see how long it takes for the fish to consume them. If, after five to ten minutes, there are still uneaten flakes



Ensure that you thoroughly clean your pond at least once a year, preferably before the onset of winter, when toxic gases from rotting debris can cause severe problems.

left, then don't add any more. Conversely, if all of the food is devoured within a couple of moments, still wait for an hour or so, then provide just a further few flakes.

My own regime is simple: during the season, for fish kept indoors, a pinch first thing in the morning, a pinch early evening and, maybe, a pinch late evening. For those kept outdoors, a small handful of pellets in the morning, and, likewise, early evening.



Wherever you decide to put your fish on the show-bench, always check the Standards for each individual show before you make your entry. The fact that a favourite Goldfish may have won top honours at one show does not necessarily indicate that it will achieve a placing at the next.

If any food is seen to be uneaten, then I do not feed the fish at all and, every week, the fish enjoy a 'day off' from feeding altogether, which, in my opinion, does them more good than harm. (Similarly, it is far safer to make no arrangements for feeding your fish while you are on holiday for up to two weeks — again, you will probably find them looking healthier than ever upon your return!)

And, come the close-season, my outdoor fish are rarely fed between mid-November and late February, while even those kept indoors receive only one feeding every morning.

## OFFSPRING

Correct feeding, therefore, is an essential part of ensuring that fish are kept in tip-top condition, to promote healthy growth and, not least, produce strong offspring.

Without doubt, one of the most enjoyable aspects of Goldfish-keeping is producing and rearing fry. And here lies the root of another Golden Rule.

The many and wonderful varieties of Fancy Goldfish available today are the results of hundreds of years of dedication by the fathers of our most pleasurable pursuit. By careful and selective breeding, individual genetic strains have been created and, over the centuries, purified to ensure that the majority of the varieties are strong.

Therefore, it is most undesirable to cross-breed from one strain to another. For example, an Oranda would be perfectly capable of producing a cross-strain with a Moor, but the result would be an intermingling of the characteristic genetic qualities of each strain. While you may not think that your own 'dabblings' would have any effect upon the Goldfish scene, just one bad mutant accidentally introduced into a breeding line could completely destroy the genetic make-up of that line. So, resist that particular temptation and, if you wish to pursue this particular aspect of the hobby, and it is highly recommended, go out and obtain the best breeding pair you can afford. Such a pair should possess most of the characteristics of your favourite variety (a good guide to which is provided by the Show Standards of any coldwater society).

## STANDARDS

Remember that Show Standards are only a guide to the ultimate: an ideal to which breeders strive. There is no such animal as the perfect fish — more important is what is perfect for you.

Eventually, however, you may want to pit the strengths of your own fish's characteristics against those of other hobbyists. There are a number of specialist Goldfish shows around the UK which attract Goldfish across the length and breadth of the land. Not each show judges the entrants by the same set of Standards, though, so it is important to bear in mind a further Golden Rule: always obtain and check the Standards of any show you wish to participate in before making an entry.

I have occasionally seen fishkeepers disappointed and more than a little bemused by the fact that their particular favourite didn't achieve a place in a particular event, yet won Best in Show the week before!

### OBTAINING FISH

Going back to obtaining fish, just where can we obtain the best quality, at the best price? There are two main options: a number of reputable retailers of Fancy Goldfish have become established throughout the UK, as the advertisements of this publication will reveal. The majority of them will happily provide you with advice and guidance on choosing the best fish to suit your purpose (and your pocket!). Alternatively, extremely good Goldfish can be obtained for a modest sum from fellow members of a specialist coldwater or Goldfish society.

Wherever you obtain your stocks, though, do make sure you quarantine them thoroughly. My own newly-acquired fish are kept in a bare aquarium for at least six weeks before they are introduced into the pond or tanks with other fish. This enables any parasites or diseases to show up without endangering my existing stocks. Do not let yourself become tempted by "that pretty fish" in the garden centre. How many times has that fish been launched into a pond immediately upon the return home, only to cause a complete wipe-out of the other inhabitants?

A similar process of quarantine should also be carried out for plants, as fish are often kept with them at retailers' premises, and parasites can be transferred to your own set-up.

Snails are also often inadvertently transferred to garden ponds and home aquariums in this way and you will find that the only way to eradicate an infestation of snails is a complete strip-down.

A further note of caution when obtaining stocks of fish or plants. **Never, ever, take these from the wild.** Apart from the fact that it is quite illegal to do so, there is an enormous risk of parasitic infection and the outbreak of severe disease. So, regardless of the temptation, simply don't.

### FILTER

It is a popular misconception that, at the end of every pond season, the pond filter should be shut off, stripped down, gravel thoroughly washed, and the whole thing left dormant until the new season starts.

While this may not cause any particular harm to your fish, the whole process does nothing but render the filter wholly ineffective.

It can take up to two years for a fully-adequate pond filter to become 'mature', that is, until all the bacteria within the filter bed have reached their fullest capacity for disposing of all the waste matter produced by the pond inhabitants.

It is such a circumstance which causes the less patient pondkeeper to exclaim, within six months of commissioning the filter, that it isn't working properly. Give it time! You



New and more exotic varieties of Fancy Goldfish are being introduced continuously into the UK — but avoid cross-breeding. This will only serve to destroy genetic strains which have been refined over centuries.

will find that, come the second year, a miraculous transformation takes place and that the 'pea-soup' of the previous year really is a thing of the past.

Rather than strip down the filter every year, and lose that lovely build-up of healthy bacteria within the filter medium, you should, instead, **completely clean out the pond every year.** And, rather than a spring-clean, this task should be undertaken before the winter sets in.

By far the biggest cause of fish fatalities, come the new season, is overwintering in a, frankly, smelly pond. Rotting vegetation and

mulm deposited throughout the season causes a build-up of toxic gases which, especially when trapped beneath a layer of ice, can kill or, at very least, stress the fish.

Therefore, with the arrival of spring, bacteria strike at a time when the fish are at their least healthy, having used their stocks of energy. The subsequent stress often leads to the demise of the fish. So **pay close attention to water quality**, especially at the beginning of winter and at the start of the new coldwater season (around March/April).

Finally, one last Golden Rule — whatever you decide to do: **enjoy it!**



Although you may often see any quantity of fish in retailers' tanks, restrict your own stocking level to no more than one fish per square foot of surface area.



*Echinodorus cordifolius* is a good specimen plant, as long as the temperature does not drop below 65°F (c18°C).

## PLANTING A TEMPERATE AQUARIUM

Barry James of Everglades Aquatic Nurseries picks out his top six rules for successful plant cultivation and recommends the best plants for coldwater aquaria

(Photographs by the author)

**S**omebody once said — and I think it was me(!) — that the biggest problem in planting a coldwater or temperate aquarium are the fish. All goldfish varieties are derived from members of the carp family. As such, these fish are omnivores, consuming both animal and vegetable matter. Softer-

leaved plants, such as *Egeria densa*, therefore, will often be stripped of their leaves within a few days. Furthermore, these fish feed primarily on the bottom and are adapted to sifting the mud at the base of the pools in search of worms and crustaceans. Larger fishes over 3in (7.5cm) in length can literally 'plough' the gravel of the aquarium, uproot-

ing plants in the process. The first rule, therefore, is to keep only juvenile fishes of the carp family if you want to plant an aquarium well.

However, if you are determined to keep some vegetation in an aquarium with larger fish, choose 'toughies', such as Giant Sagittaria (*Sagittaria latifolia*) or Japanese Sweet Rushes (*Acorus* species). These should be pot grown and the pots buried in the gravel up to their rims and surrounded by large pebbles to prevent the fish uprooting them. Fortunately, modern fishkeepers are spoiled for choice when it comes to other fish species which do not damage plants. Bitterling, Rosy Minnows, Cliquers, Catfish, White Clouds and many others will all harmonise.

### TEMPERATE CHARACTERISTICS

Temperate aquatic plants come from a wide range of habitats and across several degrees of latitude. Those from the more northerly regions of Europe, Asia and North America are what are known as 'long day plants'. During their growing season, they experience 16 hours or more of daylight in the warmer months. As one goes farther south, this decreases, until one reaches the equator when the day is exactly 12 hours.

Most temperate plants hibernate during the colder months and are triggered into life with lengthening days and increasing water temperatures. These plants, in general, have a limited life in aquaria, owing to the particular demands they make on the aquarium owner. However, plants from the southern temperate and sub-tropical areas will thrive very well in unheated aquaria. So the second rule for establishing a 'long life' coldwater planted aquarium is to use sub-tropical plants.

### REQUIREMENTS

Planted coldwater tanks need to be at least 15in (37.5cm) or, preferably, 18in (45cm) in depth to achieve satisfactory results.

Like their tropical cousins, temperate plants grow in mainly clay-based pools and lakes. The substrate should therefore consist of  $\frac{1}{8}$  to  $\frac{1}{4}$ in (c0.5 - 0.6cm) gravel mixed with a proprietary substrate additive, such as Everite No 3 which is designed for coldwater plants. This mix is laid down to a depth of  $\frac{1}{2}$ in (c1.3cm) and a gravel tidy placed on the top. Further washed gravel to a depth of 2in (5cm) should be added. The third rule should therefore be to give the plants a good nourishing base for healthy root growth. Obviously, it would not be possible to use undergravel filters with these substrates. These filters tend to have a deleterious effect on plant growth — particularly if used with powerheads — and should not, in my opinion, be used in any case. Rule No 4 should therefore be to use a good submersible or exterior power filter.

The pH (acidity/alkalinity) and GH (General Hardness) of the water used in coldwater aquaria is not a major consideration, as most of these plants are native to hard water areas where the pH is high. Aim for around 7.0 pH and 15-20° DH (degrees of General Hard-

ness). As far as the temperature of the water is concerned, anything between 55°F-75°F (c13-24°C) will be acceptable.

Temperate plants need a lot of light per day. With fluorescents, aim for 20 watts per square foot of surface area. A full spectrum tube is essential. Power Glo, Triton, True-light or Aquastar should all give good results. These should be left on for 12 hours per day. This is **Rule No 5**.

When it comes to aquarium decoration, coldwater fishkeepers have the option to use calcareous rocks as well as the harder rocks specified for most tropical fish. Limestone is quite acceptable.

**Golden Rule No 6** is always to situate the tank in the darkest area of the room. Exposure to direct sunlight will almost certainly lead to algal growth.

## THE PLANTS

As in tropical aquaria, one should aim for a balanced mixture of tall and short subjects in order to give the aquascape a professional and aesthetically pleasing finish.



Above, American Milfoil (*Myriophyllum elatinoideus*) — a tall plant suitable for planting along the back of the aquarium.

Left, Red Ludwigia (this is the emerse — air-grown — form) is suitable for the background and corners.

### ① Tall Subjects for the Rear of the Tank:

*Vallisneria spiralis* — Straight Vallisneria  
*Sagittaria subulata* — Ribbon Arrowhead  
*Myriophyllum elatinoideus* — American Milfoil  
*Ludwigia mulleri* — Red Ludwigia  
*Lyrimachia nummularia* — Creeping Jenny  
*Egeria densa* — Giant Elodea  
*Cardamine lyrata* — Japanese Cress

### ② Specimen Plants for the Central Area of the tank:

*Najas japonica* — Japanese Spatterdock  
*Najas lutea* — Eurasian Spatterdock  
*Sagittaria latifolia* — Giant Sag  
*Echinodorus cordifolius* — Radicans Sword-plant (Minimum 65°F — c18°C)  
*Acorus gramineus variegatus* — Striped Rush — In Clumps  
*Ophiopogon japonicum* — Japanese Fountain Plant



Above, among the rushes, *Acorus gramineus* var. *pusillus* is a good choice as a foreground plant.

Right, *Nuphar lutea* (the Eurasian Spatterdock) — a recommended specimen plant for the central area of the aquarium.

③ Dwarf Plants for the Foreground:

- Acorus gramineus* var. *pusillus* — Dwarf Rush
- Armoracia aquatica* — American Cress
- Samolus parviflorus* — Water Cabbage
- Hydrocotyle vulgaris* — European Pennywort
- Lilacopsis novae-zealandae* — Carpet Sword
- Martilea quadrifida* — Four-Leaf Clover
- Ophiopogon japonicus* var. *pumillum* — Dwarf Japanese Fountain Plant
- Elocharis acicularis* — Dwarf Hairgrass

④ Plants for growing on Rocks and Bogwood:

- Fossinialis antipyretica* — Willow Moss

⑤ Floating Plants:

- Ceratophyllum demersum* — Hornwort
- Riccia fluitans* — Crystalwort

## AFTERCARE AND MAINTENANCE

The taller plants at the rear of the tank should be regularly pruned to retain their shape. After nine months or so, some of these will need to be replaced as they outgrow their strength. Fertilisers should be added at the prescribed intervals, especially the trace elements.

Where algae, especially the filamentous types, begin to appear, these should be speedily annihilated before they take hold, using a good algicide.

Regular maintenance of the filter, and periodic 'hoovering' of the bottom, should become routine. This is especially important if fine-leaved plants, such as Milfoils, are used, as their fine leaves soon become clogged with suspended debris.



# WHAT'S NEW ON THE COLDWATER SCENE?

Dr David Ford, of the 'Aquarian' Advisory Service, reports on the most recent developments in the coldwater hobby



DR DAVID FORD

Coldwater aquarium set up by 'Aquarian' at the Green Home in the Ecology Pavilion at this year's Ideal Home Exhibition. Note the use of low-voltage lighting.

**T**he latest data from the information services company ISI is that 11.7% of British households own Goldfish (the classification for all coldwater species is Goldfish).

This means that, of the 21.53 million homes in the UK, 2.5 million families own Goldfish. One million have ponds and 1.3 own Goldfish aquaria, with 200,000 homes having both indoor and outdoor coldwater fish.

The figure from surveys in previous years was 10.1% homes in 1989 and 8.1% in 1984, which, allowing for the increase in the number of homes, means a 48% increase in coldwater fish ownership in the last 6 years!

## FISH

Imports of coldwater fish are very active this year. Many varieties of Fancy Goldfish in superb condition are being shipped from

Hong Kong to the world's market, but the fish originate in mainland China, and so are very cheap and plentiful. The most successful Chinese fish is the Sarasa Comet, ideal for both the large aquarium and pond. Numerous varieties are now being imported by companies such as Golden Phoenix.

JMC at Dronfield report excellent coldwater fish direct from China, particularly Black Orandas and Butterfly Orandas. They also still continue to import the China Rainbow, a Bitterling that has still not yet been officially named.

Koi continue to arrive, but sometimes with diseases such as the Asiatic Tapeworm, which fish vets are finding in British game and food fish. The interest in Butterfly Koi, the American Longfinned variety, has faded. The Japanese have decided not to recognise the variety, so showers no longer breed them. Hobbyists owning the fish report poor growth and deformity — the heavy fins



DR DAVID FORD

In many countries, new varieties (like this cross between an Oranda and a Moor which won a top award at a US show) are beginning to have an impact this year.

make the large fish poor swimmers.

British-raised Koi will be on the market in substantial numbers by next year. Fish farmers who raise salmon, trout and carp for the table have discovered ornamental coldwater fish. Many are importing good-pedigree Koi as fry and raising them in outdoor pools or captive streams. It takes two or three years to produce saleable fish, but those seen so far are excellent in body shape and colour, and are both hardy and free of disease or parasites. They are also conditioned to our climate. Look out for these fish in '92 and '93.

The US is also starting to supply coldwater species such as Darters, Shiners, Sunfish, Gars etc. These fish are considered bait fish in the US and are raised commercially for fishermen to hook as lures for game fish, hence the most colourful species are farmed. They make beautiful and hardy ornamental fish for the aquarium and pond.

The North American Directory of Aquaculture (copies at \$32.50 plus \$7.50 overseas postage can be obtained from Kevgor Aquasystems, PO Box 5732, Bellingham, WA 98227, USA) details 4000 aquaculture contacts that include these bait fish farms. Many can supply American coldwater fish in bulk; dealers/importers please note.

The expert on North American fishes is Dr Robert Goldstein of Raleigh, North Carolina, an A & P contributor who was sponsored by 'Aquarian' to attend the 1990 Aquatics Trade Conference at Sparsholt College. His lecture on USA fishes suitable for the home aquarium is in the Proceedings

of the Conference... details of its availability and cost from the **Conference Manager, Jane Lloyd, Sparsholt College, Sparsholt, Winchester, SO21 2NF.**

## PLANTS

Watergarden centres are finding marginals very popular and the trade has responded by bulk production of the popular varieties, giving lower costs. At around £2, one can get the ever-popular Irises in many colours. *Mimulus* (*Mimulus guttatus*) is cheap and its brilliant yellow flowers very attractive. The red variety is only a little more costly (*Mimulus cardinalis*).

Suppliers such as Anglo-Aquarium report that garden centres are expecting a much more professional approach to selling water plants, with displays complete with growing details and advice. There is also a surge in interest in indigenous plants for the water garden, rather than exotic imports; a welcome response to ecology thinking by hobbyists.

## PRODUCTS

The newest product in the waterplant trade is the Finofill basket. This is a fine mesh pot which eliminates the need for hessian (which rots and releases soil).

The new coldwater food products this year for coldwater fish include a Floating Pond Food from the 'Aquarian' range of fish foods. Available in large (500g) and medium (100g) tubs, the floating pellets are designed to be an ideal diet for carp nutrition, and so, suitable for pond Goldfish and Koi.

## EXHIBITIONS

The interest in ecological matters has given problems for exhibitors of marine fish, especially invertebrate tanks with corals — live or bleached. Even tropicals have been criticised, where wild-caught species are

advertised or exhibited. This is all nonsense, of course, since the species taken by the hobby are infinitesimal compared with those taken as food. The losses through pollution are millions of times greater too.

However, the consequences of this ecology thinking is that coldwater fish are the 'in' thing. Many species, such as the Fancy Goldfish, are totally ornamental and could not even exist in the wild. The fact that a heater is not required reduces energy input. The calming effect of watching the pond or aquarium species has been studied by several groups (eg the International Society for Companion Animals) and medical papers have been published detailing lower heart rates and reduced blood pressure.

All this activity has made coldwater fish a 'green' item, ie they are acceptable to the Green Party and similar ecology-minded groups. This is the reason the Green Home in the Ecology Pavilion at the Daily Mail Ideal Home Exhibition at Earls Court, London last April, had not one, but two coldwater tanks. One was sited in the living room in a decorative pillar lit by low voltage minibus, and another was in the bedroom for viewing while resting.

They contained Fancy Goldfish (Fantails and Veiltails) with decorations of African petrified logs and American Indian carved stone. These decorations bring work to Africans who collect the logs from the jungle, and Indians who carve the cave and bridge-like features in their local stone, hence these decorations are acceptable to the Green lobby.

## DISEASES

The 'Italian Disease' (Carp Erythrodermatitis) has almost faded away after about 5 years of wreaking havoc in Goldfish, but the long hot summer of 1990 seems to have encouraged other diseases in coldwater fishes to become a problem. Parasites have proliferated, such as body and gill flukes,

especially tropical species: these have infested coldwater fish in the highest water temperatures.

The main problem in ponds has been a surge of Carp Pox (*Epiplatium papulosum*) with reports of the virus actually killing both Goldfish and Koi. This virus is not supposed to be harmful, just disfiguring, with its wart-like growths. Natural immunity is supposed to cure the fish in time, but many hobbyists are finding that the fish are becoming overwhelmed in the waxy growths. There is no cure, but a good technique is to flick any growth on the body, so that the fish becomes aware that a 'tumour' is present. The natural immune system then gets underway... the virus exists by hiding its presence from the fish. Use a finger and thumb to flick the wart with a hard blow.

Veterinary interest in ornamental fish is growing. There is now a **Fish Veterinary Society** and Vets who can handle ornamental fish problems are listed by the British Veterinary Association at their London HQ (7 Mansfield St., London W1M 0AT. Details of the Fish Vet. Society can be obtained from their President, G D Cawley MRCVS, Border Research, Talkin, Brampton, Cumbria).

The British Small Animal Veterinary Association's annual conference was held at the International Conference Centre in Birmingham last April. The commercial exhibition included a large tank of coldwater fish (Goldfish and Koi) on the Waltham Stand ('Waltham' is the international centre for the study of the needs and care of pet animals, and is a world authority on pet care and nutrition). It generated a lot of interest by veterinarians and leaflets were taken on the needs and care of pet fish.

## BOOKS

The books published each year on ornamental fish are regularly featured in this



Chinese Fancy Goldfish (these are Chocolate Pompons from Mainland Tropicals in Singapore) are appearing in ever-larger numbers in the UK trade and hobby.

magazine, but other publications in the scientific field are not often considered. Just published is a Veterinary Book called *Practical Animal Handling* by R S Anderson and A T B Edney, Pergamon Press, ISBN 0-08-036151-X (hardcover) -8 (flexcover) with a chapter by me on handling ornamental fish for the practising Vet. At the printers is *Ornamental Fish Diseases* by fish vet. Ray Butcher, again with a chapter by me on fish nutrition. Ray has also prepared a scientific paper listing all the parasites found on regularly inspected Koi imported from Japan, Israel and California, which will be published in the British Veterinary Journal.

#### VIDEOS

Video magazines are increasingly popular and the veterinary profession have one published five times a year, called *Practice, the Magazine for the Practising Veterinary Surgeon*. The 1991 edition contains details of surgery on Koi by Peter Scott, showing how to anaesthetise the fish and how to sterilise, medicate and seal wounds or ulcers. I also appear discussing hobbyists' problems with the editor, Ian Hughes.

#### CONCLUSIONS

It is certainly all happening in the coldwater fish scene. As the 'green' issues become paramount, the acceptability of coldwater fish must give a surge of interest in this aspect of our hobby. The range of



Gars and other North American species have been attaining greater popularity in the UK in recent years. This golden specimen comes from Ekk Will Waterlife Resources in Florida.

coldwater and temperate fish is wide, and specimens excellent and numerous, thanks, principally, to the Chinese. The USA connection has tremendous potential, but there may be problems with Wildlife and Country-side Acts in both our countries because their bait fish are farmed wild species, rather than

farmed ornamental varieties. This is something Ornamental Fish Industry (UK) of OFI must look into . . .

But for an aquarium with low running costs, ease of maintenance, and great (even bizarre) beauty, nothing compares with the coldwater fish tank. It has a great future.

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# Coldwater jottings

By Stephen J. Smith



## SINGAPORE EXPERIENCE

I cannot let June pass by without a final reminder that the second Aquarama exhibition and conference takes place in Singapore this month (27-30 June). For those who have never experienced the aquatic scene in Singapore, it is well worth the visit, even if it does mean missing the next two years' holidays!

One of the most outstanding features of my own trip to Singapore for the first event two years ago, was the high state of

awareness of all things aquatic. From the moment you step into the airport, every opportunity is taken to incorporate an aquatic feature.

I even travelled on a lift which descended into the heart of an enormous marine aquarium — and that was in a shopping centre!

For Goldfish enthusiasts, hundreds of acres of the island are devoted to rearing Fancies, in all their varieties; and the sight of some of the largest Ranchu, Orandas, Ryukin, et al you could ever wish to see was an experience I shall not forget in a hurry.

My only personal disappointment for this year is that, for (happy) family reasons, I was unable to accept an invitation to judge at Aquarama '91. (Perhaps next time...)

It is not too late to organise your trip, though. For further details about Aquarama '91, contact our editor John Dawes (A & P is one of the 'official' supporters of Aquarama), or Miss Irene Goh, Academic Associates Pte Ltd, Block 808, French Road, 03-185 Kitchener Complex, Singapore 0820. Tel: 010 65 2926166; Fax: 010 65 2924625; Telex: RS 34032 ACADEM.

## INTRODUCING DARIUS...

As promised in last month's Jottings, I am delighted to commit to the printed page the first instalment in a series of four *Darius Chronicles*.

Darius is the brainchild of regular correspondent Alex Stephenson from Norfolk, and will have appeal specifically to Goldfish-keepers — especially those who have experienced the ordeal of showing fish. It will also provide an intriguing insight into the hobby through the eyes and mind of a championship Goldfish. Read on...

It was dark in the transporter; quiet, and still comfortably cool. Darius inspected the capsule which had recently been cleaned. The usual stale smell of previous occupants was missing. He wasn't always this fortunate.

Darius wasn't his real name, of course. It was what 'outsiders' called him. Outsiders were not aware of his real name and title, and couldn't have pronounced it anyway. He wondered how long his trip would take. How long before he was home again.

Noises outside the capsule brought him sharply alert. The seal was being checked. Bracing himself for the loading procedure, he recalled how, a couple of campaigns ago, one of his companions had gone berserk at this point. Everything became still. He didn't relax yet, knowing that the engine would fire any minute now.

"Here we go," he muttered to himself. A bone-shattering blanket of sound and vibration knocked out all his senses for a moment. The bedlam slowly subsided to a steady drumming and he regained his sanity. "We are on our way. That's the worst bit over." He tuned down some of his senses to background level.

Darius spent the next couple of hours trying to sleep. He always tried... and always failed. Some of his colleagues said they managed to sleep through the transportation. He didn't believe them: "They were more likely in third degree shock," he thought dryly. Not that he had a superiority complex; it was just that, as a veteran of 20 or so missions, sleep was something he had never witnessed.

Panic, yes; a couple of injuries; and, once, a long time ago, death. It still shocked him to remember 'the accident'.

She had been a good looker. Oh yes, females campaigned as well. She was on her first trip, nervous and hypersensitive. There were six of them in the capsule that time, and things had gone very wrong. The temperature inside had risen quickly. He remembered the smell. He would never forget the smell.

Darius was alone this trip: unusual these days, must be something special! "Always knew I was in a class of my own," he chuckled.

The capsule continued to vibrate gently. It was getting warmer, but oxygen levels were good; his breathing was slow and regular. That was something else he remembered, along with the smell: there had been difficulty in breathing, followed soon after by loss of

normal functions. He recalled trying to move and found he couldn't. Help did arrive, of course, but not in time to save one pretty lady.

A sudden jolt threw Darius sideways. Several more buffetings caused further changes in attitude. He swore quietly. An unusual level of stamina and a balanced outlook on life were essential qualities for survival in this game. These, together with the right physical build, training, and a lot of luck, are what got you to the top.

He had known many start out well, only to drop out due to health problems. Stress was part of everyday life. Even outsiders, totally oblivious to most things, recognised this. Perhaps they suffered a similar condition.

Careers were usually short; his was already much longer than most. It couldn't go on, of course; age was against him now. The life had few perks, long days of object boredom, punctuated by occasional days of terrifying endurance. It did, however, command a lot of respect: very important if you want to eat regularly.

One big disadvantage for Darius was not being able to fraternise with the opposite sex. Except for the rare chance encounter, they were always out of reach. There were many times he had regretted this while watching the girls next door grooving into glorious possibilities.

The accident bounded back into his thoughts. She had been a lime-bred beauty and could well have featured pleasantly in his future.

His mind drifted into areas completely unknown to outsiders,

where sound had 'feel' and pressure formed images. He was close to his 'id'.

Time passed and the transporter rumbled on.

Sending journey's end, Darius made himself aware of the noises and bumps. "Yes, I feel we have arrived," he concluded. A few earthquakes later, the engine shut down. "Not before time," he thought. "It's getting stuffy in here."

There was a long pause, during which he re-tuned his faculties and prepared himself for what lay ahead. If he could give the performance of his life today, maybe, just maybe, his ambition could be realised: a place in the breeding programme with all the comforts and prestige that went with it. The thought was enough to make his tubercles twitch!

The reverie was interrupted; he was on the move again. The seal was opened, a net scooped him upwards into the show tank. Now, it was up to him.

Follow part two of *The Darius Chronicles* in next month's *Coldwater Jottings*.

STEPHEN SMITH WILL BE PLEASED TO REVIEW YOUR NEWS AND VIEWS ON ALL ASPECTS OF THE COLDWATER HOBBY. WRITE TO HIM (ENCLOSING A S.A.E.) c/o THE EDITOR

# VARIABLE KRIBS

## (Part 1)

There are Kribis . . . and there are Kribis. Didier Granet sorts out the different types and offers guidelines to their care and breeding.

(Photographs by the author — Text translated by Mary Bailey\*)

**T**he well-known Kribensis is one of the two most readily available cichlids in the aquatic trade (the other being the Angel, in all the forms which the pisciculturists of SE Asia have been able to create for it). One must bear in mind that, as far as many aquarists who have no interest in cichlids are concerned, this fish is not thought of as belonging to that family, or else has the status of an uncichlid-like cichlid. It thus lies on the borderline between the usual concept of 'cichlid' and that of 'ornamental fish', assuming that one accepts such a distinction.

To elaborate on the above, it appears that the bad reputation which dogs the heels (or should I say fins) of cichlids has not affected that of this West African fish. But the fact that the Kribensis is so widespread (a better word than common, which could be taken as derogatory) has rendered it uninteresting in the eyes of those specialist aquarists who are cichlidophiles. So, is it not paradoxical that this cichlid is, thanks to its 'good' behaviour and attractive coloration, often found in community tanks, but, because it lacks rarity value and is easy to maintain, is more or less rejected by cichlid specialists?

### CONFUSING NAME CHANGES

The fact that it is so easy to obtain this fish has led to a degree of vulgarisation and has created the need to use a common name in some countries. For example, in France, it is known as the 'Pelmato', a shortening of the old generic name, *Pelmatichromis*. This creates all sorts of problems among aquarists regarding its scientific denomination 20 years after the revision by Thys van den Audenaerde which placed this species in the genus *Pelvicachromis*. To add to the problems posed by the different names for this fish, *Pelvicachromis pulcher* has frequently been referred to as *Pelmatichromis kribensis*, which is the old name for *Pelvicachromis taeniatus* Kienke (which has recently been returned by Paul Loiselle to full specific status).

One may argue that the name of the fish is not critical and that the fish alone is important. But misnaming can cause further problems. To hypothesise: if we have the intention of breeding this species, and wish to avoid inbreeding, it will suffice to buy males and females from different places; so we obtain a group of females labelled *Pelvicachromis kribensis*, and then go out and buy a batch of males of *Pelvicachromis pulcher*. It is clear that the chances of having fishes from

the same bloodline are minimal, but it is possible that, in our attempts to avoid breeding from fishes from the same source, we may have obtained two different species. And their offspring will be hybrids, which, to my mind, was not the object of this hypothetical exercise.

### DIVERSITY OF FORM

*P. pulcher* has been known to aquarists for so long, maintained and bred for so very many years, and in such a variety of physico-chemical conditions, that it is considered by many to be a fish of little interest. Yet, many of the so-called more desirable fishes have only an insipid coloration compared with this little cichlid from the Niger Delta. Moreover, the numerous differences in colour it can possess provide a diversity which can be matched by few other species.

The revision by Thys van den Audenaerde distinguished two forms on the basis of the permanence of the longitudinal band: Form A, where the band is only slightly apparent or absent, and Form B, where it is always distinct (but Thys now thinks they are probably two species, morphometrically identical, but different in coloration).

This classification has subsequently been amplified by the addition of colour varieties (greens, reds, blues, or yellows). But these differences are shown only by the males; the females are too similar to be taken into account. This has led to denominations along the lines of *P. pulcher*, Form B, Blue Variety. If one takes into account the numer-

ous crosses and line-bred varieties, and leaving aside the hybrids between species of *Pelvicachromis*, then we have something resembling the 'classification' of the Guppies.

This great diversity in appearance poses major problems regarding this species. For instance, is the diversity natural, or is it, in part, the result of transferring this fish to an artificial environment? In actuality, it is impossible to determine exactly how this phenomenon arose, and, unless a systematic investigation is made in the natural habitat, it is likely that the question will remain unanswered.

It seems to me that it is the conjunction of these two elements (the natural and the artificial) which has led to so many variations in the coloration of this species. But — and this supports my theory — wild-caught specimens form only a small part of the total number of fishes sold, and yet the varieties continue to increase in number, to the point where it is very difficult to find the original colour pattern.

What is done is done, and has to be lived with, but one should nevertheless endeavour to find the best compromise, whether one is buying a single pair or multiples of *P. pulcher* — unless one has the opportunity of obtaining wild stock.

Leaving aside the fact that each batch offered for sale may have derived from the same pair, it is necessary, in the first instance, to check if all the individuals of the batch conform with the psychological criteria of the species, and then to ensure that



Two adult male Kribis. The one in the foreground is a Form B Green individual; the one in the background is a Form B Yellow specimen.



A well-coloured Form B Green female.

the entire batch is homogenous. If one fish appears deformed, it is possible that the entire batch possesses a genetic defect apparent in only a few individuals.

### AQUARIUM TEMPERAMENT

The Krib is noted, not only for its very attractive body coloration and fin patterns, in the female as well as the male, but also for its placid behaviour which causes little disturbance to the harmony of the ornamental aquarium.

This small cichlid (attaining 10cm — 4in — in males, and 7cm — 2.75in — in females) has a fascinating lifestyle and family structure. The pairing is normally permanent and the parents tend their offspring remarkably well. In a community tank, they will protect them for up to 10 days after they become free-swimming. This adds life to the aquarium and shows us a fascinating aspect of nature, the reproduction of life.

During its reproductive phases, *P. pulcher*



A pair of Kribias with their newly-hatched fry.

does not trouble the rest of the occupants of the aquarium, as long as the latter is not too small. At other times, the pair remain in their chosen territory, except, obviously, at the daily feeding time. In fact, they only rarely emerge from beneath the stone which forms their refuge.

One can select the future territory of a pair simply by placing piles of stones in chosen areas of the aquarium, well away from plants (which are never attacked) and, above all, from areas where one has buried 'enriched' substrate material which might be exposed by the gentle excavations of the species.

This small African cichlid is perfectly content with tapwater, as long as this does not involve extremes of physico-chemical properties (very acid, or, above all, very alkaline conditions).

### THE AQUARIUM

Kribensis do not need a very large territory; a pair will be satisfied with an area 40 x 50cm (c16-20in), though minimum aquarium size should be 80 x 40cm (c32 x 16in) if one wishes it to have an ornamental element, and this species is not to be the sole occupant. The depth of the tank is not critical as regards these fishes, and should be dictated by the planting requirements.

The vegetation may be thick, but it is sensible to leave an open space (the territory) in the centre of which are placed several stones arranged to create a hiding place in the form of a cave. The entrance to this cave should be as close as possible to the substrate, as *P. pulcher* needs to have to creep into its refuge in order to feel secure. Obviously, the substrate in this territory should consist purely of washed sand, with an average grain size of 2-3mm (0.08-0.11in). There are sufficient African aquatic plants available in the trade for the aquarist to be able to compose an aquascape solely from these (eg *Valisneria*, *Myriophyllum*, *Nymphaea*, *Anubias*, *Aponogeton*).

### TANKMATES

The population should be chosen so that each of the normally recognised levels is occupied — ie the bottom, mid water, and the surface. Suitable fishes for the bottom, as well as a pair of *P. pulcher*, are various other small West African cichlids: *Nemochromis nudiiceps*, *N. parilus*, or *N. dimidiatus*, as well as

of the peaceful African barbs (*B. callipterus*, *B. fasciolatus*, and *B. swinhonis*).

It is permissible to select several Labyrinth fishes to complete the population, as long as these are not from the large predatory species and the rest of the population are not likely, on account of their small size, to end up as snacks! Bushfish, *Ctenopoma fasciolatum* and *C. oxyrhynchus* (7-10 cm — 2.75-4in) will ensure that this family is represented in a regional aquarium.

Certain *Epiplatys* (Killies) of medium size (7-10cm) can also be used to liven up the surface, but they require careful maintenance, and one should avoid housing them with species of the *Ctenopoma* genus.

### THE WATER

The three main aspects of the water in an aquarium are its cleanliness, its physico-chemical properties, and its temperature. *P. pulcher* requires clear clean water, as is the case for numerous species. In order to achieve this, an efficient filtration system is indispensable; its turnover rate per hour should equal the volume of the aquarium (a container filter will ensure suitable filtration, but other methods can be envisaged.)

This fish will adapt to a large variety of water conditions, but soft acid water greatly increases the chances of success in both maintenance and breeding (Total Hardness < 5; conductivity < 100 micro-siemens/cm; pH < 7). It is also necessary to consider if, in a given population, the fish with the least demanding requirements should decide the water conditions of the aquarium.

The temperature can vary between 24° and 29°C (75-84°F) and it is suggested that this should be varied during the course of the year, as the Niger delta is subject to seasonal variations.

### FEEDING

The advent of frozen foods has greatly advanced feeding techniques by simplifying preparation and permitting variety in feeding, something which is beneficial to the fishes.

For a good 'frozen' diet, the food can be based on a preparation of spinach, prawns, lean fish, and mussels. Frozen *Tubifex*, *Artemia*, *Mysis*, and mosquito larvae, should be mixed with the base compound in a ratio of 1 part in 3, and with the ingredients being varied.

One or two feeds per week of good-quality dried food will permit further variety in the sources of protein. In addition, live foods (*Artemia*, pond invertebrates) cannot but be beneficial in the proper development of these fishes. (TO BE CONTINUED)

#### \*Editor's Note

I would like to extend sincere thanks to Mary Bailey, not just for her excellent translation, but also for her invaluable advice and comments regarding the original French text.

John Dawes

# Books

## Swordtails and Platies

By: Dr Herbert Axelrod and Lothar Wischnath  
Published by: T F H Publications, Inc  
Price: £45  
ISBN: 0-86622-090-9

**A**nother gorgeous-looking, and highly desirable book from TFH is just about to hit the bookshelves.

*Swordtails and Platies* has enough material on well-known aquarium varieties, and lesser-known wild species and varieties, to keep both novice and specialist livebearer fans happy, a relatively rare achievement for a single book.

New aquarists will be particularly impressed by some of the fancy aquarium varieties, both old and new, featured. I seem to recognise some of the photographs from earlier publications but, nevertheless, welcome their most relevant inclusion in this colourful publication.

Livebearer specialists, for their part, are going to be delighted by the large selection of wild species illustrated. Especially welcome is the inclusion of so many naturally-occurring varieties of species like *Xiphophorus helleri*, *X. maculatus* and *X. variatus*. I think it would be safe to say that *Swordtails and Platies* contains the most extensive selection of such pictures ever published so, in this sense alone, it must be worth its cover price, considerable though it undoubtedly is.

To my knowledge, every species of *Xiphophorus* is mentioned by name, with the

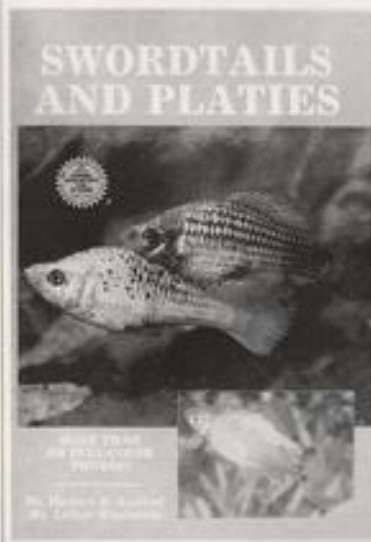
exception of the most recent, *X. birchmanni*, which is pretty good going.

Personally, I would have liked to have seen a lengthier discussion of Swordtail and Platy classification. When you go to such commendable lengths to write about other matters regarding the genus, it seems a bit of a shame not to round things off with a more comprehensive discussion of, for instance, what constitutes a Platy or a Swordtail. I would have also welcomed further elaboration on the validity of dividing the genus into Swordtails and Platies on the basis of the presence or absence of a sword. This would have been particularly relevant in the case of a species such as *X. niphidium*, which is very Platy-like, but has a small sword. In this book, it is classified as a Swordtail, yet most people would regard it as a Platy. Most people would also regard *X. pygmaeus* (the Pigmy Sword) as a Swordtail, yet few would try to convince you that it bears a true sword at all.

The text is divided, following the introduction, into the following chapters: The Wild Form of the Genus *Xiphophorus*, *Xiphophorus* Wild Forms (Swordtails), *Xiphophorus* Wild Forms (Platies), Aquarium Care of the Wild Forms of the Genus *Xiphophorus*, Reproductive Biology and Selective Breeding, Standard Strains of Swordtails, Standard Strains of Platies, Tail Patterns, Fish Diseases Affecting *Xiphophorus*, Index of Literature, and, finally, an Index.

Of the above, the chapter that stands out, owing to its brevity, is Fish Diseases Affecting *Xiphophorus*. At one page in length, it looks for all the world as an afterthought. The other chapters, by comparison, are lengthy and packed with the sort of vital information that will make *Swordtails and Platies* a very worthy acquisition indeed.

John Dawes



## The Complete Aquarium

By: Peter W Scott  
Published by: Dorling Kindersley  
Price: £16.99  
ISBN: 0-86318-603-3

**S**ome years ago, I was approached by a publisher (not Dorling Kindersley, I hasten to add) who wanted a 30,000-word book on "all types of aquaria, from freshwater coldwater, through tropical freshwater, to tropical marine and native marine set-ups". I protested vigorously that it would not be possible to do justice to such an all-embracing brief... and promptly lost the commission!

Despite my reservations, publishers obviously still like the idea of providing the prospective aquarist with as wide-ranging a set of options as possible within a single book. Also, despite my personal reservations,

there are other authors who don't react as I did. Further, if these authors are like Peter Scott, they not only take on the challenge, but also do a pretty good job in the process. And if the publishers are like Dorling Kindersley, then the result is a very attractive book as well — at an excellent price.

The contents of this large, colourful book include: The Natural Environment, The Fish, The Freshwater Aquarium, The Brackish-water Aquarium, The Marine Aquarium, Tank and Water Management, and Feeding, Breeding and Healthcare. In addition, there's a very useful Appendix and Glossary.

When you examine the above major headings in greater detail, the real value of the book becomes apparent. Take, for example, The Freshwater Aquarium. It is subdivided into: Setting up an Aquarium, Freshwater Community Aquarium, Amazon Rain Forest Stream, Amazon Rain Forest Acid Pool, Zaire River Rapids, Southeast Asia Black-water, Southeast Asia River, Papua New Guinea Sandy River, Central America Rocky Lake, East Africa Rocky Lake, and West Africa Floodplain Swamp. Moving to even finer subdivisions, each of these topics contains: Planning the Tank, Essential Equipment, Ingredients, Building the Tank, Suitable Fishes (and plants, where relevant), and The Finished Tank.

By adopting this approach, Peter Scott has produced a book that is 'different', interesting and very useful indeed, and I warmly commend him for it.

I would not agree with all the various selections of species, and would have welcomed up-to-date scientific names for, eg the Cardinal, the Ram and others. I also feel that someone, somewhere, has been a little slack in matching pictures and text, eg the Platies (*Xiphophorus maculatus*) on page 51 are female Swordtails, the Blue-eyed Panaque on page 58 is a Callychthyid catfish, the silver sand on page 10 is coral gravel, the Rio Negro water referred to on page 15 as "silty" is not silty at all (it is the Solimoes, or Amazon, that is silty)... and so on.

In addition, some of the photographs of the finished set-ups appear to have been taken in a bit of a hurry. In a few, the water is, in fact, so cloudy that you can't discern the fine details of the layout (see, in particular, page 74).

Leaving these slip-ups and quibbles aside, the book has a great deal to recommend it. It was, for instance, a tremendous pleasure to read the very first chapter, The Natural Environment. Great stuff... and long overdue.

Congratulations to Peter Scott and Dorling Kindersley. They've done very well. Just imagine what they could have done had the publishers decided to go for two separate books: one on freshwater and the other on marines!

John Dawes

# KENYA

## Sea Life in the Shallow Lagoons of Mombasa

Some people go to Mombasa for the sun. Peter Burgess, of Plymouth Polytechnic, went there for its rockpools. (All photographs taken on location by the author. Cross-sectional diagram also by the author)

**F**or some people, Mombasa is the place to go for a guaranteed sun-tan, cool cocktails by the swimming pool, wooden carvings, and a taste of East Africa. For me, the main reason for visiting this part of the Kenya coast was to indulge in a tropical version of one of my favourite pastimes: exploring rockpools.

My beach hotel was just a couple of kilometres south of Mombasa island. The small verandah outside my room offered views across the sea and out to the reef platform lying about a kilometre from shore.

The East African reef is of the 'fringing' type and is typically separated from the shore by relatively shallow seawater — the lagoon. This feature contrasts with a 'barrier' reef such as that along North-Eastern Australia, which occurs much further out from shore and is separated by deeper water.

The fringing reef acts as a breakwater, protecting the lagoon from the forces of strong wave action. Many types of fish are common to both the reef and lagoon, though only the juvenile forms of certain species, such as surgeonfishes and barracuda, are found in the lagoon, which functions as a nursery, providing food and shelter.

At low tide the marvellous variety of lagoon life is quite literally at one's feet. Much of this underwater spectacle can be safely viewed in crystal clear water less than a metre deep. However, a mask and snorkel ensure the best views of the rockpool inhabitants.

### SHORELINE SHALLOWS AND SHALLOW ROCKPOOLS

The lagoon is a complex area, with gradients in environmental factors such as temperature, turbidity, and exposure to air. It also varies in depth and substrate type (coral rock or sand). The lagoon therefore comprises a range of habitats, each home to a unique combination of fishes and invertebrates. By careful observations, I was able to map out these habitats and record some of the sealife common to each. A generalised cross-section of the lagoon is shown in the diagram.

The shoreline shallows are simply a stretch of open water over a sandy substrate.

Although relatively featureless, a few species of fish were sighted there, including large shoals of tiny silvery Clupeids (sardine family) and small groups of grey-green emperor fish (Lethrinids). Despite their abundance throughout the lagoon, the fast-moving Lethrinids proved to be extremely difficult to catch and photograph.

As low tide approached, the falling sea level revealed numerous shallow pools, each formed out of eroded coral rock. Many were less than a metre across. These pools became increasingly isolated until each was essentially a small 'aquarium', with its own features and inhabitants. Some were rich in vegetation and caves, thereby providing cover for certain fish, notably Olive-green and Striped Cardinals (*Apogonichthys nigripinnis* and *Ostorhinchus endekataenia*) plus Sergeant Majors, damselfishes (predominantly *Abudefduf biocellatus*) and juvenile Convict Surgeons (*Acanthurus triostegus*).

Four or five species of gobies and blennies were also abundant. One species of blenny was almost eel-like in appearance and had the odd behaviour of regularly making a wide gaping movement, as if trying to readjust a set of badly fitting false teeth! During attempts to net these fish I discovered their ability to slither rapidly across the wet sand from one pool to another. Such behaviour was clearly a valuable survival strategy, allowing the opportunity to flee from predators or migrate to other pools in search of better conditions.

By far the most numerous of the 'macro'-invertebrates were brittle stars (Ophiuroid starfish). In just a five-minute walk I encountered literally thousands, each one waving its arms in the water in order to filter feed while hiding its flattened disc body under a rock crevice. More cryptic in behaviour, but also plentiful, were hermit crabs and gastropod molluscs. Sea cucumbers, black *Diadema* sea urchins, and sea slugs also foraged here, but in much smaller numbers.

The whole scene could easily have been in an aquarist's tank, except for one extraordinary difference — the water temperature would have sent any marine fishkeeper into a state of panic. At low tide, these pools reach 37°C (98°F) and, even in the rock crevices where many small fishes retreat, the tem-

Below left, view across the lagoon, just before low tide. Numerous shallow rockpools are evident in front of the canoe. The reef platform lies just below the horizon.

Bottom left, the cardinalfish (*Apogonichthys nigripinnis*) — one of the commonest species in the warm shallow rockpools.

Near right, deep rockpools, near the reef platform — the rich vegetation provides cover for several species of fish.

Far right top, a male pipefish (*YoZIA*) showing its elongate brood pouch. In pipefishes, as in seahorses, it is the males which incubate the eggs and fry.

Far right middle, a giant clam (*Tridacna*) embedded within the coral rock. This specimen was only 15 cm (6in) in width.

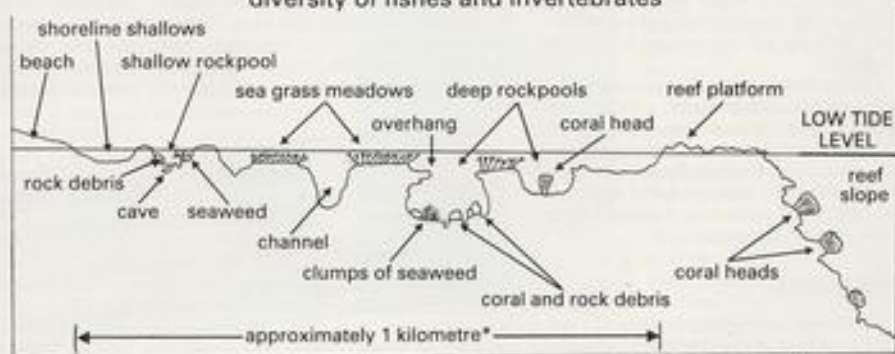
Far right lower, the Red Starfish (*Protoreaster lincki*), collected in large numbers for sale to tourists.





### CROSS-SECTION OF THE MOMBASA LAGOON (not to scale)

The various habitats within the lagoon each harbour a unique diversity of fishes and invertebrates



perature falls by only two or three degrees Celsius. Yet, the fish and other creatures appeared in perfect health.

### SEAGRASS MEADOWS

The lagoon contained several patches (meadows) of sea grass, producing attractive hues of green. According to Bock (1986), the dominant type in this area is *Cymodocea*. The term seagrass is a misnomer, as the plant is neither a seaweed nor a true grass, but a flowering plant distantly related to freshwater pondweeds. Under the strong equatorial sunshine, the seagrass gives off streams of gas bubbles. Such intensive photosynthetic activity, no doubt, usefully contributes to the oxygen levels within the lagoon.

The fish most frequently seen in this habitat were Lethrinids. Sometimes I caught sight of a moray eel, snaking between the clumps of vegetation, and on one occasion, I saw a largish green pufferfish. Motionless, it was almost perfectly camouflaged among the seagrass.

Small barracuda, up to 20cm (8in) in length, were occasionally seen hovering in midwater, often close to the edge of a rockpool. Perhaps, in this position, they had a good vantage point over the tasty morsels swimming apparently oblivious to danger in the pool below. It was on the edge of one such pool that I encountered anemone fish nestled among the tentacles of their coelenterate host. This colony, comprising two adults and three sub-adults, was the only one I discovered in the lagoon.

Whatever the seagrass meadows lacked in diversity of fishes, they made up for in abundance of echinoderms. Here were the pasture lands for Holothurid sea cucumbers which slowly graze, not on the grass itself, but on the organic debris trapped within the sandy substrate. Some were 30cm (12in) long, ranging in colour from black, through shades of brown, to mottled golden yellow. I counted five different species of starfish within the seagrass. By far the most obvious was the Orestid starfish, *Protoreaster lincki*. Its vivid red coloration is, sadly, its downfall, for these creatures are prominent against the green background and so fall easy prey to the local fishermen who dry them for sale to tourists — a sad waste of an animal's life. Perhaps if more tourists bothered to explore the lagoon, they might realise just how pitiful a faded, dried starfish looks in comparison with the vibrant colours of a living specimen.

Among those patches of seagrass situated closer to the reef platform, grazed pentagonal-shaped cushion stars (*Calcite* sp), so-named because their inflatable upper surface resembles a cushion. Brittle stars were far less abundant here, probably reflecting the paucity of crevices and other hiding places within this region.

### CHANNELS

Deep channels running between the seagrass meadows form the major drainage routes for tidal waters flowing into and out of the lagoon. These were barren areas where

strong currents could be encountered.

Fish and invertebrates were not abundant, although I did catch sight of some adult Chaetodontid butterflyfish (possibly *Chaetodon auriga*) and angelfishes.

### DEEP ROCKPOOLS

The deeper rockpools, lying further out towards the reef, were, by far, the best places for sheer variety of fish. These pools were most easily visited during low tide and before the incoming water brought in suspended matter which reduced the otherwise excellent visibility. I visited one particular pool on several occasions for it looked as if it had been created specially to please an aquarist.

At low tide this circular pool was about one and a half metres deep and some ten metres across. The water temperature was a mere 90°F (32°C), with a specific gravity of 1.023. A wide range of fish species collected here, including many aquarium favourites, such as Sharp-nosed puffers, Picasso Triggers (*Rhinocanthus aculeatus*), goat fish, butterflyfish (including *C. auriga*), rock cod (*Grammistes*), Domino Damselfishes, Sergeant Majors . . . the list goes on. Certain species were represented only by juveniles, such as Sailfin Tangs (*Zebrafish flavescens* and *Z. veliferum*). Small specimens of *Pomacanthus semicircularis*, the Koran Angel, were also present, wearing their unmistakable juvenile livery. Most endearing were young Box Fish (*Ostracion tuberculatus*), some literally only pea-sized, yet perfect replicas of the adult fish.

Upon the sandy substrate was scattered coral debris and dense clumps of seaweed, the latter home to mixed-species shoals of green *Halichoeres* wrasse. The seaweed also afforded cover to slender brown pipefish (probably *Yonia bicaricata*), the males of which were prominent by their elongate pouches swollen with eggs. In contrast to an abundance of pipefish, I never saw the related seahorses anywhere in the lagoon. Most of the invertebrate species seen in the shallower pools were also present here, together with black and white nudibranchs and grey-green octopuses.

Around the edge of many pools were rocky overhangs under which hid large Lionfish (*Pterois volitans*). These were either solitary, or formed groups of up to five individuals. Close to one *Pterois* lived two adult Threadfin Butterflyfish (*C. auriga*), each about 15cm (6in) long. These fish, presumably a pair, were aggressively defending a small area of

vertical rockface against an inquisitive assortment of fishes, including brown and grey damselfishes and a large black grouper which had emerged from a nearby rock cave.

I didn't get close enough to see whether these fish were guarding eggs or fry. Partly, I was concerned I might disturb them, though my major worry was the thought of being washed onto the long venomous spines projecting from the Lionfish! Among all this commotion swam a Cleaner Wrasse (*Labroides* sp.) performing its characteristic undulating movement, trying unsuccessfully, to attract a client. Each time I returned to this pool I found the same fish occupying the same positions.

### CORAL HEADS

In only two of the pools visited, both close to the reef, did I find outcrops of live coral. This was not surprising as the polyps are very susceptible to desiccation, so coral is mostly restricted to the seaward side of the reef and only occurs in the lagoon in areas which are sufficiently deep to allow continuous total immersion.

One coral head was occupied by a population of Damselfishes (*Abudefduf annulatus*) comprising several adults and different-sized young. These fish would stay within the ridges of the round coral surface, only venturing out to swim to another part of the head or to snatch food particles floating past. Their timid behaviour was, no doubt, warranted, for a network of caves at the base of the coral was home to black groupers and moray eels.

### REEF PLATFORM AND SLOPE

Beyond the lagoon lies the raised reef platform, home to a variety of sponges and Giant Clams (*Tridacna* sp.).

Beyond this are the deep and turbulent waters of the reef slope, home to most of the species found in the lagoon, together with larger coral fishes and predators, such as sharks and adult barracuda — definitely not a place for the nervous snorkeller!

### A FRAGILE PARADISE

The lagoon and its guardian reef are, not only a complex environment, but also fragile and highly vulnerable to pollution. The regular movements of cargo ships and tankers to and from the nearby port were continual reminders of the potential threat to this most beautiful and tranquil of natural habitats.

### SELECTED GUIDE BOOKS

- Bock J. (1986) *A guide to common reef fishes of the Western Indian Ocean and Kenya coast*. Macmillan.  
Carcasson R H (1977) *A field guide to the coral reef fishes of the Indian and West Pacific Oceans*. Collins.  
George D and George J. (1979) *Marine Life* Harrap and Co Ltd.

# Herpetology matters

By Julian Sims



## BALANCED DIET FOR SNAKES

Calcium is a mineral which is required for the healthy growth and metabolism of animals with backbones — the vertebrates. Snakes are certainly no exception; they definitely need a regular supply of this mineral in their diet.

Calcium is particularly important for ossification. This is the strengthening of the bones of the skeleton with deposits of calcium salts (together with another mineral, phosphorus). Although the majority of snakes don't exhibit any trace of external limbs, their long bodies still need to be supported. This is achieved internally by an extensive rib cage. Snakes may have as many as 200 pairs of ribs (compared with only 10 pairs of fixed ribs in humans). Such an extensive skeletal structure in snakes represents a considerable investment in calcium, phosphorus and other materials.

Boa constrictors, pythons and other species of snake which swallow entire mammals or chicks, obtain the calcium they require from the skeletons of their prey. Calcium deficiency is therefore unlikely to be a problem in these reptiles. However, one way in which calcium (together with other essential minerals and vitamins) can be offered to growing juvenile snakes or gravid females, is by adding a multi-mineral and vitamin supple-

ment to the bran on which the 'food animals' are fed.

Perhaps surprisingly, problems with health can develop if too high a concentration of one or more vitamins is present in the diet. For example, an excess of vitamin D can result in a relatively easy symptom to detect — the snake feels unusually 'hard' to the touch. Although a certain amount of vitamin D is required for the healthy development of the skeleton, too much can cause deformities of the vertebral column in snakes. 'Bony swellings' form along the backbone and these can be felt under the skin.

In addition to the correct proportions of calcium and vitamin D in the diet to ensure healthy bone formation, access to sunlight (or an artificial source of ultra-violet light) can also be beneficial. Basking in sunlight helps to prevent rickets — a disorder where the bones of the skeleton don't harden properly during growth. Fluorescent tubes which emit ultra-violet rays can be used as an alternative source of illumination for 6 to 8 hours per day. An example of such a fluorescent tube is TRUE-LITE. Further details about the beneficial effect of TRUE-LITE can be obtained from:

General Acoustics Ltd,  
Salter Road,  
Cayton Low Road Industrial Estate,  
Scarborough,  
North Yorkshire YO11 3UZ.

Another dietary problem which can occur with captive snakes is obesity. The problem of obesity can arise when captive-reared small mammals are fed to snakes. This is because, in captivity, small mammals are fed very regularly and don't have to look for food for themselves. Due to lack of exercise, and the regular availability of good-quality food, captive-reared small mammals tend to have a high fat content. These fat reserves are passed on to any reptile which eats them. Thus, young mammals are the best food items, because, while they are still developing, mice and rats are less likely to form substantial fat deposits.

## BODY TEMPERATURE

Obesity is not just a problem with captive snakes, but can also occur in any species of reptile or amphibian maintained in captivity. This is because reptiles and amphibians rely on their surroundings directly to provide warmth — there is relatively little dependence on food to maintain body warmth. Consequently, these two groups of vertebrates should be described as **variable temperature animals**, because, in cold conditions, they are 'cold', and in warm conditions they are 'warm'. Reptiles and amphibians are sometimes described as 'cold blooded'. Clearly, this term is most inaccurate and should be avoided.

In contrast, mammals (and birds) should be described as **constant temperature animals** because, irrespective of environmental conditions, their body temperature usually remains fairly steady. However, to maintain constant body warmth, mammals and birds need to eat food very regularly.

As reptiles and amphibians are not dependent on their food to provide body warmth, they only need approximately 10% of the food eaten by a mammal which has a comparable sized body. An example of this relatively low food requirement is demonstrated by an adult male snake with a body weight of about 200 grams (c7oz). Such a reptile would obtain sufficient nourishment for approximately

two weeks by digesting just one mouse weighing around 20 grams (0.7oz).

There are of course, exceptions to this very general guide — adult female reptiles require more food for egg production (oviparous species) or to allow the internal development of embryos (ovoviviparous species). Juvenile reptiles which are still growing will also need to feed more frequently than an adult male reptile.

There are three common methods by which reptiles obtain warmth from their surroundings. The following well-known species illustrate these methods:

① Slow-worms (*Anguis fragilis*) obtain heat by physical contact with sun-warmed surfaces such as rocks or sheets of corrugated iron. Reptiles employing this method of warming their bodies are called **THIGMOTHERMS**.

② Gravid female Adders (*Vipera berus*) bask in exposed areas, directly absorbing warmth from the sun's rays. Warming in this way promotes the growth and development of the embryos inside the females' bodies. This deliberate method of 'sun-seeking' to increase their body temperature has resulted in these reptiles being described as **POSTURING HELIOTHERMS**.

③ Common Lizards (*Lacerta crepitans*) are called **SHUTT-LING HELIOTHERMS**. This term describes how the body temperature is increased by basking in sunlight. These warm reptiles then regulate their temperature by a series of movements between shaded and sunlit areas.

These different methods of temperature control should be carefully considered when maintaining reptiles in captivity — either in indoor vivaria or in outdoor reptileries. Appropriate cover, as well as basking areas, must be provided. It is also most important that food is not offered in such large and frequent amounts that captive reptiles become 'perambulating stomachs', with excessive deposits of fat in their livers.



A 'posturing heliotherm' — gravid female adder basking in direct sunlight to increase her body temperature.



# What's your opinion?

Billy Whiteside,  
BA, ACP



## FANCY GUPPIES

**W**elcome back. I know that if enough *A & P* readers kept on, your missing section of a good magazine would return", writes **Graham Seddon**, of 119 Victoria Road, St Budeaux, Plymouth, Devon. He goes on to tell us that he is, in this order, a guppy/livebearer enthusiast. While **W.Y.O.**? was taking a rest, **Pat and Derek Lambert** started a new livebearer society called **Viviparous** — the Livebearer Information Service — dedicated to the preservation of all livebearing fish. Within this society is the **Fancy Guppy Section**, and **Graham Seddon** is proud to be the manager of it.

He tells us that on 9 and 10 November 1991 the society will be holding a **Viviparous-Fancy Guppy Show**, in conjunction with the **F.B.A.S.**, at the **Supreme Festival of Fishkeeping**, Sand Bay, Weston-Super-Mare. "Hope you will make an appearance at the *A & P* stand at this show," writes **Graham**. He concludes by passing on the fact that further information about **Viviparous** — the Livebearer Information Service can be obtained from **Nigel Hunter**, 60 **Barry Way**, Brighton Hill, **Basingstoke, Hants**.

Thank you for the kind invitation, **Graham**. If someone were to finance my trip I'd certainly give it consideration because I've been a life-long Guppy lover and breeder. However, it's quite a long way from Northern Ireland to Weston-Super-Mare. Years ago, I was a member of the NI branch of the **Fancy Guppy Association** and can recall giving a Belfast group

a lecture on cultivating aquarium plants in Guppy tanks. The sample plants I brought with me were quickly begged and bagged at the end of the lecture. I'm sure the show will be a big success.

## TUNGSTEN SUCCESS

The accompanying photograph shows a section of one of my decorative tanks. The plants thrive because I don't keep the tank too clean, and because I use tungsten lighting. However, other people can get plants to thrive in very clean tanks lit by fluorescent lighting.

Packets of four x 60 watt bulbs can be found in some supermarkets for less than £1.00. A 40 or 60 watt bulb is suitable for a well-planted 18in (45cm) tank, while a 24in (60cm) tank can grow thriving plants fitted with two 40 watt bulbs. I use two 60 watt bulbs for a 30in (70cm) tank.



Luxuriant plant growth in one of my tanks (see Tungsten Success).

## CONFLICTING EXPERIENCE

**Alan O'Brien** resides at 86 Blumfield Crescent, Slough, Berks, and he has become a regular correspondent in the past couple of months. He writes: "I started with marines recently — in November 1990. I set up what is commonly referred to as the minimum tank size for marines: 36 x 12 x 15 (90 x 30 x 37cm) — because that was the size I had room for. I am a great believer in the fact that stress is a major cause of fish ill health. I therefore decided on a system that would minimise my intru-

sion into the tank. In addition, because it was a smallish tank, I did not want any unnatural objects — such as uplift tubes — to spoil the view."

**Alan** continues: "I settled on exterior filtration via a Siporax-filled Eheim filter which turns over the water approximately four times per hour. I also added a very small, air-operated, corner, box filter which I also filled with Siporax. This filter was small enough to be completely hidden by Westmorland stone and actually became the back wall of a small cave. A layer of coral sand of approximately 2½in (c 6cm) deep covers the bottom of the tank. All the other decorations are marine-friendly. One Triton and one Gro-Lux tube were added to stimulate algae growth and were left on for 12½ hours per day. I do the usual water quality checks weekly, and also add **Seatrace**, **Seavita** and **Seagreen** on a weekly basis. Water

changes of 30% are effected at six-weekly intervals.

"The tank now holds a **Regal Tang** and a **Coral Beauty**, the latter installed three weeks ago. My experience, once again, seems to conflict with establishment guidelines for setting up a tank. I will elaborate. Fast-maturing agents: yes, they do mature the tank, but, in my opinion, there is still an as-yet undefined imbalance that can cause problems in a new tank and can be cured by only one thing — time! It is a wise aquarist who relies on time, rather than solely on maturing agents.

I did my first water change

after running the system for eight weeks to get the filter bacteria off to a good start, and I have had stable water conditions ever since. As regards lighting, theoretically, I have enough to produce green algae — but no one told the algae! Even with weekly trace and fertiliser additives, all I get are brown algae. My conclusion: I need more light!"

**Alan** goes on to discuss the subject of filtration. "While activated charcoal is a good medium, some companies selling it do not point out that it neutralises medication. I found this out the hard way and was not pleased; hence my reliance on Siporax for bacteriological filtration. Other companies claim your stocking level can be dramatically increased by using their product. I believe this should be taken with the proverbial pinch of salt. No matter what they say, better safe than sorry! Regarding **S.G.** (Specific Gravity) — another point that you have to dig to find out is that a low specific gravity of 1.020 reduces the water loss from marines and so lowers stress. This is useful to know when introducing new fish. Quarantine — a nice idea, but who wants an empty tank hanging about? In addition, this can be another unnecessary stress on the fish. I prefer to treat the main tank with a suitable prophylactic. It works for me.

**Alan** concludes by saying: "Food — **Regal Tangs** must surely rate as the waste disposal units of the sea. Mine seems to eat as much food as I can put in. Feeding was my main concern when starting marines, as I had heard they were finicky, but both fish take flake quite happily, although I do make use of the enormous range of frozen foods available."

## FUTURE ITEMS

Please send me your opinions on breeding **Angels**; cultivating livefoods; undergravel filters; unusual livebearers; and keeping garden ponds clean.

Write to me, c/o **Aquarist & Pondkeeper**, 9 Tufton Street, Ashford, Kent TN23 1QN. I look forward to hearing from you. Good-bye until next time.

# Diary dates

## Association of Aquarists

The Aquarium Fishkeeping Exhibition '91 is to be held on 8-9 June at Sandown Park, Esher, Surrey. We can only apologise to friends, our regular visitors and members for the confusion caused by date and venue changes over the last months.

When there was a likelihood of two fishkeeping exhibitions being held close together, both in venue and dates, it seemed right to merge these events. Unfortunately, due to circumstances beyond our control, the plans to merge at Olympia, London, had to be adjusted. The co-operation of the A of A with Concept C & E continues, of course.

Concept will be looking after the trade elements and building up the exhibition, while the Association will be staging the hobby area as previously published (See *A & P*, April '91).

The Association invites all aquarists to take part, be they members of the A of A, members of other organisations, or indivi-

dual fishkeepers, to present as many aspects of the hobby as practical.

Information of society meeting places, dates, contact addresses will be made freely available to the visiting public if notice is brought or sent to us. Secretaries are cordially invited to make available pamphlets, schedules and other information.

The displays, where practicable, will be manned so that visitors can discuss with other enthusiasts the various aspects of our hobby. We will not be claiming to be experts, but a wealth of experience and knowledge will be on tap.

The expanded exhibition will include the usual mix of trade and information stands. There will be a selection of lectures each day, plus a secure corner to 'park' the young children, and a clown to entertain them and us.

All that is needed now is for a few more individuals to support the hobby area, and for the visitors to come and make our weekend a worthwhile, enjoyable day out. Contact: Mervyn

Strange, Hilltop Nurseries, Sherborne St John, Basingstoke, Hants RG24 9LL. Tel: (0256) 22545.

## Staveley & District Aquarist Society

The 8th Staveley & District A.S. Open Show will be held at Middlecroft Leisure Centre, Staveley, Chesterfield, Derbyshire, on 9 June. Full details from the Secretary, Mrs C Yates, 47 North Road, Clowne, S43 4PG.

## Llantwit Major Aquarist Society

The 1991 Llantwit Major A.S. Open Show will be held at Llanudud Fawr Comprehensive School, Ham Lane, Llantwit Major, on Sunday 9 June. Benching: 9.00 am - 12.00 noon. Further details available from C Turner, 146 Arran Street, Roath, Cardiff.

## South Park Aquatic Study Society

The 1991 S.P.A.S.S. annual Open Show, featuring Koi and other coldwater fish, will be

held on 15 June at Wimbledon Community Centre, St George's Road, Wimbledon. For further details, ring Brian Russell on 081 397 9765.

## Association of Midland Goldfish Keepers

The A.M.G.K. 1991 Open Show will be held in Coventry on 23 June. Contact the Secretary, Mrs Karen Thompson, 34 Ninth Avenue, Grantham, Lincs NG31 9TF, for further details.

## St Helen's Aquarist Society

The 18th Annual Open Show of St Helen's A.S. will take place on Sunday 30 June. Venue: Rainhill Village Hall, Merseyside. Benching: 11.30 am - 1.15 pm. Judging: 1.30 pm prompt. Judging will be to FNAS rules and standards.

Further information from Mrs H Steadman, 10 Ribble Avenue, Rainhill, Merseyside, L35 0NJ. Tel. 051 4264213 or from the Show Secretary, Mrs E Boardman, on 0942 671463.

# News from the societies

## Show support from Hagen

1991 will bring more exciting prizes to both organising societies and individual winners alike. In an exceptional sponsorship deal announced at the second Invitation Evening, Rolf C Hagen (UK) Ltd have arranged, in close association with the Federation of British Aquatic Societies, to provide show support of up to £350 for Societies' Open Shows. In addition to this, there will be special commemorative Nutrafin Winner's Shirts for every 'Best in Show' at Open Shows and at all national major aquatic events. Additionally, to get things under way, societies throughout the UK will be receiving sample packs of Hagen Nutrafin Foods and remedies for their own use.

There is no need for societies to apply to Hagen's for any of these awards, as all distribution is being solely handled by the FBAS. The method of receiving Society Show Packs is simplicity itself: societies holding Open Shows should write, on society-headed notepaper, to: Alan Henderson, 5 the Nook, Corby Village, NN17 1XA.

Please enclose details of your Show (Draft Schedule etc.) for inclusion on a Register of Open



Shows. Upon receipt, confirmation will be sent, together with a Hagen advertisement which should be incorporated into the official Show Schedule, wherever possible. Show packs will be despatched in time for Shows, but applications should give as much notice as possible.

Nutrafin Winner's Shirts will be distributed pending proof of qualification, ie, Winner's Cards, notification of Show results by Show Secretary etc. Hagen have also agreed to 'backdate' awarding of shirts by one year and winners of 1990 Best in Shows, British Open, Champion of Champions, Fish of Fishes, Supreme Champion and equivalents should also write to the above address for qualification details. Photograph shows Ted Derrick (Halton AS) and John Graham (Workington AS) wearing their

new Shirts, while Hagen's Andrew Bartyla and Dick Mills lend support.

## Strood and District Aquarist Society

At the AGM of the above society, the following Officers were re-elected: Chairman: Pete Cottle; Treasurer: Alan Best; Secretary: John Pell; Show Secretary: Andy Kelford.

The Annual Open Show will, again, be held at Meopham Village Hall, Meopham, Kent, on Sunday, 2 June.

For any information concerning the Open Show, or the Club, contact should be made with the Secretary, John Pell, 44 Lakewood Drive, Wigmore, Gillingham, Kent ME8 0NS. Tel: Medway 389362.

# SNAKE IN THE GRASS

Dr Gareth Evans extols the many virtues of the harmless and peaceful Grass Snake — one of only a handful of native British reptiles.

(Photographs by the author)



Top view of a Grass Snake, note the absence of bold body markings.

While calling someone a "Snake-in-the-Grass" doesn't rank as one of the all-time greatest terms of endearment, the animal to which this epithet might, perhaps, be best applied has much to recommend it to our interest, if not our affection. A reptile well suited to its chosen way of life, and greatly dependent on its habitat, the Grass Snake is one of the most fascinating and colourful of our native herpetiles.

## DESCRIPTION

Growing to between 2-5ft in length (60-150cm), and, exceptionally, even longer, the Grass Snake, *Natrix natrix*, is found throughout much of Europe, though it is absent from Malta, Crete, Iceland, Ireland, Scotland, and Scandinavia above 67°N. Its range also extends into Asia and parts of north west Africa.

The body is long and slender, the scales being sharply keeled. The head is clearly defined, the snout is rounded, the eyes relatively large, and their pupils circular. Coloration is very variable in this species, depending on age, sex, and locality, there being at least ten distinct geographical forms recognised. The dorsal surface is usually some shade of olive, greenish-grey, or green, though steel-grey, brown and black specimens are not unknown.

The lower jaw is white, these markings typically deepening to powder yellow, wrapping around the nape of the animal's neck to form the characteristic 'collar'. In some individuals this may be white, orange, red or even totally absent.

Old country wisdom maintains that, from this collar colour, you can tell the sex of a

Grass Snake. It is an interesting notion, but entirely wrong. Generally, females are the longer animals, though their tail is shorter, and more pointed, than that of the male.

## HABITAT

Despite its common name, this snake is very much a water-side animal, most frequently encountered alongside ponds, lakes, canals and rivers. It prefers areas of dense rushes and the like, where it is fairly safe from interference and it may hunt for the frogs which make up the mainstay of its diet. Common Frogs, *Rana temporaria*, and European Tree Frogs, *Hyla arborea*, are the preferred food, though other frog species, newts and fish may be taken. A large specimen may take 4 or 5 frogs in one sitting, not eating subsequently for several weeks.

Like the amphibians upon which it preys, the Grass Snake is very susceptible to habitat disturbances, and the all-too-commonplace drainage of land which has reduced frog populations in some areas has had equally far reaching consequences for this animal. Though they are less tied to their habitat for reproduction, they are almost exclusively frog-eating, so the increase in mice which often accompanies human activities around drained ponds is of little consolation. In any case, as their rounded pupil suggests, Grass Snakes are diurnal ('day' animals). Even if the invading nocturnal rodents were palatable, they would still be active at the wrong part of the day.

As one might expect, this snake swims well, both below and above the surface, and may commonly submerge for 15-30 minutes or more. It does not lie in ambush for its food, but actively hunts, relying on vision



Adders have a bold, attractive zig-zag pattern running down their back.



The characteristic yellow collar of the Grass Snake is clearly shown in this photograph.

and an excellent ability to detect movement. Once in range, a rapid movement of the head seizes the prey, which is then manoeuvred to facilitate its head-first journey to the animal's stomach.

### THREE-LINE DEFENCE

Unlike the behaviour predicted by just about every adventure film made, if disturbed, almost all snakes will try to make good an escape peacefully. The Grass Snake is no exception to this rule, and only if cornered, will it coil, raise its head and hiss in an elaborate bluff designed to intimidate the aggressor into leaving it alone. If really pushed, the snake may strike with a closed mouth, but only very rarely will it bite.

If picked up, the animal uses the second of its three lines of defence, squirting a smelly oily secretion from glands at the base of its tail. This characteristically foul-smelling substance normally plays a part in waterproofing the snake, but, used like this, it is a very effective protective measure, deterring all but the most ardent snake-hunter.

The third strategy in its repertoire is termed 'thanatosis' — feigning death. Like the Opossum (hence the expression 'playing possum') the Grass Snake can put on a fairly convincing 'dead' act. By rolling onto its back, writhing and frothing from its open mouth, the animal mimics its final throes, hoping to convince a would-be predator of its unpalatability. It can keep this performance up for anything up to half an hour, before miraculously resurrecting itself and departing.

### LIFE HISTORY

Grass Snakes emerge from their winter quarters in April, and spend their first 2 or 3 days after hibernation basking in the sunshine to warm themselves. Mating begins almost at once, and continues through May and into June. Though the resulting eggs are not laid until July or August, the embryos thus produced begin their development within the body of their mother. In this way, when she does seek out a suitable site, often in piles of leaves or compost heaps, where the humidity and warmth produced by the rotting vegetation aids the incubation, her young have something of a headstart.

Somewhere in the region of 10–20 greyish white eggs, each some 2–3cm in length (approx 1in) are laid, encased in leathery shells which harden with time. Since good laying sites may be hard to find, it is not

uncommon for a number of females to use the same spot.

The subsequent development of the young depends very largely upon the climate. When sunshine is plentiful, they may hatch within 5 weeks; less favourable conditions extend this period. Generally, however, the young tear their way free of the shell, using the special egg-tooth on their snouts, during the beginning of September. They are around 15cm (6in) long, and well able to fend for themselves, though, at first, they are not very skillful swimmers. This, coupled with the decreasing availability of frogs as winter approaches, means that many will hibernate on an empty stomach. Those which survive,



Close-up of a Grass Snake showing the round pupil which is typical of species that are active during the day.

however, will find a plentiful supply of tadpoles when they emerge the following spring. They will become sexually mature at 3–4 years of age.

In late September or early October, the snakes leave their damp summer-time abodes, entering hibernation within stone walls, compost heaps, or beneath tree-stumps. The larger animals go into hibernation earlier than the young or their smaller brethren, who perhaps need this extra time (anything up to 14 days), to maximise their food reserves.

### ENEMIES

The Grass Snake falls prey to a number of foes; rats, stoats and some birds may take their eggs, and this list is joined by foxes, birds of prey, and domestic cats, as potential predators of the adults. However, man is their greatest cause of mortality, both directly by killing individuals, either in the mistaken belief that they are dangerous, or more simply, just because they are snakes, and indirectly by land usage.

### CLOSING REMARKS

Ever since the book of Genesis (and probably before) snakes in general have never topped the charts in any animal 'hit parade'. In Britain, the wholly irrational fear in which we hold our only poisonous snake, the Adder, *Vipera berus*, means that almost any vaguely serpentine animal is often regarded with suspicion, if not outright hostility.

The image, with all due reverence to the Good Book, is wholly unfounded; the Grass Snake is a beautiful and remarkable animal — one of Britain's few native reptiles. Its fragile dependence on wetlands, in an age of such ecological awareness, stands as a timely reminder to us all of the importance of careful habitat management. But then, as the Bible tells us, "the serpent was more subtle than any beast of the field".

## A QUICK GUIDE TO BRITAIN'S TWO COMMONEST SNAKES

	Grass Snake ( <i>Natrix natrix</i> )	Adder ( <i>Vipera berus</i> )
<b>HABITAT</b>	Ponds, lakes etc. Nearly always near water	Heaths, moors etc. Almost never near water
<b>LENGTH</b>	2–5 feet, 60–150cm	Up to 2 feet, 60cm
<b>BUILD</b>	Body slender	Relatively thicker
<b>MAIN COLOUR*</b>	Variable, usually greenish or grey	Silver (males) or reddish (females)
<b>MARKINGS*</b>	Yellow collar	Black X or V on nape; back zig-zag patterned
<b>EYE</b>	Pupil round	Pupil vertical
<b>VENOMOUS?</b>	NO	YES* <sup>1</sup>

\*NOTE: These colours and markings are found on the majority of specimens. Exceptions do occur.

\*<sup>1</sup>Although the Adder is venomous, the danger is largely over-stated. More people die of bee-stings than of Adder bites. However, the best way to avoid being bitten is to avoid picking one up, so if in doubt, leave well alone!

# PRODUCT ROUND-UP

BY DICK MILLS

## Aquarian

The popular range of AQUARIAN FISH FOODS is set to move into the 1992/3 European era (and market) with style. Along with tri-lingual instructions, each tin of food has an authenticated prize-winning fish photograph on the wrapper; no more artist's impressions.

While no new 'flavours' have been added, there are two slight alterations — the Guppy Food has been discontinued and the Vegetable Food has been retitled Herbivore Food to tie in more accurately with the Carnivore Food description.

The complete 'Aquarian' food range is: Goldfish Food (500gm, 200gm, 13gm); Floating Pond Food (500gm,

100gm); Tropical Fish Food (500gm, 200gm, 13gm); Colour Food, Herbivore Food, Carnivore Food (all 25gm); Growth Food (61gm); Tablet Food (48gm-100 Tablets); Fry Food (48gm); Marine Food (200gm, 25gm). The disparity in weights between varieties is due to the varying densities of the foods; Growth and Fry Foods, being smaller in particle size, means

you get more weight in the tin!

With both indoor and outdoor fishes being catered for (pardon the pun), there is virtually no way your fish can escape being fed high-quality foods.

Details from: AQUARIAN ADVISORY SERVICE, PO Box 67, Elland, West Yorkshire

## Interpet

"Never carry a bucket again" is the latest exhortation from INTERPET. Before you leap to the conclusion that they have uncovered a market demand from a host of incontinent hobbyists, you should know that the slogan refers to their new NO-SPILL, CLEAN AND FILL — The Aquarium Owner's Friend. Using this system, dirt can be siphoned (well, sucked really) out of the tank and, at a turn of a control, fresh water pumped in to replenish the lost water.

A Special Tap-Connector/Tap-pump 'T' piece/Siphon-Supply Bell fixes the up to 100ft (30m) hose to the water supply tap; at the other end, the fitted gravel-washer tube is placed into the tank at strategic intervals as required. Turning on the water

with the siphon in the 'Drain' position, the dirt is removed from the gravel by suction; pushing the siphon up and twisting a quarter turn, reverses the action and water from the tap goes into the aquarium.

Although dechlorination occurs through 'gassing off', it is recommended that the normal conditioning agents are added to treat the incoming

tapwater. If a mixer tap is used, then the water can be used at approximately the correct temperature but, with 'cold tap' only, water should be added over a period of an hour or so to prevent thermal shock to the fish. Extension tubes and extended Gravel Washers are available. Details and informative leaflet are also available on request.

It's still not too late to do

something about Blanketweed. POND BALANCE is Interpet's answer to the problem and, unlike some similar remedies, it will not damage other plants (or fish). While safely adjusting water conditions not to suit blanketweed, it actually promotes other plant growth at the same time.

Since the recent introduction of TRIZYME, the use of the biological-filtering bacteria-encouraging agent has been expanded to outdoor ponds; ask for POND TRIZYME at your stockist.

Coming soon for those indoor tanks — Fluorescent Tube Reflectors — watch this space!

Details of all Interpet products from: INTERPET LTD, Interpet House, Vincent Lane, Dorking, Surrey RH4 3YX (Tel: 0306 881033).



No spill and fill — courtesy of Interpet.

## Jerrard Bros

One of the attractions of the aquarium is undoubtedly the effect of light dappling the underwater scene, but how to achieve it? Most indoor aquariums are lit by a single-source lamp and any 'dappling' is usually the accidental by-product of surface water turbulence caused by a power filter or airstone.

The ARCADIA LOW VOLTAGE TUNGSTEN HALOGEN LIGHTING SYSTEM from JERRARD BROS will enhance the appearance of an aquarium already lit by fluorescent tubes. The two mirrored lampholders deflect the light from two sealed-beam dichroic tungsten halogen lamps into the water, giving the appearance of shafts of sunlight.

appearance of shafts of sunlight. Each lamp has a glass front for safety and easy cleaning; the low voltage (12v) nullifies the risk of electrical shock, even if the unit falls into the water. Areas of light and dark can be created, with light-loving plants, invertebrates and other attractive items highlighted. Replacement lamps are easily available.

Still with aquarium lighting, the ARCADIA PENDANT 150 lamp and fitting has been specially developed to provide a top-quality light-source giving the proper conditions in marine invertebrate aquaria. The ceiling-mounted ballast unit and combined lamp reflector and discharge igniter unit, are connected by a 'Rise & Fall' unit which allows exact lamp

placement to be made. The ballast unit includes a safety thermal cut-out, and the corrosion-resistant splash-proof aluminium housing remains cool during use, thus allowing comfortable adjustment.

The cooler (4,000 degree Kelvin), light is directed with a beam angle of 40 degrees spread and will provide excellent penetration, invaluable in deeper tanks. Its efficiency (it is claimed) allows twice that of comparable standard mercury fittings and its 'slow-start' operation will not scare the fish.

So you've got a fish house, or run an aquarium shop? The ARCADIA HQI LINEAR RANGE of lamps have been designed to give a top quality lighting solution for those needing power and intensity of

light (for runs of tanks or other displays) at an economic cost. The HQI Linear can be suspended by chains over aquariums, or to the underside of any shelving immediately above, and is available with a choice of single or multiple lamps in three wattages, allowing the correct light output over a pre-determined light spread length. Initial lumen outputs are: 70W — 5,500; 150W — 11,250; 250W — 20,000, available in 220v or 240v in Black, White or Anodised Aluminium with optional fan-assisted cooling.

Full details of all products from: JERRARD BROS plc, Cairo Road, Croydon CR0 1XP (Tel: 081 688 8222 Fax: 081 681 3119)

## Mealworm Company

Those creepy-crawly things are on the move again! No, I don't mean the MEALWORM COMPANY but, rather, their products.

Keepers of large hungry fish,

reptiles and amphibians will be pleased to know that last year's prices have been held for this year too — but there's more, there's more (a topical, no apologies, punning cricket joke — geddit?). The price of pre-packed worms has dropped by as much as 20%, and a smaller

pre-pack of 50 afore-mentioned crickets (geddit now?) should retail at less than £1.50.

Acknowledging that good business usually means giving customers what they want, red earthworms (alias Loblings or Dendrobeans) and fruitfly cultures (winged or wingless) have

been added to the range of products.

Details from: **THE MEALWORM COMPANY LIMITED**, Unit 1, Universal Crescent, North Anston Trading Estate, Sheffield S31 7JJ (Tel: 0909 568953/568954 (24 hour service) Fax: 0909 568666).

## Cyprio

Not content with helping hobbyists to maintain the best water conditions for their pond fishes, CYPRIO have now turned their attention to helping the fish to breed.

In the stark, bare ponds of Koi, females find fewer refuges from the harrassing males than a Goldfish would in its more heavily-planted environment. The ensuing spawning chase may go on unresolved for many hours, resulting in both very tired females and frustrated males!

The Cyprio FISH SPAWNING MOP solves these problems by providing an ideal area where, not only can the fish spawn happily, but also from where the hobbyist can conveniently collect the protected eggs for future hatching and raising of the fry.

The mop is made up of



machined strips of green, open-cell foam. Its 'spread' is some 70cm (c27.5in) and it has neutral buoyancy, remaining conveniently at the surface for the hobbyist to collect once spawning is over. The mop should then be removed to a separate container of pond water and provided with aeration and filtration. A Cyprio Amphimaid shield over the pump's intake will stop fry from being drawn in. Once all the fry are free-swimming, the mop can be removed, rinsed through and stored for future use.

Details from: **CYPRIO LTD**, Eastgate Mews, 131-133 Eastgate, Deeping St James, Peterborough PE6 8RB (Tel: 0778 344502).

Cyprio's open-cell foam spawning mop is efficient and re-useable.

## Remanoid

For crystal-clear ponds look no further than REMANOID's new range of AQUAFRESH FILTERS.

The two units are in grey weatherproof materials and come with filter medium and full instructions. Two sizes are available, for ponds of 650 and 1,000 gallons (2,925-4,500 litres) capacities.

To complement these filters, Remanoid has also introduced ULTRACLEAR, an ultraviolet (UV) green water cleaner. The 8 watt totally-enclosed unit is effective for ponds holding from 50-1,500 gallons (225 - 6,750 litres). The design is a breakthrough in efficiency, making maximum use of reflected light, and allowing lamp replacement without dismantling the unit. Used in con-

junction with Aquafresh filters, crystal-clear water can be achieved under normal conditions.

Also available is an ULTRACLEAR unit attached to a filter lid which is designed to adapt existing filters into combined filters and UV cleaners by simply replacing the old filter lid with the new unit.

For hobbyists starting from scratch, the new DE-LUXE

AQUAFRESH 1200 (suitable for 50 - 1500 gallon - 225 - 6,750 litres - ponds) includes mechanical and biological filter media and features a built-in UV cleaner.

Details of filters, UV cleaners and all Remanoid products from: **REMANOID LTD**, Unit 44, Number One Industrial Estate, Medomsley Road, Consett, County Durham DH8 6SZ (Tel: 0207 581089).

## Batsford

If you've ever wondered what a drowned village under a recently-flooded new reservoir might look like, then you can create the same effect in your aquarium, thanks to BATSFORD'S latest range of SIMLASTONE/SIMLAWOOD ornaments.

Small and large STONE COTTAGES and matching STONE WALLS help to complete the illusion. Alternatively, a seabed location is equally re-creatable, complete with



Derelict stone cottage — just one of the items in Batsford's new Simlastone/Simlawood range.

SHIPWRECK GRECIAN AMPHORA and DECAYED WOODS,

the last creating both aesthetic interest and helping to hide the mandatory aquarium hardware.

For fish that like to swim through things, the THREE-LINK CHAIN, TWO-LEVEL CAVE and OPEN-BACK CAVE all provide possibilities (if they won't swim through the cave, then block it up with a ROCK WALL or STONE RIDGE to offer them a secluded spawning site instead!

All models are made from safe materials and will not harm fishes nor alter water conditions.

Details from: **BATSFORD**

PRODUCTS, Holly Lane Industrial Estate, Atherstone, Warwickshire CV9 2HA (Tel: 0827 713730 Fax: 0827 718679)

### APOLOGY

The telephone number of Camlab Ltd given in last month's Product Round-up should have been: 0223 424222. We apologise to Camlab for the slip-up, and to any readers who may have been inconvenienced as a result of our error.

# News



## Top Award for Rainbow Rock

Rainbow Rock, first featured in Product Round-up in the December 1990 issue of *Aquarist & Pondkeeper*, was voted the Best Aquatic Product at the Petindex trade exhibition staged at the N.E.C. on 7-8 April.

Ever since its launch in the UK late last year, sales of this spectacularly attractive product have rocketed. This success has now 'spilled over' to the other products distributed by the sole UK agents New World Aquatic Distribution Ltd (see the April 1991 instalment of Product Round-up for further details).

Seen receiving the Best Aquatic Product award (donated by *Aquarist & Pondkeeper*) from *A & P* editor John Dawes is Dave Richards, Chairman of New World. Looking deservedly delighted with the proceedings is Russ Feller, President of Feller Stone, Inc, the company which actually owns(!) Rainbow Mountain, where the most appropriately named Rainbow Rock is quarried.

## Sparsholt's Third Aquatics Trade Conference

Following the success of the first two conferences, Sparsholt College once again plays host to the aquatic trade on Monday and Tuesday, 15 and 16 July.

On Monday morning the theme is business and business expansion. Mike Clarke of Interpet will present his ideas on ancillary products which may

be sold along with major items, eg chemical test kits with aquarium set ups, plus a wide range of other ideas to present. A broader view will be given by Klaus Christianson from Denmark who will discuss plant sales across Europe. An American dimension to the discussion on retailing will be provided by Nancy Cowell, whose trip to the Conference has been sponsored by 'Aquarian'.

In the afternoon there will be a choice of visits to:

1. Southern Sciences Ltd — a water analysis laboratory.
2. Sealife Centre.
3. Longstock Water Gardens.

During the evening the social side of the Conference is, once again, enhanced by a dinner which is followed by an entertaining speaker. Informal discussions go on late into the night.

On Tuesday morning, Peter Burgess of Plymouth Polytechnic will describe the fascinating work he has undertaken on Marine White Spot. Gordon Howes of the Natural History Museum will bring a selection of preserved specimens — see the very first Swordtail, Guppy, etc, which were described for science, and will talk about the work of the Museum. Mintel have just completed another business survey of the aquatics industry and Finella McCarthy will outline their findings and identify the trends the survey has revealed.

During Tuesday afternoon the hot potatoes of 1992 will be discussed. Barry Hill of the Ministry of Agriculture, Fish and Food, Fish Disease Laboratory, will present a paper on the state of EEC legislation concerning zoning. He will be fol-

lowed by speakers from both the ornamental and food fish industries outlining their hopes and fears of the outcomes of this legislation. During the discussion that follows the speakers will be available to answer questions.

Delegates arriving on the Sunday evening will be greeted with a free BBQ kindly sponsored by Interpet.

Contact: Jane Lloyd — Conference Director, or Dave Alderson — Short Course Manager, Sparsholt College, Hampshire, Winchester. Tel: 0962 72441.

## Northern Ireland Reader Wins TFH Prize

Our picture shows Edmund Burns, one of our Northern Ireland readers, receiving a copy of the spectacular *Ad Konings' Book of Cichlids and All the Other Fishes of Lake Malawi* — the very special prize he won in our recent, highly successful competition sponsored by TFH Publications.

Presenting the prize is Stanley Andrews, proprietor of Animal Magic, 36 Frances Street, Newtonards, Northern Ireland, while Edmund's wife looks on in disbelief at the superb prize.



In the words of Sam Hardy of TFH: "Animal Magic, almost entirely supplied by Glenkrag — the leading wholesalers in the whole of Ireland — is the best kept and cleanest shop that I have ever seen". And this, despite the fact that the presentation took place at 6.30 in the evening, after a busy day's trading!

Our sincere congratulations go to Edmund and all the other lucky winners, and our thanks to TFH for sponsoring such a great competition.

## Bring on the Singing Haddock

A new permanent exhibition entitled *Fish* opens to the public at the Royal Museum of Scotland on 15 June. Within the exhibition, stunning specimens, video sequences, computers and interactive devices help the visitor to explore the diverse ways of life of fish.

Three-quarters of the Earth's surface is covered by water, and the curator and designers of the exhibition have attempted to recreate something of the underwater environment with imaginative sets and lighting effects. Fish have been gathered from all over the world to illustrate particular behaviour or aspects of biology. About 100 of the more than 20,000 species are represented, ranging in size from a huge ocean sunfish, to the smallest known fish — an 8mm long midget goby.

Specimens have been prepared by the Museum's award winning taxidermists to show how herring spawn, how rays swim, how male seahorses 'give birth' and how haddock produce their purring mating calls.

A Shark Park surrounds the visitor with different kinds of shark, including Threshers scything their way through a shoal of mackerel. Shark Fax, a computer data base provides answers to such questions as "How smart are sharks?" and "Must sharks swim continually or die?". The final section deals with the inter-relationship of fish and people, and also refers to fable and folklore.

A book entitled *Fish Facts* has been produced to accompany the exhibition by the National Museums of Scotland, in collaboration with the Sea Fish Industry Authority. Illustrated by internationally renowned cartoonist, Kate Charlsworth, and written by Geoff Swinney, Curator of Fish at the National Museums of Scotland, it will be launched on 14 June.

The Education Department is organising a series of workshops for teachers to encourage maximum use of the gallery. Admission is free. Opening hours are 10am to 5pm, Monday to Saturday, and 2pm-5pm, Sunday. For further information, contact Geoff Swinney, Curator of Fish, on 031 225 7534 Ext 234 or Sara Craig, Press Officer, Ext 221.

# KEW GOES MARINE

Kew, synonymous with anything and everything botanical, is taking another major step this month with the opening of the £1-million Marine Display.

*A & P* editor **John Dawes** reports.

*(Photographs by Andrew McRobb. Reproduced by courtesy of the Royal Botanic Gardens, Kew)*



The spacious, brand-new Marine Display at Kew provides a revolutionary approach to exhibiting seaweeds, brackish water, mangrove and shoreline plants.

**W**hen I first heard the news, I just couldn't resist the temptation to investigate. A £1-million exhibit... for seaweeds? Under the famous Palm House at Kew Gardens? This, I had to see.

I, along with numerous other aquarists, have long felt that marine plants get a pretty raw deal overall. Therefore, when one of the leading institutions in the world decides to invest £1 million in an exhibit designed to cater for seaweeds and other salt- and brackish-water-loving plants, it's a sure sign that these long-overlooked algae and angiosperms (flowering plants) are, at last, being afforded the appreciation they so richly deserve.

Heading the whole operation is Peter Morris, a marine biologist who has travelled the world, diving the major reefs and visiting tropical and temperate mangroves, mudflats, estuaries and sandy and rocky shores, in order to study their vegetation in situ, thus allowing him to provide for their every need 'in captivity'.

## BACKGROUND

Work leading up to the new exhibit started way back in 1981 when extensive plans were drawn up for the restoration of the world-

famous Palm House at Kew. It had always been known that two basement areas existed which, if linked by excavating the earth in between, could provide space for a new plant collection. However, before this basement could be designated as the site for a marine display, the Kew authorities had first to satisfy themselves that such a collection would be a viable proposition.

Early investigations were not encouraging. Most of the world's experts on marine plants felt it would not be possible to keep algae alive for long periods in aquaria. Undeterred, two trial tanks were set up in 1983 to grow several species of tropical green algae. To most people's surprise, they survived and grew, so by 1985, Kew felt sufficiently encouraged to employ a marine biologist (Peter Morris) to take the research work on to its next phase.

## THE EXHIBITS

From reef drop-offs to mudflats and mangroves, each exhibit has been designed by Peter and his team to meet the exacting demands of its plant inhabitants to perfection.

It is pertinent, at this stage, to stress that the Marine Display is a *habitat* exhibit, not an animal one. Therefore, don't expect to find all the aquaria to be brimming over with fish and invertebrates. Certainly, the animals are there, and in sufficient quantity and quality to make most marine aquarists highly envious. But the emphasis is, quite rightly, on the plants.

Again, I feel that it is relevant to make another important point in this connection. As anyone who has dived on any reef anywhere in the world will tell you, plants do



Mark Wilkinson carries out essential maintenance work behind the scenes.





Tank-grown *Valonia ventricosa*, commonly referred to as Sailor's Eyeballs.

not normally grow in profusion in these habitats. It's the animals and rocks that take up most of the available space (lagoons are exceptional, sometimes being clothed in Turtle Grass). Therefore, the Kew tanks (all top-quality Hockney systems) reflect this natural state of affairs, with plants being present in 'natural' concentrations (which may be a little lower than some aquarists might expect to find).

Once you get the whole concept into true perspective, though, you will find that there's a great deal to enthral you. I certainly found it so.

In the mangrove display, you, quite naturally, have Mangrove Trees (*Avicennia* and *Rhizophora*), plus *Nyssa* palms and *Acrostichum* ferns... plus one Fiddler Crab, soon to be joined by suitable brackish water fish, such as Mudskippers. The tropical shore display includes such rarely-seen plants (in the UK, at least!) as the distinctively leaved *Ipomoea pes-caprae* — a common shoreline plant in the Tropics.

Best-known among marine aquarists are, of course, the various *Caulerpa* and *Halimeda* species, and these are joined by other delightful macro-algae such as Sailor's Eyeballs (*Valonia ventricosa*), tank-reared *Sargassum*, Turtle Weed (*Chlorodesmus fastigiata*)



The 'velvet-textured' *Codium gepii* grows exceptionally well in the Display's aquaria.

and many others.

For their part, the temperate tanks contain our own native superbly delicate Coralline Seaweed (*Corallina officinalis*), the various Wracks (*Fucus* spp and *Ascophyllum nodosum*) and, of course, the most impressive of all, the kelps such as the Sea Belt (*Laminaria saccharina*) and the Oar Weed (*Laminaria digitata*).

## DESIGN OF THE DISPLAY

The marine display has been designed with three major objectives in mind:

1. To accommodate all necessary life support systems to ensure healthy growth of the collection.
2. To provide ease of operation and adequate propagation facilities.
3. To provide a public section finished to a standard in keeping with the world-famous Palm House located directly above it.

In essence, the marine collection area is a rectangular box measuring 28m long by 12m wide (c.92 x 39ft) in which a public display area has been created, incorporating a wide circular domed centre, roughly following the shape of the Palm House. The false walls which divide the public section from the service area (located behind) are constructed



*Sargassum* is also being cultivated very successfully in the unit.

of stainless steel framing clad with vitreous enamel panels.

Although the total marine collection area is relatively small, almost half of the available space is given over to essential service facilities. Of the 19 display aquaria, 5 are large glass-reinforced plastic tanks, ranging from 2m to 4m (6.6 - c.13ft) long; 13 are smaller, all-glass aquaria, and the central one is a 12-sided all-glass exhibit measuring 2.5m (8.2ft) across the flats. The 10 centre tanks each form part of the central display walls, their flat glass fronts matching the adjacent central 12-sided aquarium. A continuous platform runs behind the aquarium stands, giving easy access for maintenance and feeding, while, in the public section, a drop-down panel is provided above the aquaria to enable the tanks to be cleaned and decorated from the front.

The floor of the service section is reconsti-



The most appropriately named *Halimeda opuntia* (*Opuntia* is the scientific name of the Prickly Pear Cactus whose 'leaves' — stems, actually — look like the 'leaves' of this species of green seaweed).

tuted York stone containing a non-slip additive, dissected by four large drains which allow for the whole area to be hosed and kept spotless. Each aquarium has its own supply of seawater, freshwater and air, including the 15 propagation tanks which are positioned in three nursery areas behind the scenes.

A formidable amount of equipment is needed for a venture such as this, of course: 50 specially-made lighting units, 50 power filters, 5 refrigeration units, 3 tidal tanks, tonnes of sand, rock and coral, and 10,000 gallons (45,000 litres) of synthetic seawater.

Each aquarium has its own special filtration system which separates it from all the other tanks in the display. This may not be the simplest arrangement available, but it was felt that this flexibility was needed in order to reconstruct successfully the many and varied habitats in which the displayed plants are found in the wild.

It's a far cry from a North Wales rocky shore, a Hampshire saltmarsh, an Australian coral reef, or a Thai mangrove forest, to a basement area two metres below the world's most famous glasshouse. Yet, this difficult transfer from the wild to Kew has been achieved, giving us, in the process, a glimpse of four of the most unique, and sometimes inaccessible, habitats in the world.

I wish Peter Morris and his team the very best of success in their exciting venture and congratulate them for providing, at long last, somewhere where seaweed nuts like me can go to enjoy our beloved algae to our heart's content.

### OPENING HOURS: 10.00 am - 4.00 pm

#### Notes:

1. The entrance fee to Kew Gardens is £3.00. Entrance to the Marine Display is free.
2. A guide, costing £1, will be available by the time we go to press. Full details from Peter Morris, Manager, Marine Display, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB. Tel. 081-940 1171.

# Your questions answered

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

All letters must be accompanied by an S.A.E. and addressed to:

Your Questions Answered, The Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.

Herpetology, Julian Sims. Koi, John Cuvelier. Tropical, Dr. David Ford. Coldwater, Pauline Hodgkinson. Plants, Barry James. Discus, Eberhard Schulze. Marine, Graham Cox.

## HERPETOLOGY

### IF IT MOVES . . .

At the moment, I have three Dwarf Clawed Frogs (*Hymenochirus boettgeri*) and three Dwarf Aquatic Frogs (*Xenopus*



Dwarf Aquatic Frogs or Dwarf African Clawed Toads (these are *Hymenochirus curtipes* photographed in amplexus at this year's Florida Tropical Fish Farms Association show) can fall prey to large *Xenopus* toads if kept together.

tropicalis). They all live happily in the same aquarium. In the near future I would like to obtain some African Clawed Toads (*Xenopus laevis*). Will the smaller frogs be safe? I ask because even my small specimens appear to go for anything that moves, irrespective of its suitability for food or not. However, all my fish have, so far, escaped capture.

As you correctly say, amphibians are stimulated primarily by movement when they feed, and not by the suitability of the live creature they try to catch.

Adult *Xenopus laevis* (African Clawed Toads) are relatively large cannibals and readily take moving prey, such as earthworms. They also grab the legs of other similar-sized toads if these move nearby. Therefore, I would recommend that you only keep toads of the same species, and of the same size, in any one tank — a small *Xenopus*

could easily be swallowed by a bigger toad.

For the same reason, I would not recommend keeping small aquatic toads and fish in the same aquarium. You never

know when the stimulus of movement by a fish will trigger a feeding response by an amphibian.

### WAXING LYRICAL ABOUT WORMS

I would be very grateful for any information you can give me on Waxworms regarding their cultivation and possible use in feeding herpetiles.

Waxworms are the larvae of the Greater Wax Moth (*Galleria mellonella*). The adult moths normally lay their eggs in beehives and clear honey will form an important constituent in the nutrient medium used to culture the larvae.

Waxworms are eaten by frogs, toads, newts, salamanders and insectivorous lizards.

The easiest way to start your

own colony is to buy a commercially produced culture. These are sometimes available from suppliers advertising in *A & P* and in the *Animals & Pets* section of *Exchange & Mart*.

When purchased, the culture will consist of waxworms and nutrient medium, all held together by the webs which the larvae spin. The culture can be placed in a plastic 2-litre ice cream container or a sandwich box. Ventilation is important. Therefore, two or three large holes should be cut in the lid of the container. A piece of very fine plastic mesh should be bonded over each of these holes to prevent the escape of the winged moths after they have emerged from the pupae.

There should be enough nutrient medium in the initial culture to allow the waxworms to complete their growth and pupate. At living room temperatures, metamorphosis takes about three weeks, after which time adult moths emerge from the pupae. The moths mate almost immediately and then the females lay their eggs around the edge of the container in a narrow band. The eggs can be easily scraped off the walls of the original container and used to start a new colony. Care must be taken when opening the container to prevent the escape of moths which will fly out and possibly start up one or more colonies where they are not required!

The eggs should be transferred to several new containers of similar construction to the one already described. Each new container must first be prepared by the addition of nutrient medium to a depth of approxi-

mately 5cm (2 inches).

The medium consists of: Wholemeal flour mixed with powdered yeast in the ratio, 20 parts of flour to 1 part of yeast. To this mixture, add equal amounts of clear honey and glycerol until the medium binds together when squeezed.

When the eggs hatch, the larvae bury themselves in the nutrient medium, moving downwards away from any source of light. This is an example of negative phototaxis. Therefore, if the culture containers are kept in illuminated conditions so that light can penetrate through the ventilation mesh, this is an excellent method of deterring the larvae from escaping.

Some waxworms can be collected at any time from now on, according to the size of the larvae required. Indeed, if none are removed from a colony kept in warm conditions, the growth rate of the grubs is so rapid and their appetite so voracious, it is quite likely that they will quickly exhaust the nutrient medium.

Of course, some larvae must be allowed to pupate and complete their development into moths. These will lay the next generation of eggs. At 30°C (86°F) the life cycle from egg to adult takes about six weeks. Generally speaking, the lower the temperature (down to about 15°C - 59°F), the slower the growth rate, and therefore the longer the life cycle will take to complete. Thus, if different containers are maintained at different temperatures, a ready supply of waxworms of various sizes will always be available.

## KOI

### SEEDY FILTERS

*Is there any advantage to be gained from seeding my new Koi pool filter to ensure a rapid start-up of biological action?*

Filter start-up times have always been a source of contention, with many people extolling this method or that. One person I know swears by his system of introducing some broken up FRESH cod meat into his filter at the start of each season.

Personally, I've always worked on the premise that an unseeded filter will require about 8 weeks to become active but a seeded filter needs only about 56 days to go biological!! After all, any bio-filter will

not operate unless there is sufficient food in the way of fish waste to feed the bacteria within the media. My advice is to let nature take its course and buy some nice Koi instead.



Biological filters need a fair bit of time to become fully operational — with or without seeding.

### NON-EXISTENT pH PROBLEM

*My Koi pool has now had two full seasons which, happily, have been trouble-free, with perfectly clear water and zero levels of ammonia and nitrite. My problem is the high level of the pH which averages out at about 7.8 or 8. What can I do to lower this level without harming my Koi?*

The short answer is, do nothing! Koi can quite easily withstand a pH of 9 without ill-effect. If the pH was below 7, then you would have cause for concern.

Most Koi pools tend to have pH levels higher than the

accepted optimum of 7.2 (I've never been able to find out who contrived this magic figure). I, certainly, have never had a pool that was below pH 7.6.

Provided that your figures are correct (they can vary dramatically, depending on the time of day, temperature etc.), leave well alone. Pool pH is regulated by many factors, not least of which are the fish themselves, any plant life, biological filter activity etc.

It is possible to lower the pH by something as crude as introducing clear vinegar into the water, but why bother as long as your fish are healthy and happy? Don't start looking for a solution before you've got a problem!

## TROPICAL

### BREEDING PEARLS

*I would be grateful if you would supply me with some information on how to breed Pearl Gouramis and rear the fry. My male is 5in (c13cm) and my female is 4.5in (c11.5cm). Are they likely to spawn in a community tank?*

The Pearl Gourami, *Trichogaster leeri*, or Mosaic Gourami as it is sometimes called, will attempt to spawn in the community aquarium, but such efforts are never very successful. It is better to set up a separate breeding tank, of course, and it needs to be fairly large — 2 feet x 1 foot x 1 foot (60 x 30 x 30cm). Fill it with soft water (rainwater, if the tapwater is very hard) and plant well, including some floating plants.

Set the temperature at 28°C (82°F) and introduce the male. When he is settled in, add the female. The male should build a

bubble nest, especially if the female is fat with eggs. It is, often, only a small nest, and the courtship is, generally, a gentle

affair (unlike other *Trichogaster* spp.).

Up to 3,000 or so eggs may be laid, although only a small pro-



Pearl Gouramis in a spawning embrace. The eggs will float into the nest or will be collected by the male and blown into the bubbles.

portion will eventually survive to produce adult fish. It is best to remove the female when she is spent. The male will tend the nest for the 4 days it takes for the fry to hatch and become free swimming. He can be removed then, too.

Have bottles of infusoria ready for feeding over the first few days. The fry are quite small and, like the adults, have very small mouths. After a week, fine fry foods will be taken, when growth is rapid. The air above the tank surface must be kept still and warm, i.e. do not keep lifting the lid allowing cooling draughts to enter, or many of the fry will be lost.

Use standard lighting, but do not use filters; the bubble nest needs still water. Filters and aeration could be added after the young fish are strong enough (probably after a month or so). Growth rate varies from batch to batch and tank to tank, so it cannot be quantified.

## PLANTS

### BUD ROT

*My water lily regularly produces beautiful leaves. It also throws up large flower buds. However, these wilt and fall back into the water*

*without opening. Why does this happen?*

Although it is common for both leaves and buds to rot on water lilies as a result of disease or algicide damage, I have never

come across a case where the leaves are in perfect health while the buds rot. I have searched through all my reference books on the subject but nowhere can I find any mention of your problem.

I would suggest that re-potting in a clay-based compost, and an annual feeding with a slow-release fertiliser, would cover you against any deficiency which may be contributing to your problem.

## COLDWATER

### BLANKET PROBLEM

*I have a problem with a weed that grows in long threads and in dense masses in my pond. It grows so thick that my fish get tangled in it. What is it, and how can I get rid of it?*

The unwelcome plant which is giving you so many problems in your pond is, in fact, Blanketweed. It is a nuisance and a problem once it establishes itself.

There are several products on

the market to rid ponds of this weed, but I, personally, prefer using alternatives. The best method, I have found, is to rake it out. You can also use a stout twiggy stick which should be pushed into the mass and twisted so that the fibrous plant wraps around and can be pulled out.

A continuous onslaught must be waged against this intruder until it is under control. To help prevent future growths, give more shade to your pond by adding more surface floating plants and increase the number of oxygenating plants.



Blanketweed — the scourge of virtually every pond at one time or another.

## MARINE

### YOU PAY YOUR MONEY...

*I have heard very good things about both reverse-flow under-gravel filtration and ordinary under-gravel filtration powered by powerheads or airstones, although the use of the latter precludes the use of the former, of course.*

*If using reverse flow, how would you provide aeration, taking into account the fact that airstones seem to clog up very rapidly in seawater?*

① **Reverse Flow Filtration.** This is a system whereby MECHANICALLY-FILTERED seawater from an external powerfilter is passed downwards through what would normally be the airlift tube of the U/G filter, to rise upwards through the coral gravel/coral sand bac-

terially active filterbed, thus blowing all the non-biodegradable solid components of the fish-invertebrate excretion (— I've always called this fibrous material 'SEA-HUMUS' because it looks like soil humus under a microscope) into the external power filter, from where it is easily removed from time to time. The seawater is biochemically filtered on its passage through the filterbed by the countless billions of nitrifying bacteria which live therein. This is the Rolls-Royce System of aquarium filtration — seawater, brackish or fresh, it makes no difference; it's the best there is.

② **Powerhead-operated U/G Filtration** — This is the Jaguar System of filtration for any type of aquarium. Although it has exactly the same world-beating

high nitrification potential as 1 above, since the biochemical filtration and the mechanical filtration are both carried out in the U/G filterbed, it does not mean that, periodically, ie ideally, every time you carry out your partial seawater change, it is necessary to get your hand in the tank and dislodge as much 'sea-humus' as possible from the filterbed and then siphon it out with the 'clapped out' seawater.

③ **Airlift-operated U/G Filtration.** This is, in effect, the Rover System, since you still have the unequalled and colossal nitrification potential of 2 above, but unless you use a 'Long-life' plastic diffuser on the ends of the airlines inside the uplifts, the persistent gurgling sound might get to your

nerves after a while!

You pay your money and you take your choice.

Secondly, to answer your question about aerating a marine aquarium, you simply use wooden microdiffusers, eg 'SeaMist'. These are not only the most efficient means of cramming life-giving oxygen into your seawater but also, they don't clog up, and are silent in operation. You must always remember that, not only the fishes, invertebrates and algae (at night) need all the oxygen they can get, but those 'life-savers' — nitrifying bacteria — are also aerobic respirers. They have a huge biological oxygen demand (BOD) which must be satisfied night and day if your creatures are to thrive and die of old age.



