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AQUARIST AND POUNDKEEPER

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MARCH 1992 VOL. 56 NO. 12

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EXEMPLARY PROFESSIONALISM

When it comes to the creation of 'new' aquarium fish, two places immediately spring to mind. One is, undoubtedly, the Far East — as last month's **Cover Story**, picture and **Spotlight** feature on the incredible Blood-red Parrot brilliantly demonstrated. The other 'hot-bed of creativity' is, of course, Florida — witness this month's cover picture and **Cover Story**.

March is an important month in the Sunshine State's aquatic calendar. It is when the fruits of a full year's endeavours — or, at least, the cream of the crop produced by Florida's innovative fish farmers — makes its first 'official' public appearance in Tampa at the annual Florida Tropical Fish Farms Association Show.

This spectacle is always mouthwatering, and this month's event promises to be as exciting as ever. It could even be more spectacular than in the past few years, since this time round, Florida has not been hit, either by a big freeze-up (as happened two winters ago), or by a severe drought like the one that followed it. As I write these lines, several weeks before I fly out for my judging assignment at the show, I can already feel the excitement of the challenge ahead.

Selecting superlative fish from almost-perfect ones (!), is both exacting and absorbing. The judging is therefore meticulous in the extreme. For instance, teams of three invited judges (none of whom must have *any* connection with *any* of the competitors, or with *any* aspect of the Florida industry) are given a selection of categories which they must judge 'blind'. In other words, there is no indication of any kind that could possibly give away the identity of the company whose fish are being scrutinised. Then, after all the various scores are added up, further teams are selected to judge the special categories, such as Best Livebearer, or Best Egglayer, and so on.

I've now been judging at the F.T.F.F.A. show for five years and, during this time, have been repeatedly struck by the sheer professionalism with which competitors accept the judges' decisions, irrespective of whether they agree with them or not. Not once — at least, not to my knowledge — has any decision been questioned, and not once has any competitor ranted or raved about the outcome of the judging.

Now that's pretty remarkable when you consider that we are dealing with a multi-million dollar industry in which the stakes are very high, and that the winning of one of the highly coveted awards can lead to thousands upon thousands of dollars in extra sales throughout the ensuing twelve months. The behaviour of the Florida farmers is, in a word, exemplary. I will therefore look forward to seeing the results of their 1991-92 breeding programmes, and will report back in *A & P* in a few months' time.

As the showing calendar also begins to get underway in the UK this month, I wish all competitors, societies . . . and judges, of course, an equally 'exemplary' season.

John Dawes
Editor

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EVERLASTING RUBBER? PERISH THE THOUGHT!

Always a sucker for punishment, **Jason Endfield** finds his wits stretched to breaking point (not difficult!) by a simple, inexpensive aquarium accessory.

I'm very impressed. "What with?" you may ask. Well, actually, many things — like space travel and seedless grapes, but if we're talking about things aquatic, which we generally are in these pages, then I'm very impressed by the vast array of products we can buy to help make our fishes' lives even more perfect than they already are. I believe that, whatever our critics may say, our fish lead very privileged lives — usually longer and more comfortable than any of their wild counterparts; and largely thanks to the efforts and research of a select group of manufacturers, we have just about every gadget, ailment cure and food that we could ever require.

Yes, indeed, if our fish are hungry, there are a thousand varieties of food to choose from; if the water is not quite up to scratch, then there are dozens of conditioners; if the tank's looking empty, we can fill it with anything, from exotic plastic plants to multi-coloured swirling water wheels — and the list goes on . . . and on.

I have my own personal favourite aquatic product. It's a brown liquid marketed under a well-known brand name and described as a 'general tonic and pick-me-up for fish'. Suffice to say that a few drops has even the drowsiest fish 'on a high' within a few minutes!

I'm often tempted to try a few drops myself, though up to now I've been dissuaded by the possibility of developing even more fish-like features than I already have. . . .

However — (there is always a 'however' on this page!) — one product remains very inadequate, dated and troublesome and is, in my opinion, the boil on the nose of fishkeeping (I do like that expression!): Rubber Suction Caps (they even sound unsavoury).

These little things are supplied with every piece of fishkeeping equipment, from heaters through to thermometers, are absolutely essential, and actually prove to be incredibly indispensable . . . for precisely two weeks (I exaggerate, of course, but you get my drift). After this time, in my experience, they perish, disintegrate (aided by the fish which soon acquire a taste for rubber) and leave one's aquatic appliances floating aimlessly and sometimes dangerously around the tank.

Although weighted, free-floating heaters can be potentially very dangerous and vulnerable to knocks and cracks; free-floating thermometers are merely infuriating because they're always facing the other way, so you can't read the temperature without being very agile indeed (made of rubber, one might say) which brings me neatly back to the subject.

Surely, in these days of space travel and seedless grapes, not to mention compact discs and 'no-soak' dried peas, our boffins could have invented perish-resistant rubber suction caps. Maybe they have. If so, could they please start using them?

The suction cap on the heater should be like the icing on the cake — a very important integral part of the whole product. There are aquarists out there who have managed to counter the problem a little with the kind of innovative thinking that fishkeepers are famous for.

I've even heard of one hobbyist who secures his heater to the tank with a rather elaborate system of elastic, bamboo spindles and lead weights — though he put it together in the wrong order once, and the whole thing catapulted itself across the room. . . . Anyway, why should we have to resort to such brain-draining devices after we've paid good money for the heater in the first place?

It's often the simple things in life that are ignored (well, look at me!), and there's no doubt about it, this is certainly the case with rubber suction caps. If you think that I'm perhaps taking the issue a bit too seriously, I can tell you that I've patiently put up with this problem since I took up the hobby about 15 years ago, and I'm sure that it accounts for at least half the cases of insanity within the fishkeeping fraternity (other causes being noisy air pumps and fast-growing algae). Something has to be done!

So, here's my heart-felt plea to suction cap manufacturers, whoever you are (it seems incredible to think of someone out there actually making them!). Please put your boffins to work — let's have some suction caps that last just a little bit longer. I realise that it may mean you selling a few less, as they won't need replacing as often, but spare a thought for your aquarist customers and think of all the grateful fishkeepers who won't have to answer that embarrassing enquiry about 'the long fish swimming at the back' with "That's no fish, that's my thermometer . . .".

Tomorrow's Aquarist

By David Sands

OUT OF AFRICA

Young enthusiast, **Mark** Hirst, from 7 Lichenstein Road, Somerset West, 7130, Cape Province, in the Republic of South Africa, wrote to me explaining how much he loves fishkeeping. He is excited by the idea of having 'fishy' pen pals and asks if there is anyone out there who would like to exchange letters. I reckon Mark will receive a few dozen after the March issue of *A & P* has been out a month or two . . . .

Mark states that the fishkeeping hobby in South Africa is very much behind that in the UK and the USA. He also writes that there are no fishkeeping clubs near to him, so maybe he should set up his own. He has 21 tanks and breeds plenty of different fish (angels, gouramis and livebearers) and sells them to local pet shops.

Matt Bond, from 13 Gould Road, Hampton Magna, Warwick, CV35 8TU, writes to inform me that **TA** reader **Joe Hardcastle** (see previous **TAs**) is not the only heavy metal headbanger fishkeeper . . . Matt suggests that Joe should seriously listen to Sabbat . . . which sounds dangerous to me!

Matt started fishkeeping, like most of us, with the fairground goldfish prize. He suggests an article on loaches because he has a soft spot for Coolie (Kuhli) Loaches. A career in garden pond design is on Matt's list after he finishes the dreaded GCSEs.

Matt takes pictures of unusual letter boxes which makes him the current champion in our **TA** reader of unusual 'other hobby' competition.

Matt wins a prize for his answer to my December competition: "How does Santa get a fish tank down the chimney?"

He gives parents the money to buy one! Now why on earth didn't I think of that?

Phil Hollings, from 46 Vicars Cross Road, Vicars Crescent, Chester, CH3 5NL, a very regular reader/writer, agrees with Louise that **TA** should be two pages long and wants to state his bit on work experience. Phil did his part at Chester Zoo (lucky, or what?) and enjoyed his fortnight there.

His fave fish are *Microglanis* (wonderful cats) and he thinks anyone interested in fish clubs in his area should try Ellesmere Port, 7.45 pm, Wednesdays, at the Phoenix Social Club.

Finally, in this readers' letters section, **Matthew Cranham,** of 20 Millbrook Crescent, Old Hall Estate, Kirkby, Liverpool, L32 1TJ, tells me that he's trying to encourage his Tiger Shovelnosed Catfish to eat prawns. I would suggest you try a few live earthworms first . . .

Matthew wants to know if anyone locally breeds Central and South American cichlids.

FISHY FEDERATIONS

The General Secretary of the Federation of British Aquatic Societies, **Adrian Dempsey,** of 194 Greenhill Road, Greenhill, Herne Bay, Kent CT6 7RS, dropped me a line and stated the following in response to readers asking me about details of local fishkeeping clubs: "Should any of your readers (both junior and adult) wish to join their local society, I will gladly forward details, wherever possible, of same, plus meeting place, etc."

He would appreciate a SAE. Thank you, Adrian.

The Honorary Secretary of the Federation of Northern Aquarium Societies, **Dave Sidebottom,** of 18 Harry Street, Werneth, Oldham, Lancs, OL9 7TA, forwarded a list of his member societies and, I daresay, he organises the same as the FBAS if anyone should care to write to him.

Thank you, also, David.

Malcolm Goss, of the Association of Aquarists and Thames Valley Cats, whose address is elsewhere in this magazine, also offers the same deal (see **Diary Dates**).

Over the last year or so, many readers have asked me to inform them of their local aquarist society, so now's your chance to ask. We'll do what we can to help.

IT'S THE END OF THE WORLD AS WE KNOW IT

After a goodly period of time writing this column, I'm afraid my time has come to an end. When the editor asked me to do this feature a couple of years ago, I was half and half about the idea.

How could I produce something original which didn't treat young readers like babies, or call them kids or beginners? The exchange of letters has surprised me — we've had some great and some awful poetry, some brilliant letters showing how bright some of you are and, most of all, plenty of enthusiasm.

I have enjoyed this column more than I ever thought I would, and I hope whoever takes on the task from now on will enjoy your feedback.

A special thank you to all those readers who wrote to me.

Keep cool and . . . happy fishkeeping.

Tomorrow's Aquarist will be back next month, so keep those letters coming!

"I'm sure it's around somewhere. After all, who'd want a starting handle?"

JOHN DAVIS

Common Toads — inoffensive and charming, but grossly misunderstood and abused through the ages.

THE MYSTERY OF THE TOAD'S STONE

In a fascinating insight into mediaeval practices, **David Gunston** reveals just how risky life was for our inoffensive, sedate toads.

For centuries, as is well known, the Common Toad was a much-maligned, undeservedly misunderstood and cruelly-persecuted creature, closely associated with witchcraft. Yet, it is strange that, arising out of all this, toads should today still be rather misrepresented in a curious and interesting way, in some quarters at least. The old toad legends went deeper than many present-day naturalists would have us believe.

Mistaken origins

The error seems to have originated in those much-quoted lines which Shakespeare puts into the mouth of the exiled Duke senior in *As You Like It*, II, 1, in his well-known little "Sermons in Stones" speech:

Sweet are the uses of adversity,
Which, like the toad, ugly and venomous,
Wears yet a precious jewel in his head;

This reference to the "precious jewel" in the toad's head, so some authorities innocently tell us, is but the poet's fanciful and striking way of describing the creature's large and prominent eye, glinting ruby and gold with that fascinating ever-changing opalescence. "Jewel", it is naively averred, is wonderfully apt for the remarkable eyes a toad possesses and finds so useful when feeding off moving insects.

But Shakespeare, whatever his occasional shortcomings as a naturalist, falling here for the prevalent belief that toads were actually poisonous, was too good an observer of life to use any such ineffectual metaphor, and it is inexplicable why this explanation should be so widely accepted.

The mention of a jewel was a direct reference to the toad's stone, the precious gem-like stone almost universally believed to lurk, temptingly, inside every toad's head.

It was no mere metaphor, this stone, but for most folk throughout the Middle Ages and for some time afterwards, a real jewel credited with supernatural medicinal and other powers, particularly in relieving snake bite. Endowed with such powers, a toad-stone was indeed considered precious. Viewed against this allusion, Shakespeare's phrase, in its full context about the good in the bad in life, is clearly more powerful and striking than the eye explanation. From the evil and malignant toad comes the valuable elixir which cures personal ills.

First references

The first reference to toad-stones appears to be that of Bartholomew de Glanville, better known as Bartolemus Anglicus, a learned friar whose fame rests largely on his encyclopaedic volume, *De Proprietanbus Rerum*, written in the middle of the thirteenth century. This work mentions the toad-stone as a jewel taken from a toad's head, and stresses its efficacy as an antidote for poisons in general, and snake venoms in particular. Quite a number of later writers allude to the stone in similar terms.

One of the secrets connected with it was the actual surgical removal of the stone, and Heaven alone knows what ghastly crimes were committed against innocuous amphibia down the ages in this connection. There were a number of ways of doing so, all considered correct at different times. Thomas Lupton, who wrote *A Thousand Notable Things of Sundry Sortes* (1579), was a firm believer in the medicinal properties of toad-stones, and gives this method of obtaining one:

A good way to get the stone called Crapaudina out of the toad: put a great or overgrown toad (first bruised in divers places) into an earthen pot, and put the same in an ant's hillock, and cover the same with earth, which toad at length the ants will eat, so that the bones of the toad and the stone will be left in the pot.

The Rev. Edward Topsell, scholar of Christ's College, Cambridge, and one-time

incumbent of St. Botolph's, Bishopsgate, London, preferred the more fantastic method described in his *Historie of Serpents* (1608):

> *There is a precious stone in the head of a toad, and there be many that wear these stones in rings, being verily persuaded that they keep them from all manner of gripings, and pains in the belly. But the art is in taking it out, for it must be taken out of the head alive, before the toad be dead, with a piece of cloth of the colour of red scarlet, wherewithal they are much delighted, so that while they stretch out themselves as it were in sport upon that cloth, they cast out the stone of their head, but instantly snap it up again, unless it be taken from them through some secret hole in the said cloth, whereby it falleth into a cistern of water, into which the toad dareth not enter, by reason of the coldness of the water.*

But most often the creature must have been subjected to the direct physical removal of the stone in the way depicted with force in an illustration to the *Hortus Sanitatis* (1491), one of the first printed herbals. There, a determined-looking man is about to open up the head of a rather large-scale toad, which begs appealingly for mercy with its front legs! One wonders what part of the creature's anatomy was actually extracted.

Toad-stone substitutes

Almost as soon as the whole legend gained credence, false substitutes for genuine toad-stones began to circulate. The real gem was extremely valuable and commanded a very high price when offered for sale, as it must occasionally have been. Consequently, the sham stones became quite plentiful, but of course, they had no supernatural powers. Lupton, in the work already quoted, offered a fool-proof test for the genuine article:

> *You shall know whether the Toad-stone called Crapaudina be the right and perfect stone or not: hold the stone before a toad, so that he may see it, and if it be a right and true stone, the toad will leap toward it, and make as though he would snatch it from you; he envieth so much that a man should have that stone.*

This belief in the efficacy of toad-stones no doubt led in time to the faith in the healing properties of other parts of these creatures. If the actual stone was hard to come by, why not try applications of live toads, toads' bones sewn into a linen bag and hung round the necks of children as a prophylactic against convulsions and other ills, powdered toad, and so on? The developments from this original notion of the mythical toad-stone were many and varied, and some survived until the last century.

'Fossil' toad-stones

One other point in connection with toad-stones should be mentioned. The somewhat later practice of wearing a so-called toad-stone in a ring or amulet was perhaps a variant of the mediaeval idea, but these gems had no real connection with toads at all, although they are known as Bufonites or Crapaudines.

Such a stone is really a cup-shaped fossil palatal tooth of *Lepidotus*, an extinct fresh-water pike, quite common in Wealden and Oolitic strata in many parts of England. Although once white, they are usually stained from the adjoining rocks and are mostly of a drab colour, with a convex polished surface when mounted. Two of them were often made into lockets with their hollow sides facing.

There was a strong belief in the therapeutic value of toad-stone rings, and in the sixteenth and seventeenth centuries, the rings were often made of gold and silver and worn freely in the hope that the stone would keep away disease. Most collections of finger rings include a few, like those in the British Museum, and their use retained all the powerful old superstitious lore surrounding toads generally. In a letter to Sir Walter Scott, Joanna Baillie mentions such a ring owned by her mother which was frequently borrowed by her neighbours for the protection from illness of new-born babies.

The trend away from the stones alleged to come from real toads to the unconnected carboniferous fossils was a fortunate one for these eminently useful, admittedly ugly, but really by no means venomous creatures, which have waited many centuries for the enlightened respect from us all that is their due.

Coldwater jottings

By Stephen J. Smith

SUCCESSFUL BRINE SHRIMP HATCHING

Continuous ample supplies of brine shrimp nauplii are one of the essential ingredients in successfully raising the fry of coldwater fish, such as Koi and goldfish.

As discussed in last month's **Jottings**, space and consistent warmth are two additional essential ingredients, and it is important to remember that it is far better to rear six good quality specimens, than struggle with 600 'runts'.

Having made an initial cull of obviously-deformed fish (something which, with experience, becomes easier to spot), the remainder need to be fed with plentiful supplies of good-quality live food. By far the most popular first food for fry is newly-hatched brine shrimp, which is high in protein and small enough to be easily consumed within a week or so of the fry hatching.

The only drawback with brine shrimp nauplii is that they are cultured in saltwater, and, as too much salt can cause complications in the development of healthy fry, it is essential that fry are weaned off brined shrimp to finely-sifted *Daphnia* at the earliest opportunity.

So, how do we go about producing sufficient quantities of brine shrimp nauplii?

There are a number of proprietary kits available to help you to produce sufficient live food for growing fry, while a battery of three vigorously-aerated sweet jars containing saltwater is one alternative which which traditionally has proven most effective.

One of my favourite methods requires no aeration at all — just a lot of light and some warmth: the Hykro Brine Shrimp Hatchery, available from Interpet (price £13.47). The hatcher works on the principle of newly-hatched brine shrimp being attracted to light and thus becoming separated from their shells.

Its use really could not be simpler, and it takes up so little space that it could be sited on the top cover of your aquarium itself. The kit comprises a shallow dish, the base of which is divided into rings, forming troughs and a central cup. A transparent separator is positioned on top of the rings, while a close-fitting lid, with a large aperture in the centre, is placed on top of the whole assembly. (It really sounds more complicated than it is, but a glance at the accompanying photograph should, hopefully, make things clearer).

The Hykro Brine Shrimp Hatcher is one of the most simple and effective means of producing brine shrimp nauplii to help promote rapid growth of fry.

The hatcher should be filled with clean water to the marked level, and this is then poured into a plastic bottle or similar container, which can subsequently be used as a measuring device and mixing unit. A measured amount of aquatic salt, provided within the kit, is added to the water and dissolved.

A measure of brine shrimp eggs, also provided within the kit, is placed around the outer ring of the bowl, using a measuring spoon provided, and the transparent separator is placed on top of the divisions and the lid clipped on top, before adding the brine mixture.

Within the well at the centre of the assembly is placed a small strainer and, within 24 to 48 hours, the first nauplii will have migrated to the light at the centre of the unit and into the strainer cup, having swum over the division in the bowl and under the transparent dividing rings, leaving their shells behind.

To feed your fry, all you need to do is lift the strainer cup and rinse the contents under a trickling tap before immersing the strainer into the fry aquarium and allowing the nauplii to swim free. The strainer is then returned to its position in the centre of the unit to collect further nauplii.

Within seconds, fish fry can be seen chasing the fine specks of brine shrimp nauplii and devouring them voraciously. It will be seen that such a diet promotes vigorous growth and, especially in the case of the fry of 'round-bodied' Fancy Goldfish, their bellies will 'drop' quite distinctly (often with a bright red hue, so don't be alarmed).

Depending upon the numbers of fry you are hoping to rear, the hatcher will provide two or three days' supply of nauplii, so it is a good idea to culture a 'bank' of two or more hatchers, setting up each one a day behind the other, to ensure a continuous supply.

MORE ON LOW-TEMP CONTROL

Nick Barwell, sales manager of **Rocon Electronics**, has very kindly written to me in response to our pleas for a heater-stat for coldwater fishkeepers (see **Coldwater Jottings** — October 1991).

Electronic stats for aquarists of all persuasions are provided by Nick's company, and he points out that the company's *Digistat* has a temperature control ranging from nought to 159°F (minus 19 to 69°C).

The unit will, apparently, work with mats, tubular heaters, or heater-stats, provided that the mechanical stat is turned to its maximum setting.

The bonus is provided during the summer months, in that the *Digistat* can be used to control the operation of a fan or chiller. "What else could fine fish need?" exclaims Nick.

We have had some tremendous response from that initial item back in October, but we still haven't found an enterprising manufacturer who can come up with a *combined* low-temperature heater-stat. Any takers . . .?

Rocon Electronics can be contacted at **5A Penyrorsedd Industrial Estate, Llangefni, Anglesey, Gwynedd LL77 7JA. Tel: 0248 750134.**

ORANDA PUZZLE

It is extremely heartwarming to hear of newcomers to this pleasurable pursuit of fishkeeping — especially when they are so enthusiastic about a newly-acquired collection of goldfish!

A superb example is provided by **Jean** and **Ron Walters**, of Bradbury, Stockport. Jean has sent me a most comprehensive letter describing how the couple have become "bitten by the bug", having been given a present of a 48in (120cm) aquarium by her daughter.

Such has been Jean's keenness, in particular, that she says she has been "banned by my husband from entering aquatic shops".

The couple have been keeping their goldfish with great success and fulfilment, for over 12 months, and their collection includes Ryukins and a Moor, Orandas, a Pearlscale and a Lionhead.

However, one problem over which Jean and Ron have been scratching their heads is that, apparently, subsequent to acquiring three new fish from a neighbour, their Orandas have developed "large white fluff balls" on the head.

"The large Oranda in my big tank became covered with these tiny cotton wool balls around its cap, and the fish appeared literally to bang its head on the glass," explained Jean. "Some of the other fish also developed dropsy and I have tried dipping them, but with little success."

Just a couple of observations,

Jean, which I do hope will help you and other hobbyists: the "cotton wool balls" which you describe appear to be a symptom of a healthy Oranda developing its hood. The hood is characteristic of Oranda and Lionhead varieties of goldfish, and is a warty-like development around the head which enlarges as the fish matures.

The build-up of mucus in the 'pits' of the hood is pushed out as the hood develops, and surfaces as the tiny "cotton wool balls" you refer to. These are often misinterpreted as *Saprolegnia*, a fungus, or any other ailment, and subsequent 'treatment' leads only to stressing the fish.

The cause of the dropsy in some of your fish is more difficult to put my finger on from a distance, but my first impressions are that the aquarium may well have become rather overcrowded, and the addition of three fish to an established set-up has upset the balance of the tank. Such an upset (for example, ammonia levels could have increased dramatically) could well be the cause of your Oranda "banging its head" in an effort to relieve the resultant 'burned' gill filaments.

When stocking an aquarium, I personally prefer to keep no more than four or five Fancy Goldfish, at the most, in a 48in (120cm) aquarium. Indeed, just a pair of high-quality Orandas look stunning in such a setting, while the water quality will be fairly easy to maintain and the fish will flourish.

So, a golden rule when stocking a goldfish aquarium is: "less fish; more space".

Thank you Jean and Ron for your letter, which I hope will be the forerunner of many more from yourselves and similarly enthusiastic hobbyists.

ON THE ROAD AGAIN

Your friendly 'Coldwater Jotter' takes to the lecturn with his bag of slides and box of tricks for his first aquatic lecture of the year when he heads up the M1 to the 18th Yorkshire Aquarist Festival, held at Doncaster Racecourse over the weekend of **28 and 29 March.**

I shall be presenting *A Singapore Experience*, based upon my visit to Aquarama '89 and fish farms in Singapore and Malaysia, and which has popular appeal to coldwater and tropical fishkeepers alike. Also speaking at the event will be *Aquarist & Pondkeeper* editor **John Dawes, Dr David Ford** of Aquarian, and **Dr David Pool** of Tetra; as well as **Otto Roth,** who is travelling from Germany to present a talk on Sri Lanka in general, as well as on its native fish.

Marine fish will be on sale for the first time at YAF: Wakefield-based **Aquatica** will be displaying and selling marine fish; while **Golden Phoenix Fisheries,** a popular coldwater attraction at the festival, will be displaying and selling 'new' varieties of Fancy Goldfish collected from their recent visit to China.

Watch out for some super Fancy Goldfish at the Yorkshire Aquarist Festival later on this month.

OUT AND ABOUT

THE STAPELEY EXPERIENCE

By John Dawes

STAPELEY WATER GARDENS

The full extent of Stapeley's 'public' areas can be appreciated in this aerial shot. The Palms Tropical Oasis can be seen in the foreground. To the right, beyond the car park (and out of shot), lies Stapeley's large plant-propagating nurseries.

STAPELEY WATER GARDENS

You can't grow giant Amazon Lilies unless you have a large enough, deep enough, and warm enough, pool for the purpose. The Palms can offer these conditions in abundance.

It used to be widely regarded as the largest water garden centre in Europe. It's now probably the largest in the world, such has been Stapeley's continued growth in recent years.

I remember visiting **The Palms Tropical Oasis** just before it opened to the public some five years ago and being suitably impressed by its exceptional size and potential. With all pioneering ventures, things can go wrong, though, particularly when the operation is on such a grand scale, and I must admit that that thought did cross my mind more than once on my drive home that day.

It therefore gives me great pleasure to be able to report that today's Palms Tropical Oasis has not only developed into an attraction well worth travelling hundreds of miles to see, but is also developing its almost limitless potential along some very commendable lines.

When you look for the reasons behind the success, they are not hard to find. Certainly, Stapeley's dedication and substantial backing towards developing the Palms are undisputable key factors. But, without the right people working 'at the sharp' end, success can only be expected — at best — to be moderate. Stapeley can therefore count itself fortunate in having **Valda Fillery** at The Palms' helm.

Together with her assistant, **Mike Bentley** and an enthusiastic team of gardeners and receptionists, Valda has developed this vast indoor tropical haven into a place both of great beauty and exceptional educational value. As a one-time biology teacher and (later) teacher trainer, myself, I'm always on the lookout for 'educational' opportunities being taken up or — as is more normally the case — missed.

At The Palms, I had a field day! I found the fast-expanding collection of aquatic creatures (fish, reptiles, amphibians, etc), plus some terrestrial reptiles, birds (and Tarantulas), well presented and labelled, with each exhibit incorporating useful background information on

JOHN DAWES

The majestic Palm Court pool holds a large number of excellent Koi, many of which are included in the colour identification photographs visible in the foreground.

the species in an attractive, easy-to-digest manner. Equally, as you walk round the lush, extensive indoor tropical gardens, you come across explanatory labels highlighting certain salient aspects of selected plants (usually species which we exploit in one way or other).

Then, of course, there are the various 'lakes', including the Piranha pool (with underwater viewing facility), the giant Pacus and 'very substantial' Red-tail Catfish, the 'tunnel' aquarium, the incomparable 'Palm Court' Koi pool, the tropical water lilies, the enchanting tree frogs, the education facilities, the excellent restaurant, the shop . . . and so on.

Valda Fillery's enthusiasm appears to have no bounds for, while many people in her position would take a look at what they've helped develop and feel pretty satisfied, she was full of ideas regarding further improvements and innovations when I visited her last August. Some of these ideas will, no doubt, have already been transformed into reality by the time you read this . . . others will, equally undoubtedly, come to fruition this year.

The Palms Court Oasis is open all the year round, including Bank Holidays, from **10 am.** It is also available for evening hire and group bookings. **Admission rates:** Adults, £2.50; Senior Citizens, £1.85; Children, £1.25. Season tickets and concessionary rates are also available, the latter for pre-booked visits of 20 or more people.

Although I always planned to publish this report in spring 1992, I visited The Palms last August because I wanted to see it 'in full bloom'. I also wanted to see the main water garden centre before autumn set in.

My 'guide' for this part of the tour was the livestock manager, **Dean Barratt,** who, like his colleague **Paul Mason,** is full of exciting ideas for the aquatics department.

One thing that impressed me straightaway about Stapeley's fish was their outstanding quality. This is very largely down to Dean's and Paul's approach to the way in which the livestock is handled on arrival at Stapeley. Nothing is put on sale until it is thoroughly inspected and acclimatised/quarantined in the centre's extensive behind-the-scenes quarantine section which I had the opportunity of seeing during my visit.

JOHN OAKES

Tropical water lilies with resident tree frogs.

STAPELEY WATER GARDENS

A section of Stapeley's well-stocked tropical fish department.

JOHN OAKES

The water lily collection at Stapeley is second to none — this is just one of seemingly countless lily ponds. In the foreground, Valda Fillery points out a particularly beautiful specimen to my wife (Vivian) who wishes we had the space for even a fraction of 1% of Stapeley's display!

STAPELEY WATER GARDENS

Stapeley combines water and 'normal' gardening in a 'big' way.

This is backed up by a stringent programme of water quality control whose results speak for themselves. No system can offer 100% guarantee, of course, so aquarists and pondkeepers must still follow adequate introduction procedures when they arrive home with their newly-acquired fish, but when they buy stock from Dean Barratt's and Paul Mason's department, they can, at least, rest assured that the treatment their purchases have received is top-rate . . . and you can't ask for more than that.

Outdoors, the scene — if you are a water lily addict — is, quite simply, overwhelming. If there is a larger selection of water lilies available for sale to the general public anywhere else in the country, then I've yet to see it or hear about it. Visit Stapeley in late spring or summer and be prepared for a mindblowing, spectacular lily display that will make you wish you had a lake, rather than a pond, in your garden.

There can be few, if any, pondkeepers who will only be interested in pond plants; more likely than not, they'll be interested in most other plants as well. At Stapeley, not only will they be able to give full rein to their aquatic preferences, but they will also be able to explore and enjoy the many delights of a magnificent all-encompassing 'normal' garden centre as well.

The Water Garden Centre is open:

1. **Summer:** Mondays to Fridays — 9 am to 6 pm.
   Saturdays, Sundays and Bank Holidays — 10 am to 7 pm.
2. **Winter:** Mondays to Fridays — 9 am to 5 pm.
   Saturdays, Sundays and Bank Holidays — 10 am to 5 pm.

With so much to look at both indoors and out (and with facilities both for disabled and able-bodied aquarists and pondkeepers), it is impossible to cover more than a small selection of what's on offer. To go beyond this, you'll just have to pay the centre a visit. Only then will you be able to enjoy the full 'Stapeley Experience'. You'll certainly enjoy it!

Stapeley Water Gardens, Stapeley, Nantwich, Cheshire CW5 7LH. Tel: 0270 623868; Fax: 0270 624919.

The Palms Tropical Oasis: Tel: 0270 628628; Fax: 0270 624188.

Growing Tips

By Barry R. James

NEW SPECIES

Unlike in the fish world, where new species appear with almost monotonous regularity, newly discovered plant species are not so common. Consequently, new plants are greeted with delight by devotees and are eagerly sought-after.

With the development of tissue culture techniques, the importation of even the odd specimen can lead to widespread availability within a year or so using this approach.

Since the exploitation of new fish species is very profitable, collectors will go to great lengths to find them and ship them. I am sure that, sometimes, in their eagerness to net the fish, they fail to even notice that rare or unknown aquatic plant they are trampling in the mud! I am sure that many very beautiful plant species await discovery.

Professor H C D De Witt, writing back in the late fifties stated, and I quote:

"What to say about a remark of H Hess (1953) who at an altitude of 5,500 feet, west of the highway to Jau on the Huila plateau (Chella mountains) in Southern Angola collected an Anagallis *species growing submerged in a pool. Slender stalks up to 20in in length bore filiform leaves spirally arranged. This relative of our Scarlet Pimpernel pushed its pretty white, red-veined flowers just above the surface of the water."*

In the same pool Hess found dense bunches of *Eleocharis*, *Eriocaulon*, *Utricularia*, *Najas*, a submerged lythraceous plant not yet identified, *Lagarosyphon* and *Limnanthemum*. Could there be new aquarium plants among these? However, with the tragic events of the last few weeks, in which a party of English travellers were murdered, I think it would be difficult to find volunteers to make up a party to go and find out!

With the rapid growth in air travel, many of our readers must journey to almost every corner of the globe. A quick wrapping job in damp newspaper and polythene will often get any specimen you require home alive. Or, if seed has been set, even greater surety of success can be hoped for. Of course, Customs Regulations must always be observed, so check these out before you attempt to bring any specimens into the country.

NEW AQUARIUM PLANTS

Continental nurseries are always keen to cultivate new plants. The last few years have seen a whole crop of new *Echinodorus* (Amazon Sword) species and varieties. Some are well-known species which were lost to cultivation for a while and re-introduced, while others are new forms collected in South America. Still others are mutations discovered by chance or have been created by selective breeding programmes, to enhance a minor characteristic and produce a more spectacular plant. *Echinodorus* 'Tropica Marble Queen' is, for example, derived from *E. cordifolius*. Blotched with yellow on a deep-green background, this is a worthy introduction which will prove very popular.

The Leopard Swordplant is derived from *E. schlueteri* and is similar in shape to *E. cordifolius*, but with wine-red blotches on a green background. *Echinodorus osiris* var: *rubra* is an attractive plant with olive-green ovate leaves. Submerged, the leaves lighten in colour and take on a reddish hue. *Echinodorus* x Rose is somewhat similar, but with a different shade of red in the underwater foliage. *Echinodorus barthii* has deep wine-red foliage and is most attractive.

BARRY JAMES

***Echinodorus* x Rose — one of the 'new generation' Sword plants for tropical freshwater aquaria.**

A plant which I have grown increasingly fond of over the last few months is *Hygrophila polysperma* var: Sunset. The leaves, which show a pretty yellow veining in the emergent form, become suffused with pink when submerged.

A new *Ludwigia* known as *L. perrennis* is quite exciting. It has longer leaves than *L. mullertii* with acuminate (pointed) tips which are olive-green; the stems are red.

A new variety of *Gymnocoronis* (Spade Leaf) with variegated foliage has been promised and I will keep you informed when I receive my specimens.

A new plant arrived in a shipment last year. Sold to me as *Armoracea* 'new form', which it most certainly is not(!). It has proved a hardy and durable plant. Growing in the form of a rosette, it has short-petioled strap-like leaves some 4-6in (10-15cm) in length. They are mid-green in colour. Last summer I potted a few up and put them out of doors. In June, they threw up a 12in (30cm) high inflorescence smothered in ½in (c 1.3cm) long tubular flowers in a delightful shade of pink. I think this is one for the coldwater aquarium.

GERMAN SYSTEMS

The interest in German plant-growing systems continues to grow apace. The message that heating cables, CO_2 diffusion, etc, really does the business, is finally getting home. Of course, since there are differences in philosophy between the great German houses, this still causes some confusion.

For instance, Dupla is convinced of the merits of wet/dry trickle systems for planted aquaria, while Dennerle isn't convinced.

I should be interested to hear from readers with trickle systems in operation and their comments on plant performances with these devices.

NEW LISTS

As I write this (in early February) I am beginning to receive all the coldwater plant lists for the forthcoming season. I am delighted with the number of new water lily varieties being offered. Many *Iris laevigata* hybrids are also making their appearance after a long absence. Variegated varieties of *Nuphar luteum* (the European Spatterdock) and *Typha latifolia* (Greater Reedmace) are now well established on most lists. Both are nice plants, and all worth their comparatively high price.

BARRY JAMES

The new 'Marble Queen' should be available round about now.

Corals (such as these photographed in the Maldives) are vulnerable to over-exploitation, because they are both easily harvested and slow-growing. But of greater concern is the habitat damage that may be caused by their removal.

Coral Conservation

Dr Elizabeth Wood and **Sue Wells** of the Marine Conservation Society review some legal aspects of the current situation regarding trade in corals.

Photographs — unless otherwise indicated — by Dr Elizabeth Wood

All hard corals are listed in Appendix II of CITES. This does not constitute a ban, but provides a mechanism for controlling and monitoring trade. This consignment was photographed in Phuket, Thailand.

One issue that seems to rouse much passionate debate is that of the collection of corals for use either as household 'ornaments', or as decorative items, or living specimens for home aquariums. Opinions about the trade are generally highly polarised into two opposing camps: *'hands-off-coral-at-all-costs'* versus *'all-you-want-to-do-is-ban-everything-and-spoil-my-hobby'*. The Marine Conservation Society has been involved in reef conservation work for some years now, and, naturally, is concerned about the coral trade. However, we are also the first to admit that collection of corals (for the curio and aquatic trades) is not the only pressure on coral reefs.

Siltation, sewage pollution, coral mining, coastal development, damaging fishing methods and recreational activities are all taking a toll. Often, this is used as an argument for continuing to collect corals regardless. But surely, this does not make sense? There is no justification in causing more damage just because the system is damaged already.

Individual coral colonies may appear relatively unimportant, but, added together, they produce an ecosystem recognised as comparable with tropical rainforests in terms of diversity and productivity, and of incalculable economic value through fisheries and tourism. It is because of the structural importance, yet slow growth rate, of corals that their removal (for whatever reason) is a cause of concern. Not only does this dismantle the 'home' of other reef organisms, but it also reduces a reef's capacity to recover from impacts such as hurricanes, ship groundings, pollution and heavy diving pressure. Trade in reef corals has escalated in recent years, with the USA alone importing 1,456 tonnes in 1988. It is for all these reasons that corals are listed in CITES.

WHAT IS CITES?

There must be few people who would feel happy about advocating totally 'free trade' in wildlife, without any controls. This is why the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) was born. It is now ratified by over 110 countries and, in essence, prohibits international trade in endangered species, but permits trading, in a regulated manner, in species that could become endangered if trade was not controlled.

Endangered species are listed in Appendix I. Species that could become endangered by trade are listed in Appendix II. As far as marine species involved in the curio trade are concerned, marine turtles are in Appendix I and giant clams, black corals and stony corals in Appendix II.

In certain cases, an entire group may be listed in CITES to ensure that the more vulnerable ones are controlled. This has been done for corals and is considered by some people as unnecessary and unfair. We agree that the first priority is to target those species about which there is specific concern, but corals are so difficult to identify, that in 1989, the Marine Conservation

Society spearheaded the move to list all hard corals. We, and others, considered this the most sensible way forward — a system that would work and be fair to all concerned, for the following reasons:

- The proposal was for CITES II and not CITES I listing. CITES II listing does not constitute a ban. Trade is still permitted with those countries where collection and export is legal.
- Commercial exploitation of all reef corals is potentially hazardous from a conservation point of view (for the reasons outlined above). There was no sense in listing some and not others.
- Identifying coral species is a highly specialised task. The selected list of 17 genera introduced in 1985 was proving confusing and difficult for everyone, but particularly for Customs officers whose job it was to check consignments.

Some people feel that too much fuss has been made about the coral trade, and that listing is not justified. We would like at this point to refer back to an article published last year by Dave Keeley (*Aquarist & Pondkeeper*, March '91) in which he quotes from a UK Pet Trade and Industry Association (PTIA) report on the 1989 CITES Conference, which he points out is *"to say the least, highly critical and not a little sarcastic"*. We have not ourselves seen the report but would like to respond to the quotes.

The PTIA report about the meeting says *"it was noted that the alarming tonnage of traded coral mentioned in the proposal to list the group was actually composed largely of coral sand"*. The issue of coral sand was certainly discussed at the CITES Conference and it was noted that the proportion of coral sand in the available figures for the coral trade might be high. This, however, does not alter the fact that substantial quantities of coral were also in trade. For example, the US import statistics for 1987 show a total of over a million pieces. It was on the basis of the amount of coral in trade, rather than sand, that delegates to the conference voted to list corals.

The PTIA report also says that *"it was accepted that the entire world trade in live coral could be satisfied by a portion of reef of only two square kilometres"*. There was, in fact, no indication that all delegates accepted this statement, which was made in one of the reviewers' comments on the proposal. The figure of 2sq km is almost certainly a considerable under-estimate and does not take into account the fact that corals often do not reach their full growth potential, as a result of naturally damaging events like hurricanes, as well as the many forms of human damage.

ILLEGAL TRADE

The need for conservation action is now well appreciated by most countries with reefs, and a growing number protect the coral itself (see Table). In the Philippines, immense efforts are underway despite lack of financial and technical resources. Fewer than 5% of Philippine reefs are in good conditions and a third are assessed as being poor. The least we can do here is to back up conservation efforts by sticking to the trade regulations.

The Philippines Government banned the collection and export of reef corals as far back as 1977, but it was not until the listing of corals in CITES (1985) that, in theory, it became easier for the Philippines to implement their ban. After a slightly hesitant start, including a seven-month period in 1986 when the ban was temporarily lifted, the Philippine CITES management authority (the Bureau of Fisheries and Aquatic Resources) declared that, since November 1986, no export permits for corals had been issued. Yet, USA Customs statistics revealed that the USA imported nearly 650 tonnes from the Philippines in 1987 and over 600 in 1988. Unscrupulous dealers were obviously getting round the regulations, either by using forged documents, or no documents at all.

An officer from the East Midlands Customs and Excise Special Investigation Unit with a large Bowl Coral; just one of a huge stock of specimens from the Philippines impounded in July 1991.

Organpipe Coral — part of the large consignment of Philippine corals seized in July 1991 by the East Midlands Customs and Excise Special Investigation Unit.

Excellent artificial alternatives to real corals are now available.

Philippine coral has also found its way into the UK, despite the fact that the Department of the Environment has not issued any import permits since 1987. Customs and Excise are now hot on the trail of illegal imports and, in 1991, seized a total of 18 tonnes destined for the aquarium and curio markets. A court case is to follow and 'enquiries are continuing'.

CORAL SAND

CITES moves in mysterious ways, with *Articles*, *Annexes* and *Annotations* running to many pages. These are intended to clarify procedures and make sure the Convention operates effectively. One of the 'rules' is that CITES controls apply, not only to the **whole item** (dead or alive), but to any **recognisable derivative.**

So far, so good — it is obviously as important to curb trade in the meat of slaughtered turtles as it is the shell. Strictly speaking, coral sand should therefore be traded only under licence, and indeed, the Philippines have specifically included coral sand within their ban on coral exports. This, of course, they are entitled to do, and would-be importers must adhere to the ruling.

Although we would not condone any law-breaking, the general view of the Marine Conservation Society is that trade in coral sand is a separate issue from trade in corals. Coral sand is produced through natural processes, and although its removal can cause environmental problems through increased coastal erosion, it does not threaten either corals or reefs. MCS has tried, in conjunction with the Wildlife Trade Monitoring Centre and the UK Joint Nature Conservation Committee, to resolve this rather knotty problem with an official representation to the CITES Management Committee. Our aim was to introduce some form of official notification that the CITES listing does not cover coral sand, but this has been blocked by US representatives to CITES.

In conclusion: the situation at present is that the UK Management Authority (Department of the Environment, Bristol) is, as in the USA, insisting that consignments of coral sand must be accompanied by CITES licences. The Philippines has included coral sand in its general ban on coral exports and therefore supplies cannot be obtained from this source.

MCS ADVICE ON CORALS?

Leave them on the reef . . . seek alternatives.

When it comes down to it, precious little research into management of corals is being carried out. Only two countries are attempting to regulate the trade on a sustainable

basis. Fiji has Cabinet-approved guidelines that restrict exports to one licensed company, set a maximum annual quota and regulate collecting methods. In New Caledonia corals are taken from only one area, but it appears that the amounts being taken may not be sustainable and the policy is now being reviewed. A growing number of countries prohibit collection and export of reef corals which therefore should not be imported from these countries, even if exporters suggest ways of doing so.

Imports from other countries are permitted under CITES regulations, but we recommend that people think very carefully about whether they want to participate in this trade or not. Live corals are notoriously difficult to keep in captivity. A recent investigation in Canada (based on a study of 30 hobbyist aquaria with capacities ranging from 33 gallons to 180 gallons, over an 18-month period) revealed that "survival time in captivity" for hard corals ranged from a few days to a maximum of six months. One exception was a large *Goniopora* which lasted 14 months. Husbandry techniques will probably improve, but might it not be sensible to leave coral keeping in the hands of the 'new breed' of high-tech public aquaria for the moment?

As far as tank decoration goes, there are excellent alternatives in the form of handcrafted pieces that exactly replicate the appearance of real coral. Over 13 'species' are available — contact **Underworld Products** for details.

'CORAL' LEGISLATION

All hard corals are listed in Appendix II of CITES, and can be traded only under licence (export and import)*.

CITES is implemented through national laws or regional bodies such as the European Community. Any country is permitted to impose **stricter** domestic regulations if it sees fit, and CITES **requires** that export permits should not be issued unless the country is satisfied there will be no detriment to the wild population of the species concerned.

The following list provides some guidance to countries with specific legislation for corals, but it should not be considered comprehensive (if relevant, check with Fishery or relevant Government Department).

Australia
no exports permitted until approved management programmes have been implemented (none have for corals).

Bahamas
collection banned.

Bermuda
collection banned.

Cayman Islands
collection banned.

Dominican Rep
sale and collection of some stony corals banned.

Egypt
collection banned along Sinai coast.

Fiji
exports restricted.

Haiti
collection of corals banned.

India
export prohibited (general ban on all specimens of Appendix II listed species).

Israel
collection and trade banned.

Malaysia
exports from Sabah banned.

Netherlands Antilles
collection banned.

New Caledonia
trade permitted under permit in 18 genera, plus the family Faviidae.

Philippines
collection and export banned.

Sudan
collection banned.

South Africa
commercial collection banned.

USA
collection and export banned under state legislation in territorial waters in Florida, Guam, Hawaii, Puerto Rico and some of the other US Pacific territories. Collection of Scleractinia and *Millepora* outside state and territorial waters is banned under federal legislation.

* CITES permits and further information relating to the implementation of the Convention in the UK can be obtained from the **DoE, Tollgate House, Houlton Street, Bristol BS2 9DJ.**

Coral Conservation: Views of OFI (UK)

The vast majority of corals entering the aquarium trade are living. Dead corals collected for the curio trade far exceed in quantity live corals destined for aquarium use. While there is undoubtedly some small overlap between the aquarium and curio industries, they are largely independent of, and quite different from, one another.

Collectors of live coral depend on the continuing good health of the reef habitat to provide a livelihood for themselves and their families. It is in their interests, therefore, to use ecologically sound techniques for harvest. Dead coral material may, however, be collected by means far less sympathetic to the conservation of the reef.

Keith Davenport.

OFI — Ornamental Fish Industry (UK) Ltd — has taken active steps, particularly since the appointment of Keith Davenport as full-time Executive Co-ordinator, to keep all members of the aquatic trade fully informed about which animals are listed on CITES Appendices, or are covered by UK or EC legislation. The association deplores, and actively discourages, any irresponsible or illegal import and trade in hard corals.

Retailers who stock hard corals should ensure:

firstly — that their suppliers include the relevant CITES permit number or a photocopy of that document with any invoice;

and further — that full instructions on the care of hard corals is given at the point of sale.

ALEX HAMILTON

Living corals — illegal trade is condemned by OFI (UK).

OUT AND ABOUT

CHILTERN AQUATICS

By John Dawes

Photographs by the author

Don't buy a marine fish unless you know that it's actually feeding in the shop tank. How often have you heard this advice? And, if you have, how often have you put it into practice?

Well, if you decide to buy your marines from Chiltern Aquatics, you need not fear. They actually preach what they (and we) teach. Therefore, even 'often-difficult' feeders, such as Copperbands (*Chelmon rostratus*), can be seen chasing food and with full stomachs in their spotless tanks. In fact, no fish is put on sale until it's settled in fully and is feeding normally.

Keith Todd, co-proprietor of Chiltern Aquatics (the other partner being **John Curry,**) simply 'bombards' his fish with livefood. Sooner or later, some of the food will be taken in — even if unintentionally — and, from that point on, the problem is usually solved. Fish are often great imitators, so when one starts feeding, the others tend to follow suit. Some don't even know when to stop and will actively 'search Keith out' for a handout. Mind you, handfeeding an over-friendly Queen Angel can be quite a 'nipping' experience!

I have to say that I had a great time watching all this activity during my visit to Chiltern Aquatics. But marine fish with healthy appetites don't, on their own, attract customers 'across the board'. You also need equally well run freshwater, tropical, coldwater, plant and dry goods departments.

Despite the fact that I visited Chiltern Aquatics during the winter, it was great to see such a wide selection of coldwater fish in stock. All the well-known types were there, of course, but what particularly pleased me was the sight of large, good-quality specimens of some of the less-frequently-seen varieties like black, gold and calico Bubble-eyes, Humanishiki (sold as High-head Pearlscales by Chinese and Singaporean exporters), Redcap Ranchus,

Top left, John Curry (foreground) and Keith Todd inspecting one of their many excellent marine aquaria.

Top right, handfeeding an over-friendly Queen Angel needs very special skills . . . and quite a bit of courage!

Above, one of several banks of well-maintained coldwater aquaria.

Left, the spacious, very clean and well-stocked tropical section.

Hamaniski — not often seen elsewhere, but a 'regular' at Chiltern Aquatics.

Pandas, and so on.

Other well-known, but not-often-seen, coldwater species included wild-type Goldfish x Crucian Carp hybrids, Medakas, Bitterling and Gudgeon.

Being mid-winter, the outdoor coldwater area was, as one would expect, closed down. However, John and Keith explained their plans for this section and, when the modifications are complete (which should be round about the time we go to press), this aspect of Chiltern's business should be every bit as varied, comprehensive and interesting as the indoor departments.

Again, as you would expect, the tropical freshwater department boasts all the bread-and-butter fish that form the mainstay of this part of any business. However, as is the case with the marine and coldwater sections, there are also quite a few pleasant surprises in store as you walk round and peer into the well-stocked aquaria. Prominent among these is a good selection of the more-rarely-seen catfish, including some lovely Plecos and Panaques.

But the creatures that really got me going weren't fish at all! They were large, colourful . . . and absolutely beautiful, freshwater tropical crabs, the likes of which I've never seen before. I wouldn't tempt fate by keeping them in the same tank as fish, but on their own, with appropriate tank decor, they would constitute a stunning — and very different — display.

There's a great deal to admire at Chiltern Aquatics. The range of dry goods and livestock is extensive, and their quality of a very high standard. The service is also professional and pleasant (backed up by their own in-house-generated advisory leaflets), and the whole place is very attractively set out. In addition, clubs are always welcome, obviously, provided suitable arrangements have been made in advance.

Opening times: 9 am-5.30 pm (seven days a week). Late night on Thursdays — 8 pm.

For further information, contact **John Curry** or **Keith Todd, Chiltern Aquatics, Poplars Nursery, Harlington Road, Toddington, Dunstable, Beds, LU5 6HE (300 yards from junction 12 of the M1). Tel: 0525 875520; Fax: 0525 875590.**

Stunning freshwater tropical crab.

Letters

OBITUARY
Hilda Allen

Regular readers of this magazine will be very sad to hear that Hilda Allen — the first 'Koi Queries' column contributor — died on 4 January after a brief illness.

Hilda submitted articles for the magazine on Koi and related subjects since the BKKS was founded in 1970 and, for a decade spanning the late 70s and early '80s, she regularly wrote Koi Queries. Some of her photos still appear in the magazine, in particular, one of her Koi feeding from a baby's bottle.

For Koi keepers it is, indeed, the end of an era. From July, 1971, Hilda officially took on the job of general secretary for the BKKS, but had effectively become public relations officer, minute and membership secretary as well.

By the autumn of 1972, her husband Eric had become chairman of the Society, and it would be true to say that for the first seven years of its existence, the main energy of the Society was generated from their home in Peterborough.

Hilda always promoted the BKKS as a vehicle for the amateur and small fishkeeper, called a spade a spade and went out of her way to help members with their problems when there was *no* other source of reference.

In the first four years, she had built up the Society's membership from 20 to nearly 500 and placed it firmly on the road to becoming the biggest fish society in the country. The BKKS will be eternally grateful to her.

For some years now, despite her failing health, she had put all her energy behind the 'Live Export of Animals' issue, Compassion in World Farming, and many other outstanding animal causes, all at great personal expense.

On Saturday, 4 January, she went out much as she had lived, fighting with dignity and refusing all but sedatives towards the end.

She is survived by her devoted husband Eric and daughter Lynda, to whom our hearts go out.

Hilda requested no flowers at her funeral — which was attended by many members of the Peterborough & District Section and some of the biggest Koi names in the country — but asked for any donations to be sent to:

The Brook Hospital for Animals,
1 Regent Street,
London SW1Y 4PA.

Val Frost,
British Koi-Keepers' Society

[*We at A & P, offer our most sincere condolences to Eric and Lynda. We, too, will miss an old, irreplaceable and valued friend.* **Ed.**]

F.B.A.S. Remembers Hilda

It was with much sadness that members of the Federation of British Aquatic Societies learned of the passing of Hilda Allen early in the new year.

Our connection with the British Koi-Keepers' Society in general goes back a long time, and right at the forefront was Hilda, in particular. We were very grateful for the encouragement and support she gave to the Federation when its then new *Bulletin* made its appearance in the early 1970s. From then on, whenever the latest information on Koi matters were needed, Hilda was the first point of contact.

Of necessity, Koi Shows are physically big sprawling affairs but, no matter where you were in the Showground, if Hilda spotted you, then her unmistakable "Cooeee" was quickly followed up by the offer of a cup of tea, accompanied by cheery conversation.

DICK MILLS

Times remembered: Hilda Allen, B.K.-K.S., caught in conversation with Bob Esson, F.B.A.S., at a Koi event.

We shall miss her presence and down-to-earth sagacity and join the B.K.K.S. in mourning their loss.

Dick Mills,
P.R.O., F.B.A.S.

OBITUARY
Harry Berger

Harry Berger, a fishkeeping enthusiast for many years, died in hospital on Christmas Day at the age of 88.

Harry joined the Ilford & District Aquarist's & Pondkeepers' Society in March 1960 and had been its president since 1970.

Until recently, he regularly attended the society's general meetings and committee meetings, and presided at special functions, such as the annual exhibition. Despite ill health, he was, in fact, able to attend the society's annual show in October 1991 and presented the awards. Harry Berger was very well known as a leading figure in the Goldfish Society of Great Britain and as a speaker on coldwater topics all over the country.

He has served as vice-chairman and, in 1977, was made a Fellow of the society for his work on the goldfish. He was particularly interested in the Lionhead and won many awards for his fish in open shows up and down the country.

Harry will be missed by many friends and colleagues in the fishkeeping world. Our sincere sympathies are extended to his daughter Rita and to his two sons John and George.

R. Downer,
Ilford & District Aquarist's and Pondkeepers' Society

[*We join Ilford & District in extending our sympathies to Harry Berger's family at this very difficult time.* **Ed.**]

Fruitless Calendar Search

I started my hobby of keeping Fancy Goldfish just over two years ago and have become very close to my 'little children' since then. Last summer, I saw the *Aquarist & Pondkeeper* in the newsagents and have been a keen reader ever since.

Each year, I buy a calendar and, this time, decided to buy one with pictures of fish . . . but could I find one(?) . . . not a chance! I've been in garden centres, shops and newsagents . . . everywhere.

I really thought that January would have brought one in your magazine, but no. I've ended up buying one with pets, but no fish in that either. Surely, with more and more people keeping fish, it would be a good idea for someone to produce a calendar . . . or if they have, where on earth can it be purchased?

Elaine Green,
Winsford,
Cheshire.

B.C.S.G.: No Confusion

The British Cichlasoma Study Group wish to reply to the B.C.A. letter published in the December issue of *A & P*.

It must be stated, once and for all, quite clearly, that there should be NO confusion among readers of *A & P* between the B.C.A. and the B.C.S.G. The only confusion lies in the difference of aims and beliefs between the two organisations.

The B.C.S.G. was formed on the 21 October 1990, by senior ex-members of the B.C.A. with many years expertise within the field of all cichlids. The B.C.S.G. makes it quite plain in all its promotional literature that it is in no way connected to the B.C.A.

The B.C.S.G., while specialising in *Cichlasoma* and related fishes, actually deals with *all* types of cichlid. For example, the January '92 edition of *The Journal* includes a feature on Battersea Power Station and its warm-water holding tanks, the first UK recorded breeding of *C. pinnacum* (Yes — these fish are available to members), an article on *A. calvus* by Nancy Shuttle, one of the UK's foremost Malawi breeders, and a book review on a stone-age fish long thought to be extinct.

Anybody wishing to receive a copy of the January *Journal*, complete with an *Uaru* I.P., should send a postal order for £1 to cover costs, and we will donate the rest to the Christie Cancer Hospital in Manchester.

John William Cintas
(Ch Exec),
British Cichlasoma
Study Group,
93 Banks Lane,
Offerton,
Stockport,
Cheshire SK1 4JK.

NORTHERN RIO CORTEZ SWORDS

Part 1

Derek Lambert — chairman of Viviparous — begins a three-part series reviewing the very latest information available on this closely-knit group of attractive Swords, including advice on their aquarium care.

DEREK J LAMBERT

DEREK J LAMBERT

Every once in a while a scientific paper is published which turns everything aquarists know on its head. One such a paper was published in 1990 by M Rauchenberger, K D Kallman and D C Morizot (see References).

In this paper the five previously known northern Mexican Swordtails are examined in detail, four new species are described and the relationships within the group discussed.

Three monophyletic clades (groups of species descended from a single common ancestor) are recognised within the group. These are:

***X. cortezi* clade containing:**
- *Xiphophorus cortezi* (Cortez Swordtail)
- *Xiphophorus malinche* (Highland Swordtail)
- *Xiphophorus birchmanni* (Sheepshead Swordtail)

***X. montezumae* clade containing:**
- *Xiphophorus montezumae* (Montezumae Swordtail)
- *Xiphophorus nezahualcoyotl* (Northern Mountain Swordtail)
- *Xiphophorus continens* (El Quince Swordtail)

***X. pygmaeus* clade containing:**
- *Xiphophorus pygmaeus* (Slender Pygmy Swordtail)
- *Xiphophorus nigrensis* (El Alba Pygmy Swordtail)
- *Xiphophorus multilineatus* (High-backed Pygmy Swordtail)

Since a great deal can be said about the three species in each of the clades, it is my intention to limit this article to the *X. cortezi* clade alone and follow it up with two other articles on the *X. montezumae* and *X. pygmaeus* clades at a later date.

THE CORTEZ SWORDTAIL *(Xiphophorus cortezi)*

The Cortez Swordtail (*Xiphophorus cortezi*) was the first species of wild swordtail to be introduced to the UK hobby. In 1974 J H Preston collected in a tributary of the Rio Axtla a few miles north of Tamazunchale. Two species of *Xiphophorus* became established from this collection, one being *Xiphophorus pygmaeus*, the Pygmy Sword, which later died out. The other was distributed widely as *Xiphophorus montezumae montezumae*, the Montezumae Sword. This was later identified as *Xiphophorus cortezi*. Several other collections of this species have since come into the hobby, but this original one is by far and away the commonest.

One of the males pictured in this article comes from J H Preston's original collection from Rio Axtla and is approximately 18 months old. He is the dominant male in the colony and, as such, has developed a larger dorsal fin and a number of long, narrow vertical bars along the sides. These tend to mask the more commonly seen zigzag lateral stripe which is so prominent in subdominant males and females of this species.

There is only a hint of yellow on this male. However, in some fish, this can be deep orange to gold, and the fins or body can be variously marked with black spots or blotches. This is clearly shown in the other photograph of a Rio Axtla male by Daniel Falgerho.

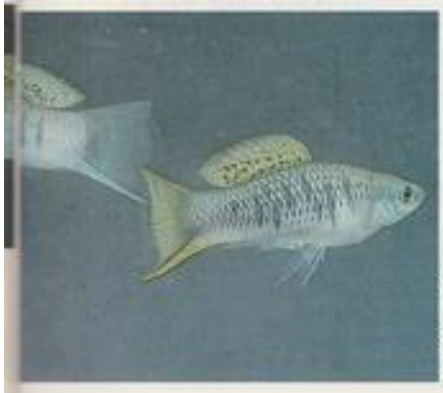
Two size morphs of the male of this species are known to occur. This is a sex linked characteristic and is quite common among the Rio Panuco Basin Swordtails. Other species which are known to exhibit differing size morphs are: *Xiphophorus pyg-*

PANUCO SWORDTAILS

DANIEL FALGERHO

DEREK LADBROKE

DANIEL FALGERHO



DANIEL FALGERHO

maeus, *Xiphophorus nigrensis*, and *Xiphophorus multilineatus*.

The Cortez Swordtail is a peaceful, attractive swordtail of about 2in (5cm) in size which will live happily in a community tank of average sized aquarium inhabitants. If enough plant cover is provided, some fry will even survive to maturity in such conditions.

Feeding represents no problem, as they will take all foods ravenously. While being quite tolerant to temperature, an average of 74°F (c 23°C) should be aimed for. Water quality presents no problem to this species either, as they do well in all types of water, provided it is clean. An aquarium with either filtration and regular partial water changes, or a balanced aquarium with plenty of plant life, will suit them.

Broods are born on an average every 26 days. However, this will depend on temperature and lighting conditions. Warmer temperatures, coupled with longer hours of lighting, will shorten the gestation period. In experiments conducted by Dr Klaus Kallman of the New York Aquarium, brood intervals varied between 21 days and 32 days.

Brood sizes vary depending on the size and age of the female and the amounts of food available during the eggs' development. The record for live fry produced from a single isolated female of this species is 76; a good brood size would be about 30 for a mature female.

THE SHEEPSHEAD SWORDTAIL *(Xiphophorus birchmanni)*

The Sheepshead Swordtail was described by Lechner and Radda in 1987 as a subspecies of *Xiphophorus montezumae*. It was reportedly imported into the UK in the late 1980s, but these fish turned out to be either hybrids of *Xiphophorus birchmanni* and wild-type *Xiphophorus variatus* or just *Xiphophorus variatus* alone. The true *Xiphophorus birchmanni* was finally imported in 1991 by both Ivan Dübble and myself in the early part of the year.

The unusual common name is derived from the knobbly hump on the head of mature males. This is similar to the hump of the Hump-back Limia (*Limia nigrofasciata*). Two more characteristics of this species distinguish it from the other two members of the clade. Firstly, the males, and to a lesser degree the females, have very broad vertical bars along the sides. In *Xiphophorus cortezi* these are fine, and in *Xiphophorus malinche* they are more distinct but often broken into blotches.

Finally, and most importantly, the Sheepshead Swordtail male has hardly any sword at all. In wild populations, fewer than 1% of the males have any sword appendage. In the aquarium, the percentage seems to be higher, but the sword is never more than a short spike of about 5mm (0.2in) in length.

The male in my photograph is from the Rio Calabozo collection of this species and is still a young fish without the full head development. As can be seen, he is one of those rare individuals with a slight sword. The magnificent lemon yellow, high dorsal fin which is common to all members of this clade can be clearly seen in this photograph.

Daniel Falgerho's photograph is of a fully mature male from the Chapualhuacan collection. This fish clearly shows the knobbly hump and beautiful lemon-yellow dorsal fin. However, it also has a large black blotch in the caudal peduncle which may be a cancerous tumour.

It is still very early days with this species, as far as aquarium care is concerned, but, from the little experience we have so far had, it would seem to require the same conditions as the Cortez Swordtail.

THE HIGHLAND SWORDTAIL *(Xiphophorus malinche)*

The Highland Swordtail is, to my mind, the most attractive species in the clade. The female pictured is from Dr Kallman's tank-raised stock collected in the Rio Calnali. I brought this specimen back to the UK in May 1991; probably the first time this species was ever imported to this country.

Daniel Falgerho's photograph of the two males shows both the Rio Claro and Rio Calnali collections. The lower fish is from the Rio Claro and is the more highly coloured strain of this species. The strongly marked vertical bars down the sides can be

Far left above, Sheepshead Swordtail *(Xiphophorus birchmanni)* male from Dr Kallman's Rio Calabozo collection. This is a young fish without the full head development, but already showing the rare sword.

Far left below, Highland Swordtail *(Xiphophorus malinche)* female from Dr Kallman's Rio Calnali collection.

Near left top, Sheepshead Swordtail *(Xiphophorus birchmanni)* male from Dr Kallman's collection at Chapualhuacan. This is a fully mature fish exhibiting the head development, but without the short sword. The large black blotch may be cancerous.

Near left, second from top, Cortez Swordtail *(Xiphophorus cortezi)* male from J H Preston's Rio Axtla collection.

Near left, Cortez Swordtail *(Xiphophorus cortezi)* male from Dr Kallman's Rio Axtla collection. This fish exhibits very strong black and gold markings.

Near left bottom, Highland Swordtail *(Xiphophorus malinche)* males from Dr Kallman's Rio Claro and Rio Calnali collections. The lower fish, which is the more highly coloured strain of this species, is from Rio Claro.

clearly seen in both photographs, as can the short sword of the male. This species has a sword somewhat shorter and thicker than that found in *Xiphophorus cortezi*.

The Highland Swordtail behaves somewhat differently in the wild when compared to other members of this, or the *Xiphophorus montezumae*, clade. Normally, mature males of these clades will hide among large rocks and dart away when disturbed. This makes collection of mature specimens very difficult. However, in the Highland Sword, large numbers of fully mature fish were collected under floating vegetation in shallow water above a sandy bottom.

Another difference with this species is its distribution. The other members of its clade are, in general, found at lower elevations than the Highland Swordtail. It was (obviously) for this reason that the common name was chosen. It would therefore follow that this species will prefer cooler temperatures in the aquarium than would normally be given to Swordtails.

Once again, we are just at the beginning with aquarium maintenance of this species. However, I am pleased to report that it seems to breed with ease and eats all foods. The only problem I have so far encountered is in the sex of the young. Out of a brood of 20, only one was a female. This particular problem is not one limited solely to this species. Every so often, all *Xiphophorus* species I have worked with have presented me with a single-sex brood.

LATEST DEVELOPMENTS

During this article I have mentioned when the different species have been imported to the UK for the first time. However, in September 1991, Dominic Isla — an American member of Viviparous — attended Viviparous's 3rd International Livebearer Convention and gave a lecture on the wild Platies and Swordtails.

He also brought with him a great many fish, including all the new species of platy and Swordtail, which were sold in open auction. In this way, many of the new species were distributed to a large segment of the livebearer hobby at the same time and therefore stand an excellent chance of becoming established.

For further details about Viviparous, contact the new **Public Relations Officer, Angela Moore, 43 Lamb Lane, Monk Bretton, Barnsley, South Yorkshire. Tel: 0226 291832.**

CLADOGRAM OF NORTHERN RIO PANUCO BASIN SWORDTAILS (AFTER: RAUCHENBERGER, KALLMAN AND MORIZOT, 1990)

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Mary Rauchenberger, Klaus Kallman and Douglas C Morizot (1990) Monophyly and Geography of the Rio Panuco Basin Swordtails (Genus *Xiphophorus*) with descriptions of four new species. *American Museum Novitates* **Number 2975.**

Information Sheets on: *Xiphophorus cortezi, Xiphophorus montezumae* and *Xiphophorus malinche.* *Viviparous magazines Nos:* 1, 13 and 15.

COVER STORY — Rainbow Sword Variatus

Photograph: Harry Grier/Florida Tropical Fish Farms Association

Platy or Swordtail . . . or both? Whatever your conclusion, what would you call the spectacular prize-winning fish that adorns our cover this month? As the above name given to this colourful livebearer by its 'creators' (Ruskin Tropicals of Florida) shows, they regard it very much as a Platy.

The 'variatus' part of the name refers to one of the ancestral species, the Sunset or Variatus Platy (*Xiphophorus variatus*), while the fact that it also possesses a sword, shows that its other parental species is *Xiphophorus helleri*, the Swordtail.

However, since many (most?) of today's commercially bred Swordtails are, themselves crosses — often with one or other of the two most common Platy species: *X. maculatus* and *X. variatus* — our cover subject could very well have a very interestingly mixed genetic history.

Koi Talk

By John Cuvelier

MISSING KOI WRITERS

Where do all the Koi keepers go in the winter? I ask this because of the apparent dearth of writers on Koi subjects (apart from one or two notable exceptions) which seems to strike these pages.

One would have expected that with pools in virtual retirement, many more people would devote some spare time to getting their views and thoughts on the hobby into print. They can't possibly all be decorating the house or flying off to sunnier climes, or can they? It's just a thought!

EXPLOSIVE START

I'm pleased (?) to say that 1992 came in with a bang, literally for me at any rate. While pottering around our pools, as one does, an unusual noise, in the form of a sharp crack, was heard. A quick look around disclosed nothing, so the matter was forgotten until I became aware of a spreading pool of water forming in the area of the main filter.

With sinking heart, I forced my way into the protecting undergrowth and found that the top of my de-chlorinator pressure tank had been blown off, thanks to the fracturing of the main casting on the clamping ring. Now, how on earth could that happen, you might well ask?

An examination of the surface of the activated carbon revealed all. A thick layer of brown sludge had formed on top of the carbon and had solidified to the point at which water could not pass, the resultant build-up in pressure being sufficient to see the job off!

As I always backwash the system at two-monthly intervals, I can only assume that a slug of dirty water resulting from a burst pipe somewhere down the line had caused the problem. It does serve to illustrate how much we need to be alert for the unusual. I'm only thankful I was not in the line of fire when the thing blew, as it must have been travelling like a bullet! I'm still trying to figure out how to repair the damage.

UNWELCOME DELUGE

Our next disaster was even more traumatic and arrived in the form of 2 inches of rain in 12 hours early in January. The result of this deluge was that our three pools became one gigantic lake which took forever to disperse. Fortunately, with the weather being so cold, our fish chose to stay deep, rather than swim downstream to join the River Monnow!

Apart from a dramatic change in the colour of our pools (which eventually cleared), there appears to have been no lasting damage.

One happening of note relates to a waterproof (!) box containing a 13A socket which serves as the supply to my hatching pond. This box ended up under a foot of water and, once the level had gone down, the water in the box was observed to be merrily steaming away, the trip (for some reason) having failed to operate.

On the same tack, all three of my Grunfos pumps were also submerged, but came through unscathed, thanks to the sealing procedures now automatically adopted prior to installation.

You don't need to be told that this time of the year, as far as Koi keeping goes, is not the most fun-filled section of the calendar. Speaking for myself, it's only the thought of those happier months to come which keep me going and coping with all those winter chores, such as leaf clearing and bottom scraping, etc, ticking the days away until spring, when the scene depicted in my photograph will be repeated in hundreds of pools around the country.

SOLID TEST RESULTS

After many years of using water testing kits based upon liquid reagents, I decided that, just for the hell of it, I would give the recently introduced Interpet Easytest range a try, principally because I sometimes feel I'm getting into a rut and it does one good to change track once in a while.

Sceptic that I am (and always will be), a series of comparison tests were made between the liquid reagents and the new tabs' and, I'm happy to say that no discernible difference was observed right across the range, a result which one could not expect if using one of those electronic abominations which seem to vary alarmingly in their interpretation of pH in particular, no matter how much one tries to duplicate the testing procedure.

WINTER WINNER

While on the subject of newcomers, I paid another visit to Kenchester recently just to be nosey, having heard that much rebuilding and redesigning of the complex was underway and, in between gazing spellbound at the most beautiful assortment of marine fish I've ever laid eyes on, and admiring all the new tankerage, I sighted an array of canisters carrying a logo which I didn't recognise.

King British Flake food for winter feeding of Koi! Well, I just had to give it a go didn't I? Tell you what, they love it and so do my fry. Wheatgerm, *Spirulina* and, with an ash content of only 3.5%, it's got to be a winner. If I have one complaint, it's that old chestnut of cost as, at over £5 for 150 grammes, it is a bit on the pricey side. But, as usual, the well being of one's finned friends has to take priority over one's pocket.

Do forgive me if, at times, this column reads like a P.R. 'promo' campaign. I assure you that this is not the case. I merely write about what I find from my own experience and with no ulterior motive or vested interest. After all, where better to find out about one's hobby than in these pages, where sometimes I even hope to save you a bit of hard-earned cash?

Roll on summer!

News

Time Running Out for Pesticide Registration

Following eighteen months of negotiations with MAFF, the Pet Trade and Industry Association (PTIA) has reached an agreement with their Pesticides Safety Division on pesticides designed for amateur use in garden ponds and aquaria having neither inward nor outward flows of water (algicides, herbicides, molluscicides, growth regulators and flocculating agents). PTIA secretary **Barry Huckle** advises all manufacturers in this sector to take urgent note of the following advice and act without delay where necessary.

Transitional Measures

Ministers in all six departments responsible for pesticides have accepted recommendations from the Advisory Committee on Pesticides and have agreed on a series of measures to allow uninterrupted marketing while these products are brought fully into line with requirements of the current regulations.

Applications

Companies wishing to manufacture and market currently unapproved pesticides within the scope of the above definition are required to submit a letter of application detailing precisely the names and quantities of the active ingredients and co-formulants, accompanied by three copies of the proposed label. If necessary for commercial reasons formulation details can be submitted directly by suppliers of the ingredients. These product details will be presented to the Advisory Committee on Pesticides for consideration and advice to Ministers.

Manufacturers should note that, in all cases, new applications must be submitted. Applications considered suitable will be accepted and given provisional approval and a MAFF number will be issued.

In some cases, it might be necessary for applicants to supply additional data prior to acceptance.

If the application is rejected, the manufacturer will have to cease manufacture until full approval is obtained. This is only likely to arise if the active ingredient is not permitted for amateur use.

Applications should be sent to the **Data Evaluation Unit, Pesticides Safety Division, MAFF, Rothamsted, Harpenden, Herts AL5 2SS. Tel: 0582 462100.**

Deadline

The deadline for applications is **31 March 1992.**

The names of all products for which application is made, and those already approved, will be listed in the Pesticides Register.

Any product not appearing on the list will be deemed to be unapproved. Appropriate enforcement action will then be taken to ensure that no further advertisement, sale, supply, storage and use takes place. Failure to comply with the above may lead to prosecution.

Approval Fees

Applications for provisional approval with formulation details and labels only will be charged a fee of £500 per product. MAFF will invoice manufacturers on receipt of the application. The full fee, as laid down in their list of charges, will become payable when full approval is applied for.

Label Printing

Provisionally approved products will be allowed to be sold in containers carrying old labels until the end of **September 1992** to allow for new printing.

Approval for the advertisement, sale and supply of products carrying old labels will be given to wholesalers and retailers until the end of **December 1992** to allow stocks already in the distribution chain to be sold.

Disinfectants

These products are currently outside the control of the Regulations and do not require approval as pesticides.

Full Approval

Under normal circumstances, COPR approval is obtained by submitting an application form accompanied by the necessary supporting data or access to another company's data package.

This process will take place some time after provisional approval has been granted. However, any application submitted after the deadline of **31 March 1992** will not be considered for provisional approval and the normal full approval route will have to be taken. Further, any such product will not be allowed to be manufactured or sold until full approval has been given (it can take up to four years for a decision to be reached).

Data Requirements

MAFF has produced guidelines on data requirements when submitting an application for full approval. Copies are obtainable from Harpenden.

PTIA Helpline

If manufacturers require any further advice about these interim arrangements, please telephone **0234 273533,** or **Fax 0234 273550.**

Durapipe for Bristol Zoo

A new water treatment and filtration plant for the sealion enclosure at Bristol Zoological Gardens has been constructed using ABS pipework from Durapipe of Cannock. This follows extensive use of Durapipe's ABS and Air-line pipework for filtration and aeration in the zoo's World of Water aquarium complex.

The sealion enclosure filtration system incorporates chemical treatment and four sand filter beds. Durapipe's ABS, in sizes from 3 to 6in (c 7.6-15cm) diameter is used for water and chemicals transport.

The World of Water consists of several tanks created on the site of an old bear pit, and includes a large walk-through tank displaying the marine life of an Indo-Pacific coral reef. Each tank has an independent sand-bed water filtration systems, while a common aeration ring main feeds air into the separate water systems. Aerated water is then pumped through gravel beds at the bottom of each tank.

The different tanks house fish and other marine animals from various parts of the world, so sea and fresh water are heated and thermostatically controlled to maintain suitable cold, subtropical and tropical temperatures.

Entrance to Bristol Zoo's World of Water which is 'plumbed in' using Durapipe ABS.

Several hundred metres of 2in diameter Durapipe ABS pipework is used for water circulation, and the aeration pipework is constructed from 2mm diameter Air-line. Some 35 Durapipe Scorpion ABS ball valves are used on the various systems.

ABS is especially suitable for this type of installation because it is non-toxic, non-tainting and corrosion-resistant. Other aquarium users of Durapipe's ABS pipework include the Northern Ireland Aquarium at Portaferry.

For further details contact **Durapipe, Walsall Road, Norton Canes, Cannock, Staffs WS11 3NS. Tel: 0543 279909.**

Tetra Talks Fish Again in 1992

Whether you're a first rate fishkeeper, a nervous novice or a pondering pondkeeper, Tetra offers the ideal chance to learn more about all aspects of the hobby directly from some of the world's experts.

Throughout 1992, Tetra will be running a new series of 'Talking Fish' seminars covering a variety of subjects, from tropical fishkeeping to looking after a garden pond.

These seminars will, once again, be hosted by **Dr David Pool**, of the Tetra Information Centre, who will be joined by a guest speaker at each venue. Film and slide presentations will also be shown during the evening.

The March to May 'Talking Fish' programme will take place at the following venues:

University of Liverpool — 21 March — A Pond In Your Garden. This is a daytime seminar from 9.30 am-4.30 pm.

Open University — Milton Keynes — 21 May — Maintaining A Perfect Pond.

Anyone wishing to attend should apply in advance to **Tetra, Lambert Court, Chestnut Avenue, Eastleigh, Hants SO5 3ZQ.** Tickets are £10 per person for the day seminar and £3 for the evening seminar, and include a seminar pack, some sample products and light refreshments.

Environ Win European Award

Since the **Pictogram Labelling** report by our editor, John Dawes, in the December 1991 issue of *A&P*, things have really started to happen for **Environ.**

Nigel Cruickshank and **Colin Grist** — the Environ originators — are absolutely delighted with the demand that has already materialised for their revolutionary **Fish Labelling System,** both from within the UK and the rest of Europe. This success has now been recognised by **PETS Europe,** the European pet trade magazine, who have nominated the Environ Fish Labelling System as **European Pet Product of** 1991 (see also Gordon Kay's Seaview in last month's *A&P*).

ENVIRON FISH LABELLING SYSTEM

Colin Grist, of Environ, Peter Penfold, of Hambridge Fisheries, and the European Pet Product of 1991 award, during installation of the labelling system at Hambridge's Langport premises.

The Environ 'package' offers educational information, along with species identification and price details on point-of-sale labels which are proving to be extremely useful, both to traders (retail and wholesale) and their customers. The high demand that Colin and Nigel are experiencing for their product proves just how badly such a system has been needed by the trade everywhere. Their customer list is also looking pretty impressive and includes such prestigious names as Harrods of Knightsbridge, Humblets of Belgium and that highly-respected establishment, Hambridge Fisheries of Langport, in Somerset (see accompanying photograph).

Environ's next task is to concentrate on launching the two remaining elements in the system: a loose-leaf book based on all the species contained within the labelling component, and an 'updateable' computer database. Both these products will be available in the near future . . . so watch this space!

For further details, contact **Environ Fish Labelling System, 3 Jubilee Terrace, Paulton, Avon BS18 5NU. Tel: 0761 415 153; Fax: 0761 413 347.**

Tobacco Dock set to make Big Splash

A planning application was submitted in November for a multi-million pound scheme to turn Tobacco Dock into one of London's top tourist attractions with over 2 million visitors a year.

The applicant, Tobacco Dock Estates Establishment, is already in detailed negotiations with the First Leisure Corporation, in partnership with Sea Life. The partnership plans to open a permanent, interactive Sea Life Centre in Phase Two of Tobacco Dock. This part of the scheme has never previously been opened to the public. There are also proposals for a second national exhibition at Tobacco Dock, details of which will be announced shortly.

Sea Life already operates several other Sea Life Centres in Britain, including those in Blackpool, Brighton and Oban. The Tobacco Dock Sea Life Centre will be over four times the size of its nearest UK rival, Sea Life in Blackpool, which currently attracts about 750,000 people a year. It is anticipated that, at peak times, the Tobacco Dock Sea Life Centre will attract some 10,000 visitors per day.

The educational/environmental approach adopted by Sea Life will provide the perfect family attraction, and the rest of Tobacco Dock will comprise a wide range of shops and restaurants, catering for all tastes. Tobacco Dock Estates Establishment is already in discussions with several major retail and catering operators who are interested in taking space within the complex.

In keeping with modern environmental thinking, the proposals seek to discourage the use of private motor cars, incorporating instead plans for a regular shuttle bus service between Tobacco Dock and the nearby Tower Hill Underground/DLR stations, together with the provision of extensive coach and taxi parking facilities.

Initial discussions with coach tour operators indicate that this proposal is viewed as an exciting opportunity, with the excellent possibilities of combined visits with other attractions such as the Tower of London, Tower Bridge and Tower Pageant.

For further information, contact: **Linda Welch, Good Relations, Tel: 071 631 3434.**

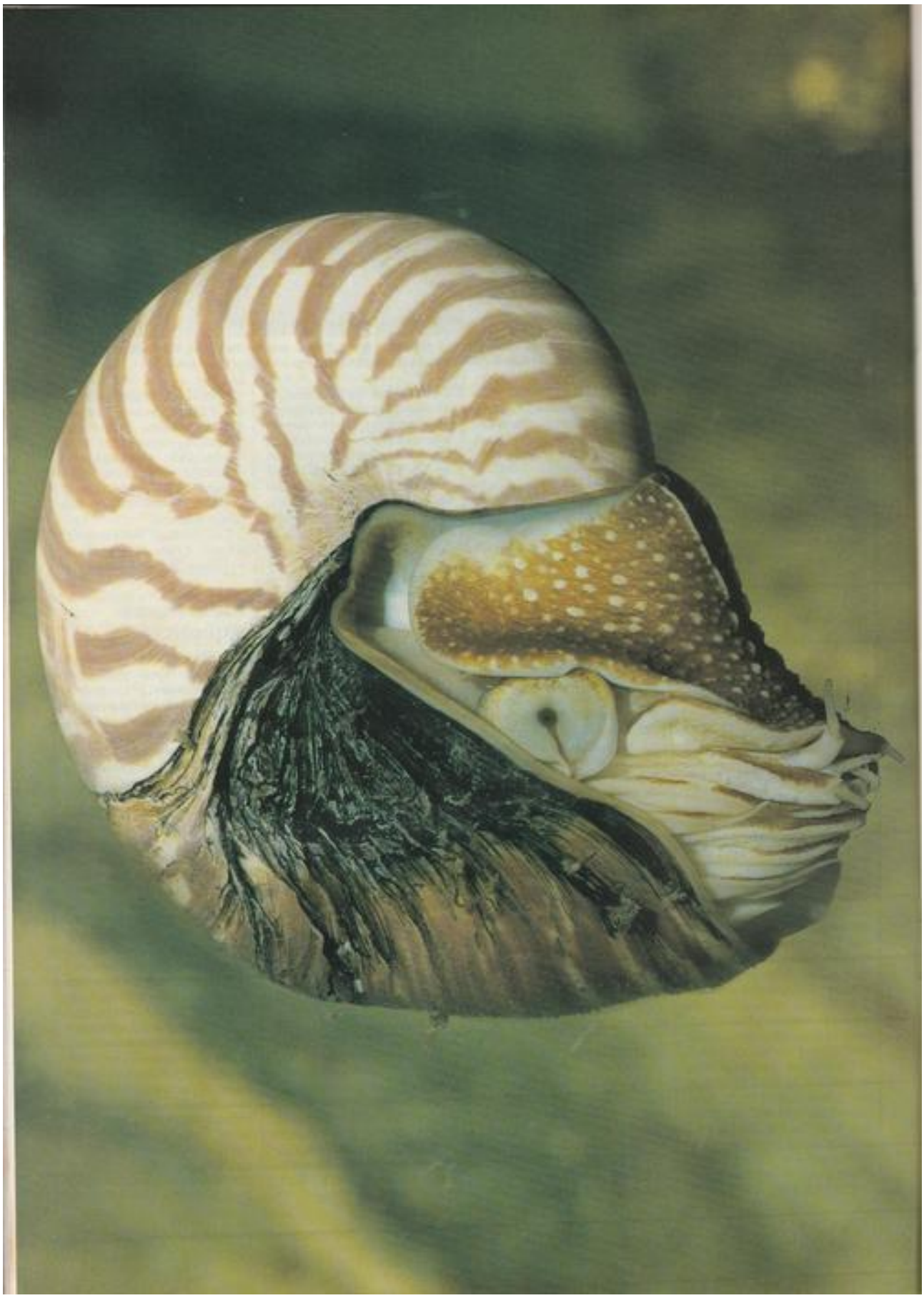
Ideal Home Aquatics

The countdown has begun: the Ideal Home Exhibition 1992 opens on 12 March at 10 am until 8 pm every day, except Thursdays, when the exhibition will stay open till 10 pm. Lasting four weeks, there is plenty of time for everyone to attend; the last day of the exhibition is 5 April.

As announced in previous months, **'Aquarian'** and **Underworld Products,** in conjunction with **Kingfisheries Limited** of Beckenham, will be at the show to promote the aquatic hobby in all its forms. Every weekend, guest celebrities from the aquatic world will be on hand to answer any questions which visiting aquarists and pondkeepers may have (see **News** last month for full list and dates of guest celebrities).

Stan Kemp of Kingfisheries will be in attendance every day of the show and will be maintaining the five stocked aquariums on the stand, which will comprise two tropical freshwater, one marine, one cold-water and one Tanganyikan set-up.

The stand to look out for is **No 1004** in **Earl's Court No 2 Hall.** See you at the show!



Spotlight

THE NAUTILUS

Gordon Kay valiantly takes up the challenge thrown down by our editor and comes up with a host of revealing and fascinating facts on this mysterious, almost-prehistoric mollusc.

Photograph by David Allison

I have said before that my love of the sea is fired by the wondrous array of animals which live beneath the surface — and there can be none more intriguing than the animal in our **Spotlight** photograph, the Nautilus. How many other creatures are there with two pairs of gills, four external ears and four kidney sacs, as well as a radula made up of eleven rows of teeth?

The term 'nautilus' is not actually strictly accurate. I should here be referring to the family Nautilidae, which comprises some five species. However, even then I cannot be absolutely certain that more do not exist — this article is another of those 'challenges' which our editor loves to give me from time to time, and there "ain't a lot of information around on the subject". Still, I shall do my best . . . .

The Nautilus is a native of the Indo-Pacific and also the area from Australia to New Caledonia, where it lives near to the seabed, not far from the coast, at depths ranging from several dozen to six or seven hundred metres. Nautilus sometimes approach the shore, but this usually only happens during the winter months. This is a predatory beast which eats things like prawns, fish and carrion — with a definite penchant for spiny lobsters.

'HYDROSTATIC' SHELLS

Nautilus shells can be large — anything up to 25cm (9.8in) in diameter. They are bilaterally symmetrical and spirally coiled so that only the last coil is visible from the outside. The outer surface of the shell is a shiny porcelain white, whereas the inner surface is an irridescent nacre.

If you were to cut a Nautilus shell in half longitudinally, you would see that it is divided into chambers, each separated by a partition, or septum. A fully-grown Nautilus has about thirty of these chambers, each is secreted in turn as the animal grows. Originally, each chamber is filled with fluid but, as the animal strengthens the partition dividing the new chamber from the rest of the shell, some of this fluid is pumped out and a gas space is formed. This gas is composed mainly of nitrogen and argon at a pressure of approximately 0.9 atmospheres.

In this manner, the Nautilus grows very rapidly and takes only a year to reach full size. All the chambers are connected by a strand of living tissue called a siphuncle, which contains an artery and a vein. The siphuncle passes through a small calcareous spout which faces inwards in each chamber. This 'hydrostatic' system is the secret of the Nautilus' locomotion.

The Nautilus can migrate up and down in the water column and alters its buoyancy to achieve this by pumping fluid into or out of the chambers, thus increasing or decreasing the gas space. The fluid is actually pumped over the living wall of the siphuncle into or out of the blood system. The calcareous tube around the siphuncle acts rather like a wick as it draws the fluid into contact with the siphuncular membrane.

BODY STRUCTURE

Despite possessing thirty or so chambers, the beast itself actually only lives in the large, final one. Its head is large, with huge, primitive eyes which are devoid of a lens and have relatively small pupils.

The leathery mantle is conical, with slender, suckerless arms which are arranged in two circles. There is an outer circle of thirty-eight prehensile arms and an inner circle of twenty-four (in males), or forty-eight to fifty-two (in females), oral arms. The bases of these oral arms merge with a thick 'hood' which closes the mouth of the shell when the animal retracts. There are also two tentacles over each eye.

In the male, the lower part of the inner arm circle is modified on one side into a copulatory organ — the spadix — while a semen receptacle is located in a sac under the buccal cone of the female. There is no funnel organ and the funnel is not fused into a tube. Its lower edges are simply coiled, one around the other.

In keeping with every other aspect of the Nautilus which sets it apart from other cephalopods, the nervous system is extremely primitive. The brain consists of three pairs of ganglia — centres for the transmission and reception of impulses. Again, unlike other cephalopods, the Nautilus is devoid of chromatophores, the pigment-bearing sacs with contractile walls which allow squids and octopusses to change colour so readily.

A FEW OTHER 'NUGGETS'

Very little is known about Nautilus reproduction, except that the female sheds very large eggs — up to 40mm (1.6in) long — singly, in shallow water. She will shed ten or so eggs over a period of some two weeks. I can tell you no more than this because, as far as I am aware, no one knows any more.

There are often reports of Nautilus from areas in which they just do not live — places like Japan and Taiwan. This is because empty Nautilus shells are lighter than water and will drift for long periods of time before being beached.

The Nautilus does have some commercial value in places like the Philippines and Melanesia. Their meat is indeed edible, but it is for their shells that they are primarily captured, these being used in the manufacture of those 'mother of pearl' trinkets.

Our editor, John Dawes, has a sadistic streak in him somewhere, but at least I get to learn something new from each of his 'challenges' and, as I said earlier, all these weird and wonderful creatures serve to fan the flames of my enthusiasm. I sincerely hope that this remnant from the Palaeozoic era, while not being an aquarium subject, has fanned *your* flames as well.

SPECIES OF NAUTILUS

Nautilus macromphalus
N. pompilius
N. stenomphalus
N. repertus
N. scrobiculatus
N. belauensis (which may be a separate species but more likely a subspecies of *N. pompilius*).

GLOSSARY

Nacre — 'Mother of Pearl'.
Septae — The partitions between the Nautilus' body chambers.
Siphuncle — Strand of living tissue, containing a vein and an artery, used to pump fluid in and out of the chambers.
Chromatophores — Pigment-bearing sacs with contractile walls by which changes of colour are effected, e.g. in squids, cuttlefishes.
Atmosphere — A unit of pressure equivalent to 14.69lb/sq in.
Ganglia — Centres in the brain for transmission and reception of impulses.

PRODUCT ROUND-UP

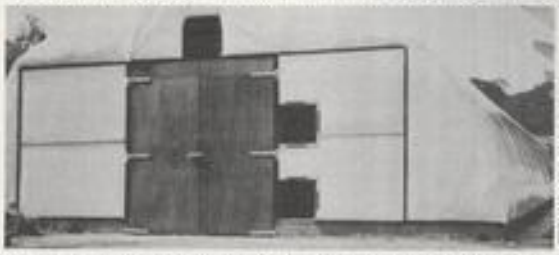
BY DICK MILLS

McGregor Polytunnels

We can all testify how warm the conditions can get in even the most attractive fish house during summer, but by a simple reversal of ideas, **McGREGOR POLYTUNNELS** have come up with the answer.

With their new, insulated, single-span MUSHROOM TUNNEL, the outside of the co-extruded polythene is white and the inside black, a reversal of traditional practice. This, combined with an eight-layer insulation package, achieves very significant advantages and improvements over existing designs. This is of particular benefit in summer months and, of course, in hot countries, as radiated heat is reflected away from the building, unlike the effects with previous black, heat-absorbing exteriors.

Building costs can be as low as £2.00 per sq.ft, and the range of widths, from 18ft to 30ft (c5.5 — 9m) mean that for, say, fish-farming, structures can be tailor-made to suit any requirements. For coldwater fishkeeping the insulated building can be cooled down to 1°C (38.8°F), so avoiding heat stress but, conversely, the building's insulation properties will also stop any general heat from escaping — just what the tropical fishkeeper wants; either way, a most effective answer to storage space under controlled-temperature conditions.



MCGREGOR POLYTUNNELS

Energy savings and better growing environments are claimed for the new mushroom house and cool storage unit from McGregor Polytunnels.

Details from: **McGREGOR POLYTUNNELS LTD, Winton Farm, Petersfield Road, Ropley, Alresford, Hants SO4 0EQ (Tel: 0962 772368; Fax: 0962 772471).**

Anglo-Crimean

So everyone's aware of the political changes happening in Eastern Europe, but I doubt if anyone would have predicted that any impact on the aquatic world would have resulted. Well, it has, albeit in a small way to start with.

ANGLO-CRIMEAN are the sole European distributors for products from a small public aquarium concern in the Crimea, part of the Ukraine. Modest they may be, but the AIR-VALVES are both accurately made and durable. Constructed from plastic, they are designed to fit into any standard-size air-line tubing, and the needle-valve is operated by a screw-in (or screw-out) motion, depending on what regulation of airflow is desired.

The virtue of needle-valves is that no restrictive clamping or deformation of the air-line is required. The samples I received were in either red or green, another bonus when trying to trace air-line paths in a crowded fish-room!

In this day and age of rising prices, it is a pleasure to report that these valves can be obtained for almost 'silly money' — at 10p each (or 13 for £1.00), plus 20p postage and packing on all orders. You could stock up a whole society's requirement for a very small outlay.

Details from: **ANGLO-CRIMEAN AQUARIUM PLASTICS, 118 Sheffield Road, Glossop. SK13 8QU.**

Camlab

Much as the hobbyist might lust after hi-tech, super-accurate test equipment, there is perhaps some truth in the fact that they are unnecessarily 'too good' (or too comprehensively-ranged) for the job in hand — and, of course, you pay for what you get, not necessarily for what you need to use.

The pH BOY, the LCD digital pocket pH meter from **CAMLAB**, narrows the gap somewhat, being a small, hi-tech precision instrument, as compared with other low-cost 'domestic' models currently available. Its commendable features include a fast response time, the facility to test very small amounts of sample fluids (although more traditional immersion depths are still catered for), and long-term stability, while the rugged, yet easily-replaceable, retractable electrode does not need moist storage conditions and will not deteriorate when not in use. An alarm warns of low battery voltage (average life approximate 500 hours, continuous use). Range pH2 — pH12.

Details from: **CAMLAB LIMITED, Nuffield Road, Cambridge CB4 1TH (Tel: 0223 424222; Fax: 0223 420856).**

Pond Pride

A pond pellet food in three different sizes and available in three different drum sizes should be all you need to keep your fish healthily fed throughout the coming year.

KING BRITISH are the main distributors for this excellent range, manufactured by **BP NUTRITION** under the name of POND PRIDE fish foods. The completely balanced diet contains all the nutrients that pond fishes (including Koi) need and the high-quality ingredients include natural colour enhancers. These Pond Pellets also have their own built-in over-feeding indicator — if they're still floating on the pond after a few minutes you've overfed! Pond Pride is available from most high quality aquatic outlets.

BP NUTRITION (WITH THANKS TO STAPELEY WATER GARDENS)

Food for all fish . . . and all seasons, courtesy of Pond Pride.

Full details from: **KING BRITISH AQUARIUM ACCESSORIES, Hayecliffe Lane, Bradford, West Yorkshire BD5 9ET (Tel: 0274 576241; Fax: 0274 521245).**

Tahiti Aquariums

O.K., hands up all those exasperated parents out there who would gladly spend a tenner or so to keep their youngsters, not only occupied but educated as well!

The BERMUDA aquarium from **TAHITI** will appeal on many fronts: the unique triangular shape with outward sloping sides certainly looks different, and the randomly coloured feet and brightly coloured hood may also help the youngster to, as they say, 'make a statement'. Low water content means a safer lightweight structure and, although quite suitable for goldfish, the Bermuda's adaptability means it can also serve as a home for other small aquatic animals too. A small change of water weekly, with perhaps a full overhaul every six weeks, is all that is needed to keep inmates happy.

A complete cabinet aquarium isn't always within everybody's financial means, but the ISLANDER range of aquariums can fulfil your needs for a neat aquatic display in another way.

The well-thought-out inexpensive system includes aquariums, hoods and matching stands which all suit each other, no matter when you buy each piece. The new CONDENSATION TRAY is the only tray that really fits the Islander (but it also fits other aquariums too).

TAHITI AQUARIUMS

Tahiti's newest stands, aquaria, vivaria, hoods and lids make for attractive, quality displays.

Tank sizes range from 18 x 12 x 12in (45 x 30 x 30cm) to 48 x 18 x 12in (120 x 45 x 30cm); the black trim looks great and also conceals the glass strengtheners. Any aquarium not passing a stringent 6-point quality control check doesn't get the Tahiti badge stuck on it.

The black NTP textured plastic hood is designed to enable easy fittings of electrical components and, unlike other hoods, it can take *two* tubes without any trouble; the removable front lid assists feeding and maintenance, obviating the need to lift the whole thing.

The self-assembly, square-sectioned tubular steel AQUARIUM STAND has black-ash back panels and takes two aquariums in a terraced design (no more pet-shop appearances!). If you can't run to two tanks, an optional tinted glass panel acts as a shelf in place of the bottom tank.

Just in case your 'herptiles' are feeling neglected with all this talk of fish tanks, you can easily convert a Tahiti aquarium into a vivarium by means of a VIVARIUM LID. This has a sliding glass access panel, a ventilation grill, cut-outs for heating and lighting, and anchoring brackets to prevent reptile breakouts. Soon, you will be able to get glass locks too, to stop 'little fingers' getting in!

Full details from: **TAHITI AQUARIUMS, Aquarius Centre, Queens Road, Hurst Cross, Ashton-under-Lyme OL6 8EW (Tel: 061 339 3131; Fax: 061 343 4439).**

Interpet

Interzoo has been, for many years, the Pet Trade Event 'sur le continent' (see, already we've come under the 1992 effect!) and it is at such eminent occasions where new products can be shown off to best advantage. Never the ones to let any publicity opportunity pass by, **INTERPET** are launching a range on environmentally-friendly POND and FISH TREATMENTS at this year's Show (Nuremberg, 7-10 May 1992).

ANTI-ULCER AND ANTI-PARASITE 3L have been introduced to assist pondkeepers with treatment of pondfish, not only Koi and Goldfish, but also Orfe and Rudd; previously, controlled medicines such as organophosphates normally used against Lice (*Argulus*), Anchor Worm (*Lernaea*), Gill Maggots (*Ergasilus*) and Leeches (*Piscicola*) had proved lethal to Orfe and Rudd, but Anti-parasite 3L is non-carcinogenic, is completely safe for all pond fish and can be used in planted ponds.

Anti-Ulcer is a safe, simple and effective alternative to the use of antibiotics and has a wide range of beneficial uses: early on, it can be used as a preventive medicament when introducing new stock — remember the new outdoor season's about to start — but is primarily an effective treatment against bacterial Gill Rot and systemic bacterial infections.

The now-widely-acclaimed triple treatment for ponds, POND BALANCE, POND CHECK and POND pH ADJUSTERS are standing ready to face the onslaught from blanket weed and varying water conditions. If in doubt, using the EASY TEST range of Water Test Kits will soon put you on the right track in keeping the conditions under correct parameters.

Details from **INTERPET LTD, Vincent Lane, Dorking, Surrey RH4 3YX (Tel: 0306 881033; Fax: 0306 885009).**

Stuart Turner

If you are into Koi, then you'll need a robust pump to deal with their pond. The new XB PUMPS from **STUART TURNER,** the specialist pump manufacturer, are designed at producing maximum flow with minimum power consumption, together with the quietest operational level too.

Features include an easy-to-remove, see-through strainer lid and large strainer basket — the latter allowing greater periods between cleaning. The

STUART TURNER LTD

Stuart Turner's new XB pond pumps are designed to meet the professional's requirements for the cleaning of Koi pools.

totally-enclosed fan-cooled motor meets the exacting conditions relating to pool applications and added pool protection is provided by thermal overload and automatic reset.

Details from: **STUART TURNER LIMITED, Market Place, Henley-on-Thames, Oxfordshire RG9 2AD (Tel: 0491 572655;**

Remanoid

It makes sense to have a pre-filter on a submersible pump, but it has to be said that many could do with being a bit bigger, if one is not to be constantly cleaning them. **REMANOID** have obviously taken this on board with their new concept in POND PUMPS to complement their extensive range of pond and water garden products.

The hardy, cylindrical units each contain a pump which is completely surrounded by a foam filter; a built-in handle folds down flat when not used to remove the pump from, (and return it to) the pond, while a removable bayonet-style opening lid allows easy access for filter-cleaning and maintenance. In addition to bell and fountain jets accessory pieces, extension pieces mean that no other support is required to enable the units to sit at the correct level in the water — no more hunting for a couple of house-bricks or a plastic milk-crate!

The new units come in three sizes — a POND PUMP 200 (with a 9-hole fountain jet); a POND PUMP 250 (with 5-hole and 9-hole fountain jets) and a POND PUMP 450 (with a 3-tier fountain and 3-way 'T' piece).

Full details of these units and the full range of Remanoid pumps, waterfall, fountain and aerator kits, semi-rigid pools, flexible liners, pond and fish care products from: **REMANOID LIMITED, Unit 44, Number One Industrial Estate, Medomsley Road, Consett, County Durham DH8 6SZ (Tel: 0207 591089).**

Herpetology matters By Julian Sims

AMPHIBIAN FENCES

During the early spring, mass movements of tens of thousands of amphibians begin in Europe and North America as soon as weather conditions are favourable. Over the past few years, these spectacular mass migrations have received a great deal of publicity. Reports on amphibian migration in newspapers and on radio and television make very good general interest stories. Unfortunately, there can be a real cause for concern behind these often light-hearted reports.

Adult amphibians do not always spend the winter near the pond or stream in which they will spawn. In the spring, many species, including European Common Toads (*Bufo bufo*), Alpine newts (*Triturus alpestris*), Smooth Newts (*T. vulgaris*) and North American Spotted Salamanders (*Ambystoma maculanum*) may travel quite considerable distances to return to their breeding sites.

For example, adult Common Toads are known to travel in excess of 2 kilometres (1.25 miles). Inevitably, such journeys are not without risk, and one of the hazards which many amphibians encounter is a busy road which now cuts across a traditional migration route. Amphibians are not fast-moving animals, and during the time taken to cross a wide road, hundreds can be killed or maimed during the migration period.

In 1986, **ACO Polymer Products Limited** became active in the development of products which would reduce the number of amphibian road casualties. Probably their best known product for this purpose is the 'amphibian tunnel' which is manufactured in units, one metre in length.

Each tunnel unit has 24 slots in its roof, and the top of the unit lies flush with the surface of the road. The slot allows air and moisture into the tunnel so that conditions do not become too hot or stuffy.

The material from which the tunnel units are made also has several advantages. Polymer concrete is resistant to deterioration and 'powdering'. It does not absorb water in the same way as conventional cement concrete either. Polymer concrete is, therefore, more suitable for amphibians to move along, with a reduced risk of the animals becoming desiccated.

For such tunnels to be effective in helping to save the lives of migrating amphibians, it is, obviously, also necessary to direct the animals to the entrance of the tunnel. Drift fences and low walls have been used for this purpose and work very well, at least for a time.

One type of drift fence which has been frequently used in the past is a flexible barrier made from polythene sheeting. However, even if this plastic sheeting is firmly pinned to wooden stakes, it is very difficult to maintain adequate tension and such drift fences can only be regarded as temporary structures. They are also highly labour-intensive to install and to maintain.

Unfortunately, if a conventional rigid barrier is constructed as a more permanent solution, then this can become a hazard to other types of wildlife. For example, if a low brick wall is built, this can restrict the movement of hedgehogs and some types of invertebrate, which are likely to get trapped on the dangerous road side of the barrier.

To overcome this problem, ACO have designed a special 'one-way' amphibian drift fence. The prototype underwent field testing in 1988 and 1989 in the province of Schleswig-Holstein, Germany near the headquarters of ACO Severin Ahlman at Rendsburg.

The patented design of this drift fence, which is now available in Britain, allows small animals (including toads) to move away from the edge of the road but not towards the roadside. This one-way movement is permitted because the amphibian fence is concave in profile.

Small animals which are on the *road side* of the fence are not trapped but can climb up the curve and drop to safety on the other side. However, in field trials, no amphibian (not even the European Green Tree Frog, *Hyla arborea*) or any other small animals (except snails) could climb up the *inside* of the concave. In the spring of 1991, some sections of this one-way fence were installed along the north side of the busy A283 near Steyning in West Sussex.

Other important advantages offered by the ACO concave amphibian fence include :

(1) It is supplied in one-metre lengths, so that it is easy to handle and install. Individual sections of the barrier are also easy to replace should they become damaged by vehicles.

(2) The deep concave shape of the sections provides shade and shelter on the inside of the barrier where the migrating amphibians collect. Thus, the ACO amphibian fence can also provide some cover from predators which include Magpies (*Pica pica*) and Crows (*Corvus corone*).

The fence sections (and the poles which are used to support them) are made from recycled plastic. The efficiency of this system could well have a practical use elsewhere, as in the rapid construction of enclosures for amphibians in the garden — although the uniform dark grey-to-black coloration is rather obtrusive!

Further details (including technical specifications) of the amphibian fences and tunnels which ACO produce, can be obtained direct from:

ACO Polymer Products Ltd,
Hitchin Road,
Shefford,
Bedfordshire SG17 5JS.
Tel: Hitchin (0462) 816666

JULIAN SIMS

The ACO Amphibian Fence. Shelter is provided by this concave barrier which is supported by plastic poles. In the foreground is a conventional drift fence made from polythene sheeting.

BOOK REVIEW

In 1982, Chris Mattison first wrote *The Care of Reptiles and Amphibians in Captivity*. This book has become one of the 'standards' referred to by many herpetologists who keep and rear reptiles and amphibians. In addition to the revised second edition, published in 1987, Chris has also written *Snakes of the World* (1986), *Frogs and Toads of the World* (1987), *Lizards of the World* (1989), and *Keeping and Breeding Snakes* (1988) — all published by **Blandford Press**.

His latest work in the Blandford series, *Keeping and Breeding Lizards* (1991), complements these previous publications and is of an equally high standard. The 224 pages of text are well illustrated with 36 black and white and 64 colour photographs taken by the author.

The book begins with an Editorial Note — metric conversions of °C to °F and centimetres to inches, followed by a three-page Introduction. Chris Mattison uses this opportunity to set the scene about these colourful and lively reptiles which have a geographical distribution from the Arctic Circle in the north, to Tierra del Fuego in the south. The following twenty-four chapters develop these opening remarks.

Chapter one begins with some 'essential biology' — thermoregulation, territorial behaviour, vitamin A metabolism and temperature dependent sex determination (TDSD) — vital information for anyone intending to maintain and breed lizards in captivity.

Chapters two and three provide further invaluable guidance; topics covered include building cages and selecting equipment to provide heat, light and to control humidity.

Outdoor enclosures and natural vivaria' are comprehensively covered in chapters four and five. Advice is given about the general construction, planting and management of purpose-built outdoor enclosures for lizards. Colour photographs and three diagrams support the text which describes the setting up of dry desert environments, semi-desert vivaria and tropical forest conditions.

Chapter six is devoted to food and feeding. Information is given about partially herbivorous species, for example, the Green Iguana *(Iguana iguana)*, large carnivorous species, and smaller insectivorous species. Simple details are given about culturing Mealworms *(Tenebrio molitor)*, Waxworms *(Galleria mellonella)* and crickets.

The very important topic of breeding is dealt with in chapter seven. This should be the aim of every herpetologist who maintains reptiles (and amphibians) in captivity. Important information is given about the incubation of eggs and the rearing of hatchlings. There is also a cautionary warning about the problems of inbreeding.

Chapter eight gives helpful advice about the management of captive lizards in order to maintain their health.

The remaining sixteen chapters of the book (148 pages) cover the majority of lizard families currently recognised. Of these remaining pages, no fewer than forty-one are devoted to geckos in chapters nine and ten. The two chapters differentiate between the Eublepharids (a small family with only 18 species) and the 'true' Geckos with more than 800 species discovered to date. This comprehensive coverage reflects how popular and how rewarding these reptiles can be if correctly maintained in captivity.

Chapter eleven deals with the Snake Lizards — a group of interesting reptiles which are found only in Australasia. These lizards are rarely available in Britain through the pet trade.

The 16 species of Night Lizard belong to the small family Xantusiidae. Details of some of these reptiles are given in chapter twelve, which is just two pages long.

However, chapters thirteen, fourteen and fifteen are very much longer, reflecting the size of each family covered and their popularity with lizard keepers. The three families are the Iguanidae (with over 600 species), the Agamidae (with about 300 species) and the Scincidae (Skinks — with more than 1,000 species).

Chapter sixteen is a particular favourite of mine because it deals with the Lacertids — 200 species of lizards found in Europe (including Britain) and North Africa.

The Tegus, Alligator Lizards and Girdle-tailed Lizards receive coverage in chapters seventeen to nineteen respectively.

Chameleons (as 'focused on' in the January 1992 edition of *A & P)* are described in chapter twenty and the Chinese Crocodile Lizard, *Shinisaurus crocodilurus*, has chapter twenty-one all to itself, being the only representative of the family Xenosauridae.

Chapter twenty-two deals with the only two species of venomous lizard, the Gila Monster *(Heloderma suspectum)* and the Beaded Lizard *(H. horridum)*. If these animals are maintained in captivity in Britain, they are subject to the controls of **The Dangerous Wild Animal Act**, 1976.

The penultimate chapter is devoted to Monitors, featured some time ago in the June 1990 edition of *A & P*. Chapter twenty-four covers the Worm Lizards, another group of reptiles which have been described in *A & P* — refer to the January 1992 edition of **Herpetology Matters.**

For anyone interested in maintaining and breeding lizards in captivity, this book will prove to be very helpful. There is much practical information of use to all — experienced herpetologists and novices alike. In fact, I only have one major criticisms of this 'new' book — if you already have a copy of *Lizards of the World*, you will find many of the pictures in *Keeping and Breeding Lizards* rather repetitive.

Even so, compared with the high costs of some other recently published herpetological books, the price of this hardback, at £16.95, must be regarded as something of a bargain, not to be missed. **ISBN 0-7137-2188-x**

Focus on: Foods & Feeding

Foods For Thought

A & P editor **John Dawes** provides an overview of commercially-produced fish foods.

JOHN DAWES

Most fish *always* appear to be hungry. Nowadays, there's a commercial food for virtually every type of fish or need.

While it is often said, perhaps with a certain degree of justification, that some humans live to eat, the opposite is even truer of fish — they eat to live. Food is, therefore, predominantly functional in fish, even though many species or individuals demonstrate a distinct preference for one particular type of food.

In the wild, much time and energy is spent searching for food. In the aquarium, where fish are faced with artificial conditions, including food items that they never encounter in the wild, their feeding behaviour can sometimes be quite different to that encountered in nature. Even so, much can be learned about fish and their diets through patient observation.

Some fish are predominantly or exclusively herbivorous, e.g. Sucking Loaches (*Gyrinocheilus aymonieri*) or any of the Plecostomus species (*Hypostomus* spp), while others, such as most Piranhas (*Serrasalmus* spp) or the Tiger fish (*Hoplias malabaricus*) are highly carnivorous or piscivorous (fish eaters). Some fish are even parasitic, feeding off the tissues of other fish or any terrestrial animal that happens to cross their path. Many of the Parasitic Catfishes (Family: Trichomycteridae), represented by species like the Carnero or Cadirú (*Vandellia cirrhosa*), fall into this category.

In between these extremes, there exists a wide variety of feeding techniques and adaptations. Some of these are extremely specialised, like the proboscis-like, extended lower jaw of the Elephant-nosed Fish (*Gnathonemus petersii*), while others can exploit a range of food items. Gouramis, for example, will take food from the surface, middle or bottom layers of the water and will feed on live or dead plant and animal matter. Such fish are said to be omnivorous.

Anatomically, there are numerous features which give an indication of the preferred diet of a particular fish. Many of these follow the same rules that apply for land-living animals. For example, herbivorous fish have a long, convoluted gut, while carnivores/piscivores have a much shorter one. Fish which are regarded as food items by larger predators have evolved predator-avoidance features which can be anything from a highly developed shoaling instinct, to camouflage or the ability to swim at a faster rate than the hunters themselves, plus every other conceivable possibility.

Eating, or the avoidance of being eaten is, quite clearly, a full-time occupation. Its importance is such that it is only temporarily relegated to second place in times of aggression or reproductive activity.

COMMERCIAL PREPARATIONS

The water content of the food that fish eat in the wild is usually between 70 and 90%. Therefore, in order to obtain sufficient nourishment, fish need to eat relatively large amounts of food. By contrast, many commercial foods, particularly flakes, sticks, pellets and all the freeze-dried varieties, can contain as little as 3% water or less.

KING BRITISH

Great winter feed for Koi — a specially developed flake.

If the quality of the nutritional components of these commercial foods matches that found in nature, it follows that a small portion of good-quality, manufactured food

AQUARIAN

Pond foods come in many forms. The most popular are the floating types.

will be equivalent, in nutritional value, to a much larger amount of naturally available food.

Some manufactured foods actually do come quite close to natural foods in quality, thus making the aquarist's and pondkeeper's job quite an easy one. Such foods have great advantages in that they can be stored for considerable periods even after opening. They are also clean to handle, take up little shelf space, are relatively inexpensive, are available all the year round and, very importantly, exist in a range of formulae suited virtually to every type of fish likely to be kept in an aquarium or pond.

Flakes

For example, there are vegetable flakes for herbivorous species, meat/fish-based flakes for carnivores/piscivores, growth flakes (with higher protein levels) for young, growing fish, colour flakes with added pigmentation enhancers, conditioning flakes to build up fish in preparation for spawning . . . the list goes on. . . .

The very latest flake food to appear on the market goes even one stage further (see **Product Round-up,** p. 64 in the January '92 issue of *A & P*) — it has been specifically designed for feeding to Koi during the winter months.

SERA

Top manufacturers produce a wide range of foods for both aquarium and pond fish

ARMITAGE

Goldfish, while being happy to eat virtually anything, have had foods specifically developed for their needs.

TETRA

Complete diets for specific fish are deservedly popular among specialist fishkeepers.

The usual advice we give concerning winter feeding of pond fish is either don't feed at all or, if you do (during mild spells), use one or other of the specially formulated pellets. A further option which I've tended to use in recent years is to give the fish a small amount of goldfish flaked food if mild weather is experienced over a period of two or three consecutive days.

For this reason, plus the fact that I've been advocating the introducion of a Koi flake for about eight years now, I was pleased to learn of the new food and think that it will be received very favourably by fishkeepers . . . and fish, through the hobby.

Tablets, Pellets, Hoops and Sticks

These foods are often developed from one or other of the 'flake' formulae referred to in the previous section.

Manufactured (generally) either by compression or extrusion methods, these more substantial foods come in a range of sizes and shapes (to suit mouths of varying dimensions), and formulae. Colour-enhancing, growth, staple and other foods of this kind have brought an extra dimension to feeding the larger aquarium and all pond species in recent years.

Formulae can also be varied to take account of the lighter feeding and slower metabolic rates of fish during the colder months of the year and, used according to manufacturers' directions, these foods can help fish overcome the hardship of winter, particularly if there are prolonged mild periods, followed by colder spells.

Fry Foods

For young fish, there are powdered foods, liquid foods, Infusoria (microscopic organisms) stimulators, Infusoria cultures, plankton suspensions, brine shrimp eggs (with or without shells) for hatching . . . and others.

I've included a mention of Infusoria and brine shrimp here merely because they are available 'in kit form', unlike most of the other livefoods. These 'kits' are supplied

with easy-to-follow instructions, so obtaining a suitable diet for fry is (thankfully) no longer the chore it used to be ten or more years ago.

Freeze-dried Foods

On the freeze-dried front, a wide range of food organisms is available. Some freeze-dried foods are loose and can be sprinkled on the surface of the water, while others are compacted into blocks which can be pressed on to the inside of the aquarium where they will stick and from which the fish will quickly learn to feed.

The most popular freeze-dried foods are *Tubifex* worms, mosquito/midge larvae, shrimps and bloodworms, but this is no more than a tiny fraction of the range that can now be bought at every aquatic outlet.

Gamma-irradiated Foods

Gamma-irradiated frozen foods are, virtually by definition, free of pathogenic (disease-causing) organisms. One great advantage that these foods possess is that they are often more readily accepted by fish which have rejected other types of food. One disadvantage over other commercial foods, albeit a small one, is that they need to be stored in a freezer.

The moisture content of these foods is, of course, as high as that which exists in naturally available foods. The range, which is continually being expanded, includes *Daphnia*, squid, bloodworms. *Mysis* shrimps, razor clams, plankton, mussels, algae, lance fish, krill and *Tubifex* worms.

One of the most recent introductions to the deep-frozen range is a food which has been specifically designed for marine angels and butterflies. Among its ingredients is sponge tissue which forms part of the natural diet of these and other sometimes 'difficult' (in aquarium terms) marines.

RUTO

Deep-frozen foods are very popular among fish-keepers and are avidly eaten by the vast majority of fish.

INTERPET

The range of excellent freeze-dried foods keeps getting wider every year.

CLOSING REMARKS

Commercial foods today are light years removed from the old 'dried ants' eggs' days. Foods now contain such an array of high-quality ingredients that, if feeding fish poses a problem at all, it is likely to lie in choosing the best food for one's needs from an excellent, extensive and continually expanding selection.

And, with research and development continuing apace, even in these days of economic depression, the future looks optimistic, so some further species which we still consider 'difficult' could well become 'easy' in the not-too-distant future . . . just as others have repeatedly done down the years.

SUMMARY OF COMMERCIAL FOODS

Category	Range
Flakes	1. Formulae to suit most fish, e.g. staple diet. 2. Formulae to suit specific types of fish, e.g. vegetable or meat/fish-based diets. 3. Formulae aimed at specific functions, e.g. growth, colour, conditioning, winter feeding.
Tablets, Pellets, Hoops and Foodsticks	1. Formulae to suit a range of fish, e.g. staple diet. 2. Formulae and sizes to suit specific types of fish, e.g. high protein for carnivores, floating for surface feeders and hand feeding, sinking tablets for bottom dwellers and night feeders.
Fry Foods	1. Dry preparations (powder) for specific types of fry, i.e. egglayer or livebearer fry. 2. Liquid preparations for specific purposes, e.g. suspensions for fry to feed on, or suspensions to stimulate Infusoria for the fry to feed on. 3. Brine Shrimp Eggs (*Artemia salina*) — need to be hatched by the aquarist (directions usually provided) and then fed to fry. 4. Infusoria and rotifers — cultures of microscopic organisms which can be fed directly to fry or cultured and fed on a regular basis.
Freeze-dried foods	1. Loose — designed for sprinkling on the water surface and best suited to surface feeders: Bloodworms, midge/mosquito larvae and shrimps are among the most common varieties. 2. In blocks — designed for pressing on to the inside of the aquarium; suitable for all types of feeders. Most common varieties are *Tubifex* worms and shrimps.
Gamma-irradiated Deep-frozen foods	Fast-expanding range which includes *Daphnia*, *Tubifex*, *Mysis*, razor clams, mussels, shrimps, krill, sponge (e.g. for marine angels and butterflies), algae, lance fish and plankton. Particles are often too large for small fish and delicate feeders but can be ground down to size.

Focus on: Foods & Feeding

LIONS, LAMBS AND MEALWORMS Part 1

Herpetologist **Ron Eddy** reviews some of the best foods available for reptiles and amphibians . . . and provides useful guides to their culture.

Photographs reproduced by kind courtesy of The Mealworm Company

Many people are fascinated by reptiles and amphibians. Therefore, sooner or later, the urge arrives to set up a terrarium of one's own; a tropical forest floor in miniature, or a section of riverbank complete with its agile lizards or fat, smug-looking toads, has almost irresistible appeal (and, let's face it, snob-value!). But, before we create our mini-Paradise, there is one issue we have to face: that of feeding its inhabitants.

Most reptiles, and virtually all amphibians kept in captivity, are carnivorous. Many, in fact, will not feed without the stimulus of moving prey. This is in direct contrast with the experience of fishkeepers, who are accustomed to being able to throw in a pinch of flake food as required.

It does, however, raise the ethical question: is it right to feed living creatures to other living creatures? People who feel strongly that all such things are cruel and wrong should perhaps avoid herptiles (terrible term, but convenient for this article!), or else stick to the few purely vegetarian ones, such as some of the tortoises. Even Green Iguanas, largely vegetarian as adults, require live insects and a good supply of calcium as juveniles.

The final answer I feel, is one of degrees. Nature is not a sweet old lady with flowers in her hair; it is a living system of balances and checks, where some of the elements provide food for some others (that may then provide in their turn).

There was a popular sideshow in some turn-of-the-century travelling fairs, appealing directly to the sentimental side of human nature, called The Lion And The Lamb. Here, a fierce-looking lion and cuddly-wuddly lamb shared a cage in apparent Holy Peace. These sideshows were extremely successful, as long as there was a steady supply of lambs . . .!

Anthropomorphism aside, I feel strongly that we have a responsibility, as animal keepers, not only to provide our animals with the best and most natural diet that we can, but also to ensure that any food animals are dispatched with the minimum of suffering. *Then*, we may be able to call ourselves 'animal-lovers'.

With reptiles and amphibians, as with other animals, variety is the key to successful feeding. So, what foods are available? First I'll look at the various 'cultured' live foods, then I'll take a look at that much-neglected resource, wild-caught food.

CULTURED LIVE FOODS

The advantage of the various cultured foods, whether bought from a petshop or ordered from a biological supplier, is their convenience. Many of the more common ones can be quite easily maintained at home if required, once the initial stock has been bought, and can tide the herptile keeper over winter or periods of bad weather. On the disadvantage side, most of them are short of essential vitamins and minerals. I prefer to use them as a stop-gap or supplement, rather than as the main diet.

Mealworms

Mealworms are, at once, the most popular and the most maligned live food for herptiles. Only crickets approach them in availability, and that, only recently. The problem, of course, is that shop-bought mealworms are just not very nutritious. They are high in fat, but low in vitamins and calcium. They also have a tough, chitinous skin, which can be almost indigestible.

Mealworms *(Tenebrio molitor)* are available from the top suppliers in 'mini', regular (such as these) and 'giant' sizes. There is also a 'Super Giant Mealworm' *(Zophobas morio)* available for larger species of herptiles.

Many lizard keepers have seen their animals greedily gulp down large numbers of mealworms, only to regurgitate them shortly afterwards. I have also heard horror stories of especially butch mealworms that have eaten their way out of small frogs! (I've never seen it myself, but don't say I didn't warn you!).

Popular (or do I mean 'populist'?) terrarium books, ever helpful, blithely advise you to feed only those soft worms that have newly shed their skins, while ignoring the fact that, in an average shop-bought pack, very few will be shedding at any one time. All these problems can be mitigated, if not overcome, by culturing your own mealworms.

To do this, half-fill an ice-cream tub (or several tubs, depending on how many terraria you have) with a mixture of bran, oatmeal and chicken or turkey mash. To this, add a good handful of sterilised bone meal or a finely-crushed cuttlebone. This improves the calcium situation. Then add a little good-quality fish flake, some crumpled newspaper, and, finally, a small piece of potato or (preferably) carrot. Then simply pour in the contents of a shop-bought mealworm pack.

Keep the culture in a fairly warm place. Within a month, your mealworms will have metamorphosed into the adult beetle which will lay eggs in the medium provided, and, shortly, you will have an abundance of various-sized mealworms that are far more nutritious than their parents. You should also find that relatively more are available in the favoured 'soft' state. Every few months that culture should be sieved to remove waste and topped up with fresh food.

This is probably a good point at which to mention colour-feeding. People who have bred the lovely Oriental Fire-bellied Toad, have, no doubt, noticed that subsequent generations of toads have greatly-reduced colouring on their bellies. This is because the toads do not produce the pigments

involved themselves, but absorb them from their food.

The afore-mentioned books happily tell you to use the colour foods developed for birds or fish without explaining exactly *how* you do this with an animal that only takes living, moving invertebrates. The problem can be overcome by feeding these foods to the *prey* (crickets are good for this, as well) and then shortly afterwards feeding them to your toads. This should not be overdone, as it is easy to give too much pigment, resulting in a 'muddying' of the overall colour. It may be worth extending this practice to other 'fire-bellied' amphibians, such as the Japanese Newt (I would be interested to hear of any successes in this).

Apart from this feature, I have found mealworms mostly useful as an ever-reliable food source when nothing else is available, and occasionally as a 'fattener', when I have received lizards or toads that have previously been underfed.

Crickets

Crickets are now nearly as freely available on sale as mealworms, and have two major advantages over them: one, they are far more digestible, whether newly-shed or not; and two, terrarium animals really love them!

Many insect-eating herptiles that show little interest in mealworms (such as some of the treefrogs), will readily take crickets. Even aquatic species like Clawed Frogs and terrapins seem to get really excited when crickets are dropped onto the surface of the water.

Again, however, crickets are not particularly nutritious. Their food value is greatly increased if they are dusted with one of the vitamin powders (of which more later), or else fed with fish flake, as described for mealworms.

It is probably not worth culturing crickets at home. For one thing, they require a high temperature to breed successfully (in the 90°Fs — 30°Cs). For another, they are quite incredible escape artists. For some reason, escaped crickets in our house always make their way to the kitchen (about as far as they can get in the house from the animal room) and set up home under the fridge-freezer, where they are almost impossible to remove. I'm told that some people find their repetitive chirping soothing. Well, I'm afraid that it brings out the psychotic in me!

Used in small quantities, crickets are very good for getting reluctant herptiles to feed. The portions sold in the little plastic tubs should be emptied into a large container (plastic sweet jars are very useful here) and the crickets should be fed and watered *at once*. For some reason that I totally fail to grasp, a water source is almost never provided for the insects while they are on the shelf, which results in a lot of cannibalism as they desperately search for fluid. One would have thought that shopkeepers would want to have more crickets alive per portion, especially when it is such an easy problem to solve.

When preparing your sweet jar or other container, cover the base with about an inch of bran, or cereal mix, as described for mealworms. Place crumpled paper on top of this, and put either a jar lid full of wet tissue paper, or more simply, a piece of carrot or orange on the bottom. When first released, the crickets will be seen to rush first to the water source. This simple arrangement means that your crickets can be kept for weeks, rather than days, and avoids needless cruelty.

One good reason for breeding crickets, of course, is to obtain a supply of newly-hatched insects, very useful for feeding smaller frogs such as the Poison-arrow Frogs, and newly-hatched lizards. Some of the biological supply houses can offer these in quantity, however, and I feel this is an easier option.

Crickets *(Acheta domesticus)* are taken avidly by virtually all species of reptiles and amphibians.

Locusts *(Locusta migratoria)* — excellent for a wide range of herptiles.

Locusts

Only generally available in larger dealers that stock a range of reptiles and amphibians, and again, difficult to culture, locusts are, nonetheless, excellent food for larger frogs and toads and medium-sized lizards.

They are usually available in a range of sizes. Again, if stocks are to be kept for any length of time, they should be fed and watered, although the diet for locusts should include a certain amount of grass or other green food.

Although they are fairly nutritious, locusts should not be fed exclusively. In my collection, both Carlos the Giant Toad and Sam the Bullfrog, eat locusts as part of a mixed diet; they are also given large mealworms, crickets, stick insects, woodlice, worms, beetles and other wild food.

Waxworms

Here the 'expert' (hah!) shows the limits of his expertise! I have to confess that I have never cultured these, as I was under the impression that fresh honeycomb was needed to be successful.

I recently read of a substitute medium, however, that seems a lot easier to provide.

Waxworms are now widely available. Care must be taken not to allow the adult moths to escape, though.

Even so, the grubs have an even higher fat content than mealworms, so I suspect that their use is limited.

Increasingly available from biological suppliers, waxworms are often offered as a substitute for mealworms, but in fact, not only is their fat content even higher, but their skins are also nearly as tough. Their best use, again, is probably as a 'fattener'.

Waxworms should be cultivated in a ventilated ice cream tub, as for mealworms, but fine mesh should be used bonded to the lid to prevent the adult moths from escaping. These adults can also be used for food and are especially appreciated by smaller treefrogs and lizards.

The culture medium can be pieces of honeycomb, if these can be obtained in quantity (the grubs eat a *lot!*) or a substitute recommended in *A & P* last year (June '91, page 104): 20 parts of wholemeal flour to one part of yeast. To this, add equal parts of clear honey and glycerol to make a dough-like paste. The whole life-cycle takes about six weeks, and the adults lay their eggs on the side of the container; these can be removed and used to start new colonies.

Care should be taken not to let the adult moths escape when the container is opened; they will not, as one German book quaintly puts, it "get into your woollens", but I recently came across a letter (in a bird-keeping magazine of all places), pointing out that wax moths are increasingly becoming a problem and are a serious pest to bee-keepers, sometimes devastating hives — another illustration of our responsibilities as animal keepers, perhaps.

Maggots

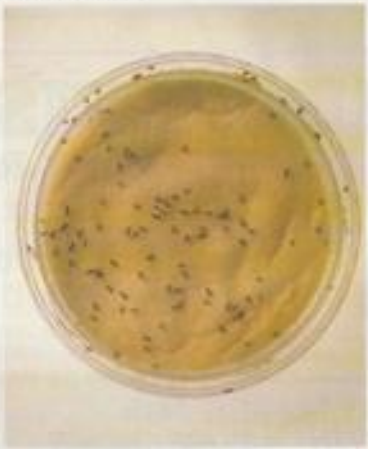
Often available from angling shops, this is a live food that I'm not too happy to recommend. Although, in theory, they are cleaned by the dealers, their unsavoury feeding habits mean that they have a high risk of carrying such infections as *Salmonella*.

The dyed variety should certainly never be used. The newly-emerged adult blowflies, though, are quite a useful food for agile lizards and larger treefrogs. The barbaric practice of crippling them by pulling off their wings to make them easier to catch (a similar practice is that of removing the jumping legs of crickets, locusts and grasshoppers) should, in my opinion, *never* be followed. If your herptiles really have trouble catching their prey, put the insects in a jar in the fridge for 20 minutes. This will slow them down without damaging them.

Casters, while not, in themselves, being suitable as live food, will eventually hatch out into nutritious Blowflies *(Calliphora)*.

Fruit flies

Almost never sold in petshops, vestigeal-winged ('wingless') mutants can be obtained from some biological suppliers. Prolific breeders and an invaluable food for many small frogs, toads and lizards, there is an 'easy' way and a 'hard' way to breed them. Both use large coffee jars, with a cloth and elastic band top.



There are numerous forms of Fruitfly *(Drosophila melanogaster)*. The easiest, by far, are the small-winged types.

The 'easy' way is to use banana skins as a culture medium or a commercial medium. Simply place skins and flies together in the jar, keep reasonably warm, and, within two weeks, you will have more flies than you know what to do with (this assumes, of course, that you eat a lot of bananas!)

The 'hard' way is to use generously-sweetened porridge. Once this has cooled, add a pinch of ordinary brewer's yeast. Put in some crumpled paper for the flies to crawl on, and proceed as in method one. One thing to watch out for with both methods is fungus growth; moulds like exactly the same conditions as the flies!

The culture has an effective life of about a month, so it is probably worth starting new cultures every two weeks or so, seeding them with flies from the previous ones. This ensures a continuous supply. Ordinary wild fruit flies can be bred instead, but as they can fly, they are not so easy to control.

Vertebrate Foods: Rodents, Chicks and Fishes

Here we come to the most ethically-difficult part of herptile keeping. Many people who might be happy to feed crickets to their lizards, are not so sure about using these 'biologically-closer-to-us' animals in quite the same way.

Again, the answer is probably one of degree. For example, many books tell us that larger anurans, such as Giant Toads, Horned Frogs and Bullfrogs can be fed live pinkies (baby mice). Quite right, they can, but *it is not necessary*. All of these amphibians can be fed on locusts and other large invertebrates and will not suffer if they never see a mouse.

Snakes and the larger lizards often do need to be given whole vertebrates, but zoo after zoo has proved that *these do not have to be alive*. In fact, such live food can be hazardous; rats and mice, as anyone who has kept them as pets knows, have very sharp teeth, and no inhibitions about using them when frightened. Many a careless (callous?) snake-owner has returned to his/her tank to find that the 'prey' has chewed the 'predator'!

Probably the best way to supply such foods is to obtain them ready-frozen. Quite a few petshops and garden centres sell frozen rats, mice and chicks, which can then be stored in the home freezer and thawed as required. They should be thoroughly thawed before being presented, and, for snakes, warmed to approximately blood temperature. Monitors, tegus and other large lizards don't seem to be quite so fussy, but again, it is important that the food is completely thawed.

Another caution about pinkies, often recommended for smaller rodent-eating snakes: they tend to be deficient in calcium. It may therefore be worth injecting a calcium supplement into them before feeding, if they are used exclusively.

Rodents can be bred at home, if you have the room, but then you have the problem of killing them as humanely as possible before feeding them to your pets. One method I have read of is to place them in a bare tank with an ordinary mousetrap. This is, at least, quick . . . though off putting.

Fish-eating herptiles present another problem. Most terrapins, clawed frogs, aquatic salamanders and the like, will accept pieces of cooked fish as a part of their diet, and the smaller water snakes and garter snakes will usually take earthworms as a substitute without any apparent ill-effect, but the larger water snakes and grass snakes seem to need whole (if not live) fish. I would be grateful for any suggestions as to how one goes about humanely killing a goldfish!

(TO BE CONTINUED)

Paper Round

By Dr Ian Winfield

CONSERVATION OF DESERT FISHES

Yes, desert fishes . . . and there are a few around the world. Needless to say, they have to be pretty specialised beasts to survive in such places, where they usually exist in very small populations. But survive they do, although a few species have been pushed to the brink by man's activities. Ed P Pister of the California Department of Fish and Game, USA, is one of the founding fathers of desert fish conservation, and has recounted some of the history of these issues in a recent publication which makes inspiring reading.

Several desert fish populations in the USA have come particularly close to extinction, being saved only by last-minute help through a combination of biology and legislation. For example, Devil's Hole is a limestone sink in western Nevada and contains the only population of the Devil's Hole pupfish (*Cyprinodon diabolis*), a small cyprinodont. Groundwater pumping by a farming operation began to lower the water level in the Devil's Hole, threatening to expose a limestone shelf which was an essential source of algae for the pupfish.

While these events preceded the US Endangered Species Act of 1973, general responsibility to do something about the state of affairs was assumed by the US Secretary of the Interior who quickly appointed a Washington-level Pupfish Task Force. This particular story has a happy ending because Devil's Hole is now in the safety of the Ash Meadows National Wildlife Refuge.

Pister also recalled the saving of the last 200 individuals of an entire genus, *Empetrichthys*, which were held in a 50-gal horse trough while a refuge was created and attempts made to restore their natural spring habitat. Similarly, the Owens Pupfish, *Cyprinodon radiosus*, came within a few hours of extinction as a small refuge pond dried up on a hot afternoon. Only emergency work into the night with dipnets, buckets and battery-powered air pumps saved the species.

Anyone interested in finding out more about the Desert Fishes Council, which coordinates the efforts of many groups concerned with the conservation of desert aquatic ecosystems, can write to me care of *A & P* for a contact address.

(**Source:** *Journal of Fish Biology* **37A**, 183-187.)

ULTRASOUND FOR FISH

Ever spent hours staring at a prized Oscar or catfish trying to decide if it is a he or a she? While suggestions may be found in many books for sexing these and other species in which the sexes are very similar, this remains a problem to aquarists and scientist alike, unless he or she is willing and able to dissect the fish. This is not too good an idea if you are trying to put together a breeding pair of tankbusters, though!

A neat solution to this problem has recently been found by N S Mattson, of the Institute of Marine Research in Norway. Mattson used an ultrasound scanner of a type normally employed by vets and was able to sex adult salmon with a great degree of confidence, confirming the validity of his judgement by subsequent dissections. In addition to merely sexing the fish, Mattson was also able to determine the state of maturity of females by measuring the diameter of their ovaries, all with nothing more hazardous to the fish than a standard anaesthetic.

Unfortunately, further dissections will be needed before the technique can be applied to other species of more interest to the aquarist, although this may well be done for some of the larger cichlids and catfish which are used in aquaculture in their native countries.

(**Source:** *Journal of Fish Biology* **39**, 673-677.)

EVIDENCE FOR THE VALUE OF EGG-SPOTS

The males of several species of fish possess bright, egg-like markings on their anal fins which are important in courtship behaviour. E. Hert of the Max-Plank-Institut fur Verhaltenspysiologie in Germany found that, at least in the laboratory, the selection of males by female *Pseudotropheus aurora* is based on the number of such egg-spots.

Hert investigated this behaviour further by carrying out a second series of experiments in the natural habitat of this mouthbrooding cichlid, off Thumbi Island West in the southern part of Lake Malawi. Two populations of *P. aurora*, differing in the average numbers of egg-spots possessed by their males, were used to stock cages, such that the males had no, one, two, three or four egg-spots. The numbers of subsequent successful spawnings and incubations were then monitored for several weeks.

As in the laboratory, females were stimulated to spawn more frequently by males with relatively more egg-spots. As these markings consist of carotenoids, Hert suggests that they probably provide an indication of the nutritional status of the male which is used by the female when making the important choice of a suitable mate.

(**Source:** *Journal of Fish Biology* **38**, 951-953.)

A QUESTION OF TASTE

While we humans only have taste buds in our mouths, many fishes have them in places where we do not even have places! External taste buds on the body surface are particularly common in the ostariophysan fishes such as siluroids and cyprinids. Andreas Gombahr, Margit Palzenberger and Kurt Kotrschal, of the University of Salzburg, Austria, have been looking at the density and distribution of external taste buds in 10 European cyprinids.

To take just one example, when examined by electron microscope, the Common Minnow (*Phoxinus phoxinus*) was found to have a complex array of taste buds over various parts of the body. In a region just below the mouth, taste buds were found at a density of 297 (yes, two hundred and ninety seven) per square millimetre (that is, approximately 180,000 per square inch!) Taste buds were also present on fins, with the pectorals having densities of 138 per square millimetre.

Among the 10 species investigated, external taste buds were most numerous in bottom dwellers such as White Bream (*Blicca bjoerkna*) and least abundant in surface dwellers such as Sabre Carp (*Pelecus cultratus*).

(**Source:** *Environmental Biology of Fishes* **33**, 125-134.)

HARRY GRIER/FLORIDA TROPICAL FISH FARMS ASSOCIATION

In mouthbrooding cichlids (this is a male *Neochromis nigricans* from Old World Exotic Fish in Florida) the number of eggspots in the anal fin of the male (this specimen has three) is directly linked to spawning success.

Focus on: Foods & Feeding

Tackling Finnicky Feeders

Often dubbed the 'Agony Aunt of Fishkeepers', **Dr David Ford** receives thousands of letters from aquarists with problem fish. In addition to helping *A & P* readers, he runs the 'Aquarian' Advisory Service which handled over 10,000 letters last year! A fair proportion of these requests for help was about fish that would not feed, so David was the ideal contributor to handle the subject of finnicky feeders. . . .

Photographs — unless otherwise indicated — by the author

Fish are so greedy that any fish not feeding must have a problem. Most species have a very good method of eating (I wish we had it): they eat continuously, digest what they need and excrete the rest. This is based on opportunist feeding because many foods in the wild are seasonal or transitory.

Carnivores will stuff themselves; some fish can swallow another that's larger than themselves! Herbivores will browse continuously; goldfish have been called 'underwater cows'. Earth Eaters (*Geophagus*) will recycle food like a rabbit eats its droppings. Most fish are omnivorous, though, and will swallow anything biological, letting the digestive system sort it out. Therefore, the vast majority of our ornamentals do not have a feeding problem and readily accept modern commercial fish foods, which are researched to be nutritionally perfectly balanced. You really do not need supplemental feeds nowadays. This being the case, fish that refuse to eat what is offered are usually ill.

A few species are specialised feeders and these will be listed later. Some, such as the Oscar, Discus or Redtailed Cat, are moody fish and can have a hunger strike as a protest. So think about the reason for the fish refusing food before deciding what remedy is necessary . . . just piling extra food into the water will probably exacerbate the problem, not cure it.

DISTRESSED FISH

The classic symptoms of a systemic disease are anorexia (the medical term for loss of appetite) with isolation (the fish no longer swims with the pack), followed by clamped fins and shimmying (swimming on the spot, by means of undulations), cloudy eyes (osmotic problems) and then gasping (lack of oxygen) and death. To save a sick fish in the latter stages is most unusual, so early diagnosis is essential, and the first symptom to look for is lack of appetite.

Set up a hospital tank for the sick fish. Little or no cost need be involved, since a simple goldfish bowl will do, placed in a warm room if a heaterstat is not available. Add a plastic plant or plant pot cave so the fish has somewhere to hide, and then consider what is wrong for appropriate treatment. If the fish has poor appetite but will take a little food, a course of antibiotic-treated flake or pellet may be required. If the fish is completely anorexic, the water itself can be dosed with antimicrobials, etc. It does not matter that food is not taken. Fish have enough reserves (stored as oils, rather than fat) for many weeks. Even a small tropical fish can live for 6 weeks without feeding.

Once the disease is cured, feeding returns immediately.

A specialist feeder: The American Lookdown which feeds off the bottom.

A different disease is irritation and, hence, stress from ectoparasites. A fish affected by White Spot, Fungus, Velvet, or Gill Fluke, may become anorexic from sheer misery. These parasites are easy to identify and treat. Again, once cured, appetite returns.

If all the fish in a community aquarium show poor appetite, the water quality must be suspect. A chemical check on the water is

essential, especially nitrite levels. *The solution to pollution is dilution*, so do carry out lots of partial water changes and make sure the biofiltration system is adequate. Do not feed the fish at all until the water is good and the fish happy again.

UNHAPPY FISH

Any experienced aquarist will confirm that fish have personalities, some are bullies and some are timid, even if of the same species. New additions to a community tank may feel disorientated and travel-weary (they may have just travelled from Singapore, let alone from the High Street). The bully soon recovers, but the timid fish may remain an outcast from the community and will have poor appetite from the consequent stress. Again, you have 6 weeks to sort things out. 'Rearranging the furniture' can help take the minds of the old fish off the newcomer. [*In the tank, NOT the home . . .! I don't know though . . .?!* **Ed.**]

The victim of the bully may also starve to death, not just from stress, but also from actually having all its food taken away. What is happening is obvious, so do watch the fish at feeding time, rather than just sprinkling in flakes and walking away. You can hand-feed individual fish if necessary, but the only sure way of curing a social problem is to remove the bullying fish, rather than the victim.

DIFFICULT FEEDERS
Special Cases

Some fish have mouths adapted for special feeding, such as the Longnose Butterfly for poking into corals, or the 'plates' of the Triggerfish for crushing coral, the 'needles' of the Piranha for biting, or the upturned mouth of the Molly for eating surface insects. Commercial flake food is ideal for all these because it is presented in a form that can be ingested by any of these mouths. The adaptations are collecting mechanisms, rather than eating devices . . . the flake supplies the consequence of food searches and is readily swallowed.

However, if the fish is on hunger strike and the reasons have been tackled without success, the presentation of food can help restart the appetite. Flake can be blended with other foods to give the necessary nutrition in a way that is attractive to the species.

For example, gelatine or carrageenan from the food store (sold for making jellies and glazes) dissolved in hot water can be blended with minced shrimp, crab or prawn and flake to make a paste. Paint this onto a piece of bleached (or artificial) coral so that it sets as it cools. Longnoses will peck at this flavourful delicacy, but remove it after feeding so that water quality is not affected.

Herbivores

For the herbivores make a gel paste of minced boiled peas, spinach, lettuce and, again, a few flakes of fish food. The reason for boiling (or just scalding) is to break down the cellulose in the vegetables.

A genuine finnicky feeder, the Seahorse only eats food that passes its nose.

Addition of gelatine, etc, will also allow a lump of the food to be left in the tank for the fish, but allows easy removal if uneaten within an hour.

Carnivores

For carnivorous fish, a chunk of fish fillet, or a whole shrimp, can be cut with a sharp knife and a flake inserted.

Use a pair of aquarist tongs (rarely seen these days! — they are long, blunt-nosed scissors) to drop the chunk near the fish, or entice it by making the chunk dance in front of other fish. You cannot do this by hand . . . the large human hand looks too much like a shark's mouth and the biter feels it is about to be bit!

Omnivores

For omnivores (the majority), there is no limit to the foods you can use to tempt a poor appetite. The rule is, if you can eat it, they can eat it.

Certain foods are unsuitable for fish because they contain hard animal fat, e.g. burgers, hams, sausages, dairy products, etc. However, since we are tempting a jaded appetite, rather than giving a routine diet, it matters not. Once the fish has started eating again, revert to normal fish foods.

Choose a chunk, sliver or paste form, according to the size and shape of the fish's mouth. Try white fish and oily fish, any shellfish (especially mussel), raw meats (especially liver), vegetables, fruit, cheeses . . . anything that may stimulate the taste buds of the fish.

Do remove anything that fails quickly, certainly within the hour, because leached nutrients may give a nitrite crisis, thus adding to the fish's problems.

SPECIAL FISH
Discus

The most common problem fish in my mailbag on feeding is the Discus. It is so temperamental, that hunger strikes often occur. The reason for the fish's distress must be tackled first but, thereafter, tempting the appetite can begin.

All the above comments apply, but the scrap foods are best cut into worm shapes because that is their natural diet.

Oscars

Oscars are the next species that refuse food if it suits them. As with all others, it is necessary to discover what is wrong. This could be anything from cigarette smoke to noise from the television (from actual cases investigated), in addition to water quality or unsuitable companion fish.

One trick used by breeders (if you can bear to do it) is to add baby fish to the aquarium to tempt the Oscar to eat them. It is no use adding a Guppy or small goldfish (runts, of course) because Oscars are wily . . . they will allow the odd fish to co-habit, so others will assume it is safe and join the shoal . . . the Oscars then eat all but one!

Red-tailed Catfish

Redtailed Catfish are considered difficult feeders and it is the most common subject

The inside of a Lionfish's large mouth showing how swallowed fish can only go one way!

found in the pages of the Redtail Catfish Club journal (**RTCC, Dave Sands, 4C Bannister Hall Drive, Higher Halton, Preston, PR5 4DE** for details).

This Catfish is a true predator and needs a huge, chunky feed that will be digested over several days. The problem then for the owner is that the fish excretes massively too, creating a sudden drop in water quality. The fish responds to this by going into stress and refusing the next large meal offered. Obviously, the problem is not the food offered, and this will be accepted once more when the water quality has been dealt with.

LIVEFOODS

Only if all else fails should aquatic worms such as *Tubifex* and Bloodworm be fed. Although these are the first items some books recommend, they are the least suitable. All aquatic live foods carry bacteria, especially *Aeromonas* spp, and many carry spores of White Spot, Fungus and worst of all, internal parasites such as Tapeworms. It is only worth the risk if all the other foods fail.

Live foods are a good choice for tempting difficult fish, so another method is to feed non-aquatic live foods to avoid the parasites and diseases. Cultivated worms such as Grindalworms, Microworms and Whiteworms are safe. Also, small red garden earthworms and non-hairy caterpillars, as well as green, black and whitefly from unsprayed plants.

Daphnia is also a popular choice to tempt the fish, but, again, there is a real risk of infestation. Home-cultured *Daphnia* is a possible choice.

The best alternative is Brine Shrimp hatched from eggs and raised to a suitable size . . . kits are available for this.

FEEDING TECHNIQUES
Feeding Fish

How do you persuade a reluctant feeder? One successful method is to use a feeder fish. If a temperamental specimen is on hunger strike, especially if it is a wild fish newly-brought into the aquarium world, the addition of a greedy fish, or shoal, will trigger a feeding response.

A familiar sight for Koi keepers is the way the water 'boils' at feeding time when a young family of Koi are fed. The reason they all rush to the owner simultaneously is that the first fish to see and smell the food puts out an external 'food available' hormone, called a pheromone; just a few molecules are all that is needed to trigger a feeding response in other fish. Barracuda, Piranha and certain sharks are other examples of the frenzied feeding response. Therefore, a feeder fish added to the aquarium may trigger feeding behaviour in a reluctant fish.

Mouth Position

Always check the position of the mouth in fish. In general, upturned mouths indicate surface feeding, forward mouths free-water feeding and a downturned mouth bottom feeding. So feed accordingly.

Digging for earthworms — a safe livefood.

Brine Shrimp culture in an old Coca Cola bottle. Brine Shrimp are ideal for difficult feeders.

The ultimate method of feeding fish — by hand (and in their element) — at the Shedd Aquarium in San Francisco.

Place a flake flat on the surface for the top feeder (most brands will float quite some time); insert a flake sideways into the water so it sinks by the fish for middle water feeders, pre-wet some flakes for bottom feeders, or use a tablet food (best placed on a small plate for easier removal if uneaten).

Nocturnal Feeders

I sometimes receive letters about a species that appears never to eat but remains healthy. Usually, the quoted species is a nocturnal feeder — many catfish are nocturnal, even the popular *Corydoras*. Therefore, the aquarist has a fish that survives on scraps found overnight. The best advice here is to give a small feed at lights-out.

Fry

Fry can be difficult to feed. Water pollution is the main danger, because lots of micro-food will pollute the water very quickly. Always use a filter, especially a gentle bubble-up foam type, to clear the water of micro-food particles.

A drip feed of infusoria is the best first food, followed by freshly hatched Brine Shrimps and then commercial fry food or crushed flake food.

If the sudden arrival of a large family occurs, an emergency fry food is 'Aylott's Soup' which is so attractive it can also be used to feed fry of problem fish.

Collect a few garden earthworms (the small red variety are best . . . if unavailable, try the angling shop). Grind them up with a mortar and pestle (the cook shop sells these) or better still, use a kitchen blender (grounds for divorce, so get your own!). Blend with a little water and allow the paste to settle. The meaty morsels float and the soil within the worms sinks. Skim off the floating meat and feed direct to fry . . . they cannot resist the strong flavour.

THE FINAL SOLUTION

For large valuable fish there is one final solution to the problem of anorexia . . . force-feeding. This requires a vet to anaesthetise the fish, after which a nutritious paste of raw liver, fish fillet and flake is inserted into the fish's gut via a catheter. This method is also used to introduce antibiotic feed into valuable Koi suffering from advanced ulceration.

In general, however, it is rare to find food refusal a problem; usually, it is overfeeding that is the problem. The fact is that fish look so hungry and appealing everytime one approaches an aquarium that the new amateur aquarist responds (quite understandably) by giving food. The fish just digest their usual needs and the rest passes through, polluting the water.

So never leave a non-aquarist neighbour or friend to feed the fish while you are away. Let them starve, just as occurs in nature when food is scarce; they have plenty of oil reserves to sustain them pending your return one or two weeks later . . . or use a proper commercial fish feeder.

Books & video

Three Further Discus Books From T.F.H.

1. Discus Health

By: Dieter Untergasser
ISBN: 0 86622 170 0
Price: £39.95

2. Singapore Discus

By: Dr Clifford Chan
ISBN: 0 86622 171 9
Price: £20.99

3. Discus for the Perfectionist

By: Jack Wattley
ISBN: 0 86622 168 9
Price: £12.95

Just when you thought it was safe to catch your breath and begin to feel that your Discus book collection was up to date, along come T.F.H. with another three books on the subject! And, these are not 'shelf-fillers' either. . . . In their own specific ways, all three books make worthwhile contributions to the Discus hobby.

Discus Health (Selection, Care, Diet, Diseases and Treatments for Discus, Angelfish and other Cichlids) — to give it its full title — is 416 pages in total length . . . far too 'substantial', of course, to concern itself specifically with Discus and nothing else. After all, there can only be *very* few diseases (none that I know of, in fact) that will affect *only* Discus. Therefore, quite rightly, in my opinion, the publishers have set out to produce a comprehensive book that applies to other related species as well.

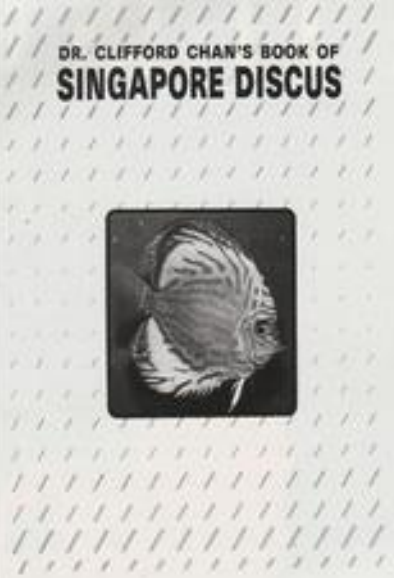
Dieter Untergasser is, by now, well known to many English-speaking aquarists, particularly after his very useful *Handbook of Fish Diseases* (also published by T.F.H.). Those familiar with his work will therefore know what to expect, i.e. a competent, thorough, comprehensive approach to the subject matter in hand, accompanied by some excellent microscopic views of pathogenic organisms. In *Discus Health*, this approach is widened to include a large selection of Discus photographs, most of which are perfectly relevant, but some of which don't appear to play any significant role, other than as useful caption 'hooks'.

Dealing with *health* (as opposed to just *diseases*), this impressive tome also tackles proper aquarium maintenance, hygiene, biological filtration, nutrition, environmental factors, prevention of disease and other topics bearing direct relevance to the welfare of fish in aquaria.

The author has also included a welcome 'Note of Caution' at the beginning of the book about safety, precautionary measures, etc. To this I would add that brand names used in the book will not necessarily be relevant with regard to equivalent products in the UK, where restrictions on the availability of some of the medications will also apply.

English-speaking readers (or perhaps, more correctly, non-German-speaking readers) will be a little disappointed to find that only two out of the 62 references in the Bibliography are in English (one of them being Dieter Untergasser's own aforementioned book). Nevertheless, *Discus Health* is a most useful book to have at one's disposal and, in my view, is both interesting and well worth the cover price.

Singapore Discus appealed to me for very different reasons, many of them directly



linked to my interest in the ornamental fish industry of the island.

I therefore found the book quite absorbing, even though I did think that some of the photographs were a bit repetitive. What particularly appealed to me were the four chapters on individual Singapore Discus breeders. They captured the 'essence' of fish breeding Singapore-style in a way that other books have been unable to do and, for this alone, *Singapore Discus* is worth its £20.99 cover price.

There's much more in this readable book, of course, including a very interesting discussion on hormone-induced colours. So, if you've already got a book on Discus care and breeding and would like to gen up on Discus produced in countries other than the US and Germany, then *Singapore Discus* will go quite a way towards achieving this.

Discus for the Perfectionist is another Discus book 'with a difference', the 'difference' this time lying in the approach adopted by the author. The Question/Answer format in which the text is presented is not new, of course . . . but it's very successful, as our own *Aquarist & Pondkeeper* Q/A **Supplements** and features have proved in recent years. In *Discus for the Perfectionist*, Jack Wattley drew up a list of 'key questions' dealing with Discus breeding and maintenance, devised a questionnaire, and invited some (most) of the leading figures in the Discus world to supply their own personal answers.

The subjects he chose were: Purchasing Discus, Food, Water, Light, Filtration, Aquarium, Breeding, Diseases, Most Important Factor *(in Discus cultivation)*, Long Range Future of the Discus Hobby, New Colour Varieties, and a final question — appropriately entitled, Finally — in which those questioned were given the opportunity of raising points which they felt had been omitted from the questionnaire.

The list of people to whom the questionnaire was sent reads like a 'who's who' of Discus keeping/breeding and includes Schmidt-Focke (Germany), Nakamura (Japan), Chan (Singapore), Gobel (Germany), Au (US), Eberhard Schulze (our own *A & P* Discus expert), and others . . . but, interestingly, no Bernd Degen (although lengthy reference to him is made between pages 76 and 80).

The end result of Jack Wattley's exercise is a very useful, fascinating insight into how various experts go about keeping and breeding Discus. Having said this, and at the same time applauding both the author and T.F.H. for adopting this bold approach, I feel that the potential of the Q/A format has only been partially exploited.

My very first book was a Question/Answer one which proved so successful that we subsequently adopted the formula at *A & P* for what turned out to be highly popular **Supplements** in 1990 and again in 1991. The scope of this approach is exceptional and its reception among aquarists and pondkeepers very high. It is therefore a bit of a shame that more was not 'extracted' from the format in *Discus for the Perfectionist.*

Despite this, enough was obtained, in terms of personal responses to the questions Jack Wattley provided, to render the book a most useful contribution to the ever-expanding body of good Discus literature.

John Dawes

Aqualife Guide to Fishkeeping

Price: £12.95
Videopoint,
5 King Charles Place,
Emerald Quay, Harbour Way,
Shoreham Beach,
West Sussex BN43 5JH.

Faced with introducing the hobby to a complete novice (not just the theory, but also the practice) in half an hour, what would you say, what would you show and what would you leave out? These are the questions that anyone producing a video programme has to decide at the outset. (The main problem facing the reviewer is to try and put oneself into the 'complete novice' frame of open-mindedness).

This particular video takes the viewpoint of a would-be customer entering a comprehensively-stocked aquarium store and proceeds to help you sort out the necessities from all the available options to get started. As the commentary points out, all the basic decisions as to what size tank, what collection or fish you want to keep, etc, should be taken before you part with the cash.

The main areas discussed are: 1. Choosing the Tank; 2. Filtration; 3. Heating; 4. Decoration; 5. Lighting; 6. Choosing Fish; 7. Feeding and Maintenance.

Each sector covered contains good basic reasoning, but the limited time-scale allotted leaves little room for in-depth explanations. The Filtration sector actually omits chemical processing, and lacks a warning against the dangers from non-colourfast coloured gravels. However, the setting up of under-gravel system is clearly demonstrated.

It is nice to see that latest types of heaters are featured, but no guidance as to correct sizing for tanks is given. I don't know if the 'hi-tech' equipment shown included the wristwatch worn by the demonstrator — I only hope it was still working after he had filled and planted the tank!

No definite species of fish to buy are advised, and warnings against buying without finding out fishes' suitability for community collections are well-pointed; some experienced hobbyists might argue over the, now - unfashionable one - inch - per - gallon method of calculating stocking levels.

This logically-put-together video provides nearly everything the newcomer should know, and answers most of the questions likely to be forthcoming by the uninitiated. The one thing it seemed to lack, for me, was a sense of excitement or enthusiasm, but then it's easy to criticise with hindsight. On a more constructive note, as a rented video on a 'look-before-you-buy' arrangement (or even as a deposit against any eventual aquatic purchases), this is well worth looking at.

Dick Mills

New Book News from Steven Simpson Natural History Books
Inland Fishes of India and Adjacent Countries

By: P K Talwar & A G Jhingram.
1992, 18 x 235cm, 1,177pp, 500 illustrations, 2 colour photo plates, cloth.
Price: £100 post free.

Nowhere in the world is a zoogeographic region so blessed as the Indian sub-continent in respect of its diversity of freshwater fish life.

This book describes the 930 recognised species that teem in the inland waters of India and adjacent countries (Pakistan, Nepal, Sri Lanka, Bangladesh and Burma). It is the first completely up to date comprehensive treatise of the freshwater and estuarine fishes of the South Asian region.

The core of the book is its systematic section which provides (for each species) data on diagnostic features, colour, size, geographic distribution, biology and abundance. The wealth of illustrations facilitates the quick identification of particular species. The dramatic advances of ichthyology have resulted in this present volume describing almost 1.25 times as many fishes as Francis Day described in his classic work over a century ago.

Supplemented by a comprehensive reference list, a glossary of scientific terms, and indices for common and scientific names, this book is an indispensible work of reference for everyone whose profession or hobby concerns freshwater fishes. Naturalists, environmental scientists and planners interested in the inland fishes of the South Asian region shall also find this book useful. It has been written with the problems of species identification and taxonomy very much in mind.

Available from: Steven Simpson Natural History Books, PO Box 853, Brighton, BN1 5DY. Tel: 0273 727328; Fax: 0273 203754.

Focus on: Foods & Feeding

More than just flying food

As German aquarist and biologist **Magnus Hornung** reveals, flies are much more than merely mouthfuls for fish and reptiles.

Photographs by the author — text translated by Mary Bailey.

Adult flies of *Drosophila melanogaster* (greatly enlarged).

It is well known that flies are as numerous as grains of sand on the seashore, and anyone who lives in the countryside will have questioned more than once the existence of those hordes of Bluebottles and Houseflies which get on the nerves of men and beasts alike. But man is aware of only a very few species, and no-one knows what a huge number of species of flies there are in nature, or how they have managed to occupy almost all areas of the insect world.

NUTRITIOUS FOOD

The 'family' of flies has evolved so widely that they are found in almost every biotope. So it comes as no surprise that, for many life forms, they are quite high on the menu. Because of their size range, from a few millimetres to several centimetres, there is a mouth-sized morsel to suit every appetite.

Their nutritional value is not to be underestimated either. The fly musculature is rich in protein, the haemolymph (the body fluid which carries nourishment round the fly's body) is rich in minerals, vitamins and carbohydrates, as flies, especially those which are used as food animals, feed mainly on nectar and pollen. The chitinous armour is outstanding in roughage, and the rest of the entrails supply essential fats.

Catching flies

During the warm part of the year one can catch flies in many places using specially designed traps. The best ones are commercially available traps designed specifically for flies. A piece of sausage or fish is used as bait and the trap is placed in a sunny, but not too dry, place. Success will not be long in coming, and one will soon catch numerous flies of various sizes.

To most people, this Bumblebee Hoverfly *(Arctophila fulva)* is indistinguishable from 'the real thing'.

The offspring of the Mourning Hoverfly *(Anthrax anthrax)* live inside the larvae of Caterpillar-flies which, in turn, have attacked butterfly caterpillars. A parasite within a parasite!

With its long proboscis and acrobatic flight, the Wool Hoverfly *(Bombilius major)* does not need to land on a flower to obtain nectar. It merely positions itself in front like a hummingbird and fills its belly. Its larvae, though, grow up inside young locusts.

Breeding flies

Moreover, flies are easy to breed and thus can also be available during winter.

Often a good culture of tiny Fruitflies *(Drosophila)* contributes in major part to the successful breeding of small frogs, newly hatched chameleons, or *Phelsuma* (Day Geckoes) and may be the factor that makes such breeding possible at all. In addition they find grateful takers in almost all fishes. It is particularly fortunate that the small Fruitflies are a favourite object of research, and that scientists have bred a form which is flightless. This makes the organisation of a breeding programme much easier.

Many small surface-dwelling fishes, eg Hatchets (Gasteropelecidae) and also young Flag Cichlids *(Mesonauta festivus)* 'go mad' when one scatters a handful of these flies on the water surface.

Breeding the larger types, for example Houseflies (Muscidae) or the fat Bluebottles (Calliphoridae), can generally be achieved without great difficulty. By controlling their diet one can adjust the intake of vitamins and other items by one's pets. During illness, or as a preventive, this can be a great help.

Culture methods

There are two possible methods of establishing such a food source. One can catch breeding stock using the fly-traps mentioned above and put them on a food medium. Soon they will lay many eggs, which hatch into larvae (which can also be used as food). However, it is easier to buy a jar of fly maggots as sold as bait for anglers.

One puts the maggots in a container (eg a marmalade jar or similar) whose lid is pierced with a hole blocked with a wad of cotton wool. When the flies hatch they can be fed through the cotton wool with milk mixed with vitamins or other substances. If they are to be used to administer medication, it is important that the flies are fed immediately beforehand, as they will otherwise adsorb the medication into their systems and thereby render it useless.

After a brief chilling in the fridge, the flies become lethargic and can easily be added to the appropriate aquaria and terraria without them flying away.

ECOLOGICAL ROLES

Those who are not converted 'Fly-Feeders' generally regard flies as extremely dirty insects on account of their normal haunts. Often one hears the partly understandable verdict of vermin, followed by a hectic chase, armed with a fly-swatter.

In fact, however, flies, together with butterflies, bees and ants, play an important part

in the ecological system, only we know less about it. In particular, the reproductive behaviour of flies and their extremely interesting biology is largely unknown.

With 85,000 species the flies are, after the beetles and the 'membrane-winged' insects (bees, ants, etc), the third most successful order of insects, and many experts are of the opinion that the heyday of the flies is yet to come.

They are distinguished from other winged insects by the fact that the rearmost of the normal two pairs of wings has developed into the halteres ("vibrating little flasks"), and thus they have attained the heights of flying skill with only two wings, hence their scientific name Diptera (Two-wings).

Because of their enormous adaptability, the flies (including gnats and mosquitos) have encompassed almost all the possibilities of the insect world, so that we would scarcely notice if there were no longer any other insects — with the exception of the honeybees.

They have not only captured the imagination of zoologists with their physiological capabilities and refined reproductive strategies, but they also have something to offer in the field of beauty. Thus, some of the Hoverflies (Syrphidae), which constantly buzz around the flowers, are so brightly coloured that one might, with justification, identify them as Butterflies.

Mimicry

Often flies are luxuriantly covered with hair and can easily be confused with bees, bumblebees or wasps. A strategy adopted by numerous families of flies, in order to evade predators, is known among scientists as mimicry. Hoverflies feed on nectar and pollen, and are thus often found on blossoms, where one notices their presence mainly because of their buzzing. Their rapid flight is one of the absolute peaks of achievement in the entire animal kingdom.

In nature they perform an extraordinarily large number of varied functions, chiefly because their life as flies is preceded by a period as larvae, during which they perform completely different functions.

Pollination and predation

The larval stage of some Hoverflies assists in the destruction of colonies of leaf-bugs, while the adult is an eager visitor to flowers and so plays an important role in the pollination of many blossoms.

In mountain ranges above 3000 metres, together with a few other insects, they perform the role of honey bees — absent in these regions — and thus permit the survival of high alpine plants.

Migration and parasitism

Some, eg the Half-moon Hoverfly (*Scaeva pyrastri*) are migratory, very much like some birds, and can easily traverse the North Sea.

Others have developed their reproductive strategies in unusual ways; for example the so-called Caterpillar-flies (Tachynidae), the

A 'Fat Buzzer' (*Cynomyia mortuorum*) — well-known in outside loos on mainland Europe! However, they feed on nectar.

The Yellow Dungfly (*Scatophaga stercoraria*) lays its eggs in still-warm cowpats. The flies themselves feed on nectar or catch other small insects.

The Carrion Flies (family Scatophagidae) don't lay eggs. They produce larvae which they deposit on carcasses.

scourge of many butterfly caterpillars. These flies lay their eggs either directly on a variety of caterpillars, or else on the special food plants which the caterpillars devour. The butterfly caterpillars, which can, by sheer force of numbers, effect a dreadful denudation on vegetation, are penetrated by the newly-hatched larvae of the Caterpillar-flies, or consumed together with the food plants by the caterpillars; the larvae then consume the caterpillars from within. In this way, they represent a natural control on this voracious army.

But the larvae of the Caterpillar-flies are themselves threatened by another fly. This is the Mourning Hoverfly (*Anthrax*), which, by some as yet unexplained process, introduces its offspring into the larvae of the Caterpillar-flies, which, themselves, in turn, parasitise the caterpillars of butterflies. This phenomenon is termed *hyperparasitisation* and is a striking example of how complex ecological relationships can be.

Ambushing

Another family of flies, the Robber-flies (Asilidae) are in competition with the spiders. Here, together with many species which remain small, we find, in the Murder-Fly, the largest of all European flies.

They lurk in the vegetation, lying in wait for insects flying by, and overpower these by a swift flying sally, disabling them with a prick from the powerful proboscis and eventually sucking them dry at their leisure. Nothing escapes their attack, and they do not know any fear even when capturing wasps. Often, they will also seize worthless items such as flying seeds or falling leaves.

Mixed feeders

Other species of flies, for example the Dancing Flies (Empididae), also catch other insects. Here it is mainly the females that go hunting, in order to improve egg production through a protein-rich diet. The males are flower-feeders and, only at mating time, do they catch an insect, which they offer to the female as a wedding present.

Waste recycling

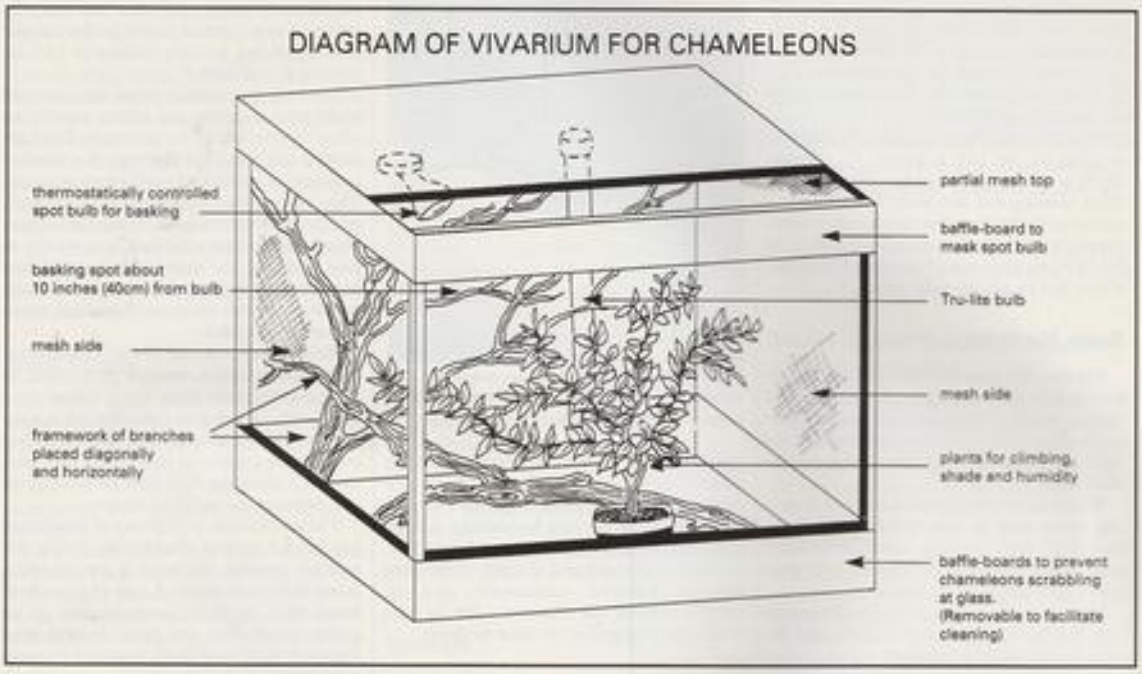
Many species of flies, especially through the lifestyle of their larvae, are responsible for the recycling of the waste products of plants and animals (humans included). The flies known colloquially as "Fat Buzzers" (Calliphoridae), the Yellow Dungflies (Scatophagidae), and the Carrionflies (Sarcophagidae), to name but a few, are particularly active in this role. Because they breed in excrement or carcasses, they permit a rapid return of vital organic matter to the food chain, and this is of tremendous significance in the natural cycle.

In warm countries there may be a million fly maggots devouring a dead horse within a week, and their role is no less important than that of the vultures, well known as 'health officers'.

Other species of flies live on decaying wood, on plant wastes in water or on land, and thus, in much the same way as earthworms, assist in the creation of humus.

CLOSING THOUGHT

The multiplicity of flies, only a tiny part of which I have been able to discuss here, shows that, like any other creature, they have a fixed place in the scheme of living things, and that, because of their remarkable abilities and their huge numbers, they have a fundamental significance in the functioning of ecological systems. I think they deserve our recognition . . . and not just as 'flying food' for our fishes, amphibians and reptiles.



SUCCESS WITH CHAMELEONS

Part 2

Robert and **Valerie Davies** continue with their expert guide to Chameleon care.

Photographs by the authors

The 'accommodation' requirements of chameleons are: adequate space for the species, adequate ventilation but sufficient humidity, correct temperature range, a hot spot and a cooler area, and some privacy if the animal wants it, so these factors must be borne in mind when designing a vivarium. Minimum vivarium sizes and temperature ranges for each species were given in Part I (January 1992). Obviously, baby specimens can be housed in quite small vivaria, and transferred as they grow (see section on **Breeding and Rearing — Part 3**).

VIVARIUM DESIGN

The type of vivarium we have used successfully has one side of ⅛in (0.3cm) plastic mesh; one-third of the top is also mesh, while the front is a sliding glass panel. The base, side and two-thirds of the top are of plastic-faced chipboard. The second side could be glass instead of chipboard, but since ours are double units, the chipboard is necessary to prevent neighbours seeing each other (chameleons have good eyesight and can spot rivals and other species at some distance. Therefore, to avoid stress, they are better out of sight of each other).

Humidity

Since a humidity of some 50-60% is desirable, the mesh would seem to be counter-productive, but good ventilation is necessary to prevent wet, stagnant areas forming, as these would only encourage bacterial development. Providing sufficient humidity can be a problem and needs regular attention. We spray the cages twice a day and try to maintain the substrate in a humid, but not sodden, condition. Living plants can also help to maintain humid conditions. **N.B.** When spraying, avoid water contact with the chameleons as they dislike this intensely.

The base of the vivarium must have a baffle-board to retain the substrate and it must be high enough to prevent the chameleons scrabbling at the glass, which even captive-bred specimens will do. A similar board at the top of the cage will mask the spot bulb.

The base of the vivarium is lined with polythene to prevent moisture affecting the chipboard (any joins can be sealed with silicone sealer). Another possibility is to use a plastic plant tray as sold in many garden centres, a method which facilitates changing soiled medium and prevents moisture contact with the chipboard.

Light and Hot Spots

The majority of chameleons like to bask in the early morning, so a hot spot is provided by a thermostatically controlled spot bulb in a 45° batten fitting. Each vivarium is provided with a Tru-lite tube fitted vertically towards the back. Although not as effective as natural sunlight, it does seem to benefit the chameleons.

The vivaria are lit from about 8 am until 10 pm during summer, decreasing in winter from 9 am till 6 pm, according to species. Chameleons enjoy sunlight even through a window, although glass filters out the UV. However, care must be taken to avoid overheating.

Furnishings

Our vivaria are furnished with a skeleton framework of dead branches, preferably placed horizontally or diagonally. The branches must not be too thick or too thin —

some variation in diameter helps to exercise chameleons' feet. Thin branches can cause foot problems and allow the claws to become overgrown. The majority of branches should be of such a diameter that the chameleon can comfortably grip them.

Branches with very rough bark should be avoided, as we had a female *C. johnstoni* develop lesions on the underside of her feet. After treating the feet with Tamodine and exchanging the branches for smoother ones, the problem cleared up within a few days. At the time, we were using branches of *Forsythia* which has an almost scaly bark.

Base Medium

Finding the most suitable medium for the base can be difficult, since chameleons will capture much of their prey such as crickets on the floor of the vivarium, and pieces of the medium may adhere to the tongue and be swallowed.

We are currently experimenting with various types, such as peat covered with large shredded bark, potting compost covered with large crushed limestone, and peat covered with sphagnum moss.

Prey, such as crickets, will often disappear into the medium before it is eaten and the cage could become infested, which is not desirable. Provided there is adequate ventilation, the substrate can be kept wet enough to deter crickets from burrowing.

For a quarantine cage, newspaper is suitable; it can be changed frequently and is easily disposed of.

Plant Cover

To provide some cover and humidity, living plants with a woody stem can be used, e.g. *Hibiscus*, Camelias and *Ficus diversifolia*. Plants with very large leaves should be avoided as they prove to be a barrier to movement. Trailing plants can be placed on small shelves and draped over the dead branches, or left to hang in a corner to provide privacy.

Ensure that plants are not too near the spot bulb. At least one branch must be directly in the beam of the spot bulb at a distance of about 25cm (10in) with a 40 watt bulb. This is the hot spot for basking. A large vivarium with a moisture-proof base can actually be planted and the top of the base medium replaced occasionally, but in smaller vivaria, the plants are left in pots which are plunged in the base medium.

Baby chameleons like this two-week-old *Bradypodion* (seen in the threatening posture) require suitably small first foods.

Spare Cage

It is advisable to have two cages for each pair of chameleons so they can be separated during periods of incompatibility, e.g. an over-amorous male may continually pester a female, while a gravid female will often repel a male in no uncertain terms. We have a *C. johnstoni* female that, when gravid, really gave the male a hard time and he had to be moved.

GREENHOUSE/OUTDOOR ACCOMMODATION

Possibly the ideal housing for chameleons is an outdoor enclosure or greenhouse which has been adapted. However, the vagaries of our climate mean that this can only be regarded as a summer home for the hardier species, unless you are willing to pay for heating it in winter.

Some of the more tropical species need night-time temperatures higher than those often experienced in our summers. Too high rainfall can also be a problem. Yet another problem is providing unfiltered sunlight. This necessitates a reasonably large mesh which enables food items to escape. Certain plastic materials are reputed to allow UV to pass through, but with such material, the greenhouse effect could cause even more problems, unless adequate shade and ventilation are provided.

Having said this, our Dwarf Chameleons spend the summers, weather permitting, in mini aviaries made from ¼in (c 0.6cm) wire mesh with a water-proof wooden top to keep out the rain. Some food is hand-fed, but other items are placed in a glazed dish on a shelf. Chilling the food first slows it down and prevents too rapid an escape.

The greenhouse, with plenty of ventilation has housed various chameleons during the summer months, the tropical species being taken indoors at night. A pair of *C. jacksoni* spent their summers quite happily in an aviary where flies and other insects were attracted by piles of fruit, meat, etc in mesh containers.

The outdoor enclosure can be stocked with shrubs, etc, preferably using those with small, well-spaced leaves, with dead branches also being used. Many chameleons show a preference for the latter. Concerning temperatures, in nature, some chameleons are subjected to quite high and low extremes. In captivity, these extremes are not desirable and should be avoided.

FOODS AND FEEDING

Maintaining chameleons is a demanding task, both in terms of time and effort. One cannot just throw a few insects into the vivarium and hope the creature will help itself as it would in the wild, and think that that will be sufficient.

Liquid Requirements

For a start, adequate liquid intake is vital. Very few chameleons will drink from a dish, as in the wild they lap dew or rainfall from leaves. In captivity, they will lap water which is sprayed onto their surroundings, but as this soon dries up, we find that they seldom get sufficient in this way. We therefore give each chameleon a daily drink using a hypodermic with a piece of catheter tubing.

Liquid multi-vitamin (BSP drops) is added to the water on a daily basis and this is also a convenient method of administering any medication which may be necessary. Some chameleons may shy away from the syringe at first, but if the water is slowly dribbled on the snout, or dripped onto a nearby leaf, they will soon come to accept it; some will even take the tubing in the mouth.

Since most chameleons drink very slowly, the water must not be squirted into the mouth; they will regurgitate it if too much

An adult *Chameleo oustaleti* male eating a locust.

goes down at once. With a little practice, one can learn to administer at the correct rate. It can be frustrating at times because a chameleon will often ignore the water at first and then, several minutes later, start to make drinking motions and will accept a drink if you try again.

An alternative method we have tried is setting up a drip feed which some specimens would use and others wouldn't. The main snag with these is that if it is constantly dripping, some form of drainage becomes necessary. One or two chameleons have actually adapted to drinking from a mouse/hamster bottle.

Solid Foods

As with most other lizards, food for chameleons consists of live insects. Several types of commercially bred insects are available and, although it may be beneficial to provide as wide a range as possible, chameleons will thrive on a basic three or four types.

Some chameleons may show individual preferences and may even undergo periods of refusing a certain type, while accepting others. We have had chameleons which would ignore surplus food which remained in the vivarium from the previous day's feeding, but would eagerly accept other items when offered.

Chameleons do not like a vivarium infested with insects and seem irritated if the insects are crawling over them. Some insects may even breed in the cage and the young escape to become a nuisance in the house, e.g. crickets.

Since most insects are deficient in nutrients, supplements must be added to the diet. This is done by dusting the food items with a multi-vitamin powder and adding liquid multi-vitamins to the drinking water. Powdered cuttlebone is also used for dusting food (especially for young animals and gravid females).

Most of our chameleons are hand-fed, either from fingers or forceps. Animals which are fed in this way will often accept insects which are dead. A further bonus is that, this way, the supplements are not lost as the insect runs round the vivarium. However, this method of feeding is not practicable for very young chameleons.

Having satisfied their initial hunger chameleons will then feed periodically throughout the day, picking off insects in the vivarium — therefore some food must always be available. We leave a few items in glazed dog bowls which have an incurved rim but some specimens, even if captive-bred, will not take food from a bowl.

The prehensile tail is used by chameleons to balance themselves and as an extra limb as they move between branches. In this case, a *C. hoehnelii* uses its tail to steady itself on a twig as it eyes a food item (out of shot).

Crickets (*Acheta* and *Grillus*)

These tend to form the staple diet. Some chameleons prefer one to the other. We feed our crickets on a specially-formulated cricket food, as well as wholemeal flour, tomato, orange, lettuce, carrot and small amounts of tinned cat food.

The gut content of the crickets may enrich their food value, providing vitamins, minerals, etc.

Locusts

These feed mainly on grass, bran and lettuce, so to increase their nutritional value, they must be dusted. We always hand-feed these to the chameleons, since if left uneaten, locusts will chew the foliage.

Waxworms (Wax-moth larvae)

Since these are nutritionally deficient and are difficult to dust, they form only part of the diet. For some lizard species they can be fattening, but we have found them useful for baby chameleons because they help growth, as long as other dusted items are provided.

The adult moths are relished by small chameleons and have often proved valuable in tempting a poor feeder. Their fluttering movement seems to act as a stimulus.

Mealworms

Most chameleons will readily eat these but they must never form a large part of the diet, as chitinous skins can cause digestive upsets. They can be given occasionally as a treat. The newly-moulted mealworms are more suitable.

Mealworms are low in calcium and difficult to dust, but can be fed on similar items to crickets before using.

Super Giant Mealworms (*Zoophobas* or *Morios*)

Large chameleons such as *C. ounaleti* will thrive on these. Others, such as *C. johnstoni* and *C. senegalensis*, can have newly-moulted specimens on an occasional basis. Remarks on mealworms apply to thse also.

Fruitflies

They are very useful as a first food for baby chameleons, starting with the wingless variety and progressing to the larger winged, flightless type. Adult Dwarf Chameleons will usually take fruitflies in addition to other foods.

This food item can be dusted by shaking into a jar with multi-vitamin powder.

Flies

Small to medium chameleons will feed eagerly on houseflies and bluebottles. They seem less inclined to take 'green' bottles. Although flies can be easily provided by purchasing maggots from an angling shop, they are nutritionally poor and are suspected of carrying disease.

They must obviously carry lots of bacteria because of the way they are bred and, although we have fed the flies to many lizards, we recently lost a male captive-bred Dwarf Chameleon and suspected either a pathogen or a poison carried by a green bottle.

Other Food Items

A useful food for baby chameleons, when available, is aphids (also adult greenfly). Hedge and meadow sweepings also provide many useful items, but there is always the problem of contact with insecticides.

Most chameleons like spiders, but these are only an occasional item. The larger species of chameleon are known to accept young mice and even rat pups, but understandably, some people would be reluctant to use such foods.

A food item we have sometimes used in an emergency is woodlice. These are usually taken quite eagerly at first, but then the chameleons begin to reject them.

The amount of food taken varies with individuals, and droppings can be quite copious, so frequent cleaning of the vivarium is necessary.

(TO BE CONTINUED)

'Well-filled' eye sockets — as seen in this *C. senegalensis* — indicate that this specimen has been fed on a well-balanced diet.

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.

DISCUS

SIZE v MATURITY

I have fairly recently obtained two Brown Discus about three inches long. I have been keeping them for three months now and they have started mouth-tugging and fluttering side by side. Does this mean I have been lucky and got a male and a female?

If they are a pair, is it possible for them to breed at this age? If not, at what age are they likely to start breeding?

Mouth-tugging and fluttering side by side are not infallible ways of sexing your Discus since specimens of the same sex will also go through this ritual from time to time. It has often been considered to be a ritual involved with establishing dominance.

This can be observed when three Discus are put into an aquarium and their sexes are known to the keeper. The two Discus of the same sex will usually fight, i.e. mouth-tugging and fluttering side by side, until one is completely dominated by the other. This behaviour can carry on for many days, or could be over within a few hours. The weaker fish will give in and usually go into 'its own corner'. The stronger fish will join the other of the opposite sex and a sexual bond is formed. When this happens, it is advisable to remove the dominated fish from the aquarium.

S. JAMES NEALE

Spawning Discus. Size is not usually a good indicator of maturity.

This method is used all over the world by Discus breeders to establish the sex of certain fish when they are sexually mature at around one year to 18 months. One 'unknown sex' Discus is kept with a 'known sexed pair' and observed. It always works and is a very reliable method. It happens equally between two males or two females.

The same behaviour can also be observed in younger fish, even those as young as only a few months, and will usually carry on all through their adolescent life. In very young Discus of just a few months, it seems that the dominant fish is usually a male.

I would have thought that a three-inch (c 7.5cm) Discus is too young to breed, but age will always be a much more reliable pointer to their state of sexual maturity. Three-to four-inch (c 7.5-10cm) Discus have bred and raised their young, but their small size is usually the result of being stunted; their size is no indication as to their age.

Discus breed at around one year to 18 months, when they should have reached a size of around 5 to 5½ inches (c 13-14cm), if kept in a healthy and happy environment.

TROPICAL

TUMOURS AND BENT SPINES

My female Platy has developed a nasty-looking growth near her caudal fin, and a female Guppy has her body at an angle, and has been like this for some three weeks.

Both fish have continued to exhibit normal behaviour and are feeding well on a good and varied diet. I have been hand-feeding the latter, but both affected fish attack the food with vigour. All other fish in the tank appear to be in good health.

I would be grateful if you would assist me in this matter. I have looked in my fish encyclopedia, but in vain.

ROSS SOCCOLO

The male (top fish) of this pair of rare *Xenodexia ctenolepis* is suffering from skoliosis. The causes could be many.

Growths are common on fish, more so with the longer-lived coldwater species such as goldfish, but occasionally, tropicals develop tumours. If the growth is benign, it can be ignored, rather like a wart in humans. Cancerous growths can also occur and, in this case, it is better to kill the fish painlessly (decapitation is best). In the latter case the fish is obviously ill with clamped fins and not eating. You say your Platy is vigorous and feeding, so I expect the tumour is benign.

The bent condition of your Guppy is a problem called Skoliosis, due to distortion of the spine. There are four reasons for this problem: one is chemical, but since the other fish are not affected, toxins in the aquarium are not the case.

The second is nutrition. Lack of Vitamin D or calcium and phosphorus can give growth disorders, but since you are feeding a good diet, this cannot be the cause either.

The third is Fish Tuberculosis. If TB of the spine is developing, nothing can be done. Let nature take its course and when the fish dies, make sure the carcass is removed because fish eating the remains can get the disease.

Finally, there are genetic problems where generations of livebearers are allowed to interbreed. Again, nothing can be done about this cause, except to remember that if you ever breed livebearers, brothers and sisters need separating and new blood lines are just as necessary as with egglayers.

MARINE

OF CORNISHMEN AND FILTERS

Having kept tropical fish for many years, I would now like the challenge of keeping marine fish and inverts. After reading a little on the subject, and made many visits to the nearest dealers, I have become very confused with regard to the best filtration to suit my needs, using a 48 x 18 x 15in (c 120 x 45 x 38cm) or similar-sized tank.

I now fancy making my own external wet and dry trickle filtration system from a smaller glass tank.

I would therefore appreciate your advice on which would be the best system to buy over the counter.

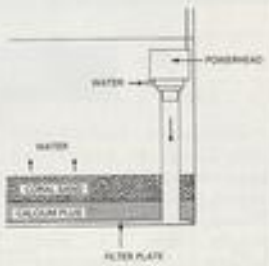
I once asked an old Cornishman (my next door neighbour) for his advice on how to grow delphiniums as beautiful as he grew them. We both enjoyed the same excellent soil, the same position, the same stock, etc, and yet, infuriatingly, his flowers were always so much better than mine. He paused in his digging for what seemed an age and then spoke the words which I'll remember as long as I live, "Aarrhh lad, there be more ways of killing a cat than by choking it with cream".

I took this timeless statement to mean that there are several ways of growing good delphiniums, or of doing anything else for that matter, and that I simply hadn't discovered the right one yet.

Exactly the same applies to maintaining a tropical marine aquarium successfully. Successful methods, ranging from the so-called Natural System, which makes no concessions whatsoever to filtration (or indeed to any water management aids other than one or more wooden microdiffusers and an airpump to operate them), right through to the space age set-up, in which the equipment employed is probably more important to the 'aquarist' than are the creatures (s)he's keeping — it's all down to the individual's skills and personal preference, as much as to individual requirements.

My own personal preference is for Reverse-Flow Under-gravel Filtration as explained and illustrated originally in my 1968 book *The New Seaquarium System* now, sadly, out of print. In this system the mechanically-filtered seawater from an external canister filter of the most powerful size you can afford, is led down the 'airlift' of an undergravel filter, where it is driven up through the coral gravel/coral sand on top of the filter plate and thence back into the canister filter. This advanced form of filtration is silent and virtually invisible and, biochemically, extremely effective. It should be supplemented by two wooden microdiffusers powered by a very powerful and quiet-running twin-diaphragm airpump, such as the Ghost III.

There is no reason whatsoever why you shouldn't also add a trickle-filter to the above set-up, but it's a bit like taking a sledgehammer to crack a nut.



The principle of reverse-flow undergravel filtration.

COLDWATER

BREEDING NACREOUS FANTAILS

I would like to breed Nacreous Fantails and would therefore welcome any advice you can give me on how to prepare my fish.

I usually start to prepare my fish during March, using a heater to increase the water temperature slowly to the mid-fifties Farenheit (c 13°C), and gradually increasing the amount of food which must contain plenty of proteins: earthworms, whiteworm, *Daphnia*, and a good-quality flake food.

I would normally use two or even three males to each female; these are normally related, i.e. brothers, father and sons. Though some breeders prefer to separate the sexes up until they believe the fish are ready to spawn, I usually build them up to spawning condition together.

The question of spawning age is a matter of personal choice. I have spawned females at only 10 months of age and got excellent results in the young. I suppose many prefer to use older fish because mature fish will have developed all their characteristics, and good as well as bad points will be obvious. Therefore, if the fish is displaying too many undesirable traits, it can be ruled out as breeding stock.

I have about 100 Fantails at this point in time. Ages vary from months to five years. I can, at a glance, recognise brothers, sisters, mothers, fathers, grandparents, cousins, etc. I do not have a photographic memory; it's simply that I spend so much of my spare time with my fish that I have become extremely familiar with them. Besides, the more familiar you become with them, the more familiar you become with their good and bad points (no two fish are the same). It is also very important to make and keep records as so much information can be easily forgotten and notes can be referred to in future breeding programmes.

I think that we should try to have some form of heating during the winter months because the cold spell lasts too long for Fantails to survive unscathed. Allowing temperatures to fall below 45°F (c 7°C) for long periods is not to be recommended.

Breeding Nacreous Fantails is a delight . . . and a challenge . . . for the keen coldwater aquarist.

PLANTS

DRY AMAZONS

I recently bought an Amazon Sword and, within a week, some of the leaves started to rot. However, the new leaves coming through were alright. Why is this?

Most of the world's supply of *Echinodorus* species (Amazon Swords) are grown in Singapore and Malaysia.

Initially, they are grown in large natural beds in an emersed state, i.e. out of water. When they are about 8in (c 20cm) tall, some are sold cheaply as 'Dry Amazons'. When transferred to aquaria, the existing stiff leaves die off and are replaced by softer foliage more suitable for underwater growth.

However, the ponds containing 'Dry Amazons' not sold in this state are then flooded. In a few weeks, larger (more lush) plants are then produced. These command a much higher price and, when planted in aquaria, do not lose their existing leaves to the same extent.

© John Dale

'Dry Amazons' under cultivation in Malaysia.

HERPETOLOGY

MUD TURTLE CARE

I recently purchased what I think is a Yellow Mud Turtle. It has a shiny carapace (palish yellow in colour) which is about 4in (10cm) long and is shaped like an egg. It also has a large head resembling that of a Snapping Turtle, with a sharply curved beak and a gaping mouth that seems to open aggressively when threatened.

The head is greeny/grey with dark green spots and can just about be retracted when the animal is picked up. Its nose is somewhat 'pig-shaped' and there are two 'fish lures' on the chin.

The neck and tail are armoured with short spiny spikes and the leg muscles seem to have skin which partially resembles human skin.

Do I, indeed, have a Mud Turtle? If so, would you be able to supply me with details regarding its upkeep and reproduction? Will I be able to keep it with my Red-eared Sliders?

Finally, my specimen has a thick 'coat' of algae on its carapace. Should I remove this and, if so, how?

As its common name suggests, the Yellow Mud Turtle (*Kinosternon flavescens*) has a carapace which varies in colour from yellow to brown. The plastron is also yellowish to brown, the scutes have dark coloration around their seams and there are two well developed hinges at each side of the middle (abdominal) scutes. The skin of the limbs is yellow to grey. All four feet are webbed.

Males have concave plastrons, long, thick spine-tipped tails and two patches of tilted scales on the inner surface of each hind leg.

Adult Yellow Mud Turtles are relatively small, even when fully grown, with a maximum carapace length of between 3 and 5¼ inches (7.5 to 13cm). Growth does not usually occur after about ten years of age.

The Yellow Mud Turtle has a natural distribution in the southern states including Illinois, Iowa, Missouri, Nebraska, Texas, New Mexico and Arizona. Three different subspecies are recognised — the Yellow Mud (*K. f. flavescens*), the Southwestern Mud (*K. f. arizonese*) and the Illinois Mud (*K. f. spooneri*).

All members of the family inosternidae (Mud and Musk Turtles) have at least one pair of 'barbels' under their chin, therefore this is not necessarily a diagnostic feature.

JULIAN SMITH

A Loggerhead Mud Turtle *(Sternotherus minor minor)* with a thick coat of algae growing on its carapace.

One of the best reference books covering the species and sub-species of North American turtles is:

Turtles Of The United States.
By Carl H Ernst and Roger W Barbour.
Published by **The University Press of Kentucky,** USA, in 1972.
ISBN: 0-8131-1272-9.

There are eight individual colour pictures of Mud and Musk Turtles to help with the precise identification of the different species.

The colour pictures should enable you to make a positive identification of your freshwater turtle.

Longevity

A Yellow Mud Turtle has been maintained in captivity in Columbus Zoo, Ohio, USA, for more than ten years. However, in the wild, these reptiles undoubtedly live for very much longer, probably 70 years or more. Humans are the only predators of the adults, although rats steal eggs from the nests and fish, water snakes and other species of turtle eat the hatchlings.

Diet

Yellow Mud Turtles are omnivorous. They feed on aquatic insects, aquatic crustacea (freshwater shrimps, etc), freshwater snails, meat and aquatic vegetation (including algae). Turtles under 2in (5cm) in carapace length mainly feed on small aquatic insects, algae and meat. Turtles over this carapace length eat a greater variety of plant and animal matter.

Male aggression

Male Mud Turtles can be quite aggressive and pursue females around the tank, biting their flippers and the edges of their carapace. In fact, pieces of the limbs and the shell can be removed. If this type of damage occurs, then the male must be kept in a tank by himself. If he is not isolated, then he will eventually kill the female who can't escape as she would in the wild. Unfortunately, male Mud Turtles will sometimes pursue small terrapins of other species. Therefore, you should monitor the situation very carefully with regard to your Red-eared Sliders (*Trachemys scripta elegans*). If they are harrassed, then the Mud Turtle must be removed and kept in a separate tank.

Carapacial algae

The growth of algae on the shell of Mud and Musk Turtles is quite natural with these species and relates to the way in which they live and feed. Unlike Red-eared Sliders and Florida Scotters (*Pseudemys floridana floridana*), most species of Mud Turtle don't bask for prolonged periods on logs or banks of rivers and ponds. Basking in sunlight would allow the carapace to dry off. Without this drying in sunlight, any algae which start to grow on the carapace are not killed by desiccation but flourish to form a thick mat, as on your turtle.

A rich algal covering on the carapace probably helps to camouflage Mud Turtles underwater so that their prey, for example small fish, swim close by and will be caught more easily — perhaps with the aid of the barbels or 'fish lures' underneath the chin.

Yellow Mud Turtles mainly feed on the bottom of ponds and the aquarium. Their acute sense of smell or taste under water also helps them to locate their food.

KOI

TESTING MATTER

In your article in the August 1991 issue of A & P *you refer to a Lovibond 1000 pH heater. How much would I have to pay for one of these?*

If it is too expensive, what other test kits would you recommend? Is the life expectancy of these kits very short?

The Lovibond comparator for pH determination which you refer to is, in fact, a professional instrument calibrated in units of 0.1 pH and, as such, is very expensive ... well into three figures!

Although this is the method I use for pH testing, it is only because I happened to buy this instrument many years ago. The ordinary liquid reagent test kits available to the hobbyist are more than adequate.

I have always regarded some of today's kits, like the Tetra range of test equipment, as being both easy to use and reliable. Your fears regarding the shelf life of liquid reagents are quite groundless, so you need have no worries on that score.

The Tetra 'Laborett' kit is a reasonably priced combination set which is worth considering; they also supply a disc type comparator wheel for the more exact determination of pH.

However, should you still wish to enquire about the Lovibond instrument, the address to contact is:

The Tintometer Ltd,
Waterloo Road,
Salisbury,
SP1 2JY.
Tel: 0722 27242.

News from the societies

Champion of Champions

For many years *A&P* has sponsored and promoted the **Champion of Champions** competition which has been generally regarded as Britain's principal National Fishkeeping Competition.

After considerable thought, and having discussed the matter with various interested parties, we have decided to make certain changes to the way in which the event is run.

Show Secretaries will still be invited to inform us of the dates of their Open Shows, in response to which a **Champion of Champions** declaration form will be sent for completion by the Club concerned and returned to us within a prescribed period. The winner of **Best Fish in Show** will receive a unique and extremely smart certificate confirming their success, plus a twelve-month free subscription to *Aquarist & Pondkeeper*.

The presentation of the **Champion of Champions** contest itself, which will continue to be held in association with Federation of Northern Aquarium Societies at the British Aquarists' Festival, is to be vastly improved, and the much-coveted Gold Pin will be given to every contestant. Winners will also receive the following:-

1st A very special Gold Pin; £100 in cash; a beautiful individually-inscribed wall plate exclusive to *Aquarist & Pondkeeper* which will be worthy of display in anyone's home;

2nd A wall plate, as described above, plus £75 in cash;

3rd A wall plate, as described above, plus £50 in cash;

Both the contest and its participants will receive maximum publicity through the magazine, of course.

For further information Show Secretaries should contact **John Young** at the **Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent, TN23 1QN.**

Aberdare Aquarists' Society

The A.A.S was founded in October 1974. Since then, it has taken an active part in the C.N.A.A. (Cymru National Aquarists Association). It also won the Welsh League a few years ago.

The A.A.S. organises trips to shops and Open Shows all over the country and has meetings to which guest speakers are regularly invited.

For the past ten years, the society has staged its own Open Show which (in 1991) attracted nearly 500 entries.

For further details, contact the Secretary, A. Jones, 34 Maeshyfryd, Cwmbach, Aberdare, Mid Glamorgan, South Wales, CF44 0DN. Tel: 0685 878692.

Association of Midland Goldfish Keepers

For full information about the A.M.G.K., please contact Juanita Hunt, 8 Wensleydale Close, Barwell, Leics, LE9 8EU. Tel: 0405 845623. Please enclose a S.A.E. if you require a written reply.

Macclesfield Aquarium Society

The M.A.S. held its A.G.M. on 8 January at which the committee positions were filled as follows:

Chairman: K. Lawn, 29 St. Johns Road, Macclesfield.
Vice Chairman: Mrs L. Jackson, 38 Thirlmere, Macclesfield.
Treasurer: T. Jackson, 38 Thirlmere, Macclesfield.
Show Secretary: Mrs J. Lawn, 29 St. Johns Road, Macclesfield.
Secretary: Mrs K Hayter, 96 Gawsworth Road, Maclesfield, Cheshire SK11 8UJ.

For further details contact the secretary at the above address.

International Water Lily Society

Sixty enthusiastic members of the International Water Lily Society attended the first Annual General Meeting of the recently-formed UK Branch of the Society. The meeting was held at Sparsholt College of Horticulture in Hampshire and covered many subjects on water gardening.

Topics ranged from disorders in *Nymphaea*, and pest infection causing damage to waterlilies, to the propagation and development of new varieties of waterlilies, iris cultivars and other moisture-loving plants.

The future plans and activities for the UK Branch were debated, such as the recent visit to Longstock Water Gardens in Hampshire that hold a magnificent collection of aquatic and moisture-loving plants, including hostas, primulas and irises, etc. Members also enjoyed a meeting at Burnby Hall Gardens in Pockington, Yorkshire, where the lakes hold one of the finest collections of waterlilies in England.

With over 600 members from 23 different countries, the International Water Lily Society provides a focus for ardent water gardeners everywhere. The I.W.L.S is far from being confined to the subject of waterlilies, though. The society welcomes and encourages pond owners with a general interest in aquatic plants. The I.W.L.S also publishes *The Water Garden Journal* quarterly which is full of invaluable information on aquatic subjects. Many of the articles are provided by members themselves.

The society's main annual event is a week-long Symposium with a very full programme of talks, debates and slide shows, plus visits to various water gardens and water plant nurseries. The 1991 Symposium was held in Munich in conjunction with an association of German waterlily growers and included several excursions to some superb water gardens and other places of interest.

The 1992 Symposium will be held in Houston, Texas, from **29 July** to **2 August,** with side trips to San Antonio, The Alamo and the State Fish Hatchery. The annual subscription for mem-


INTERNATIONAL WATER LILY SOCIETY

Meetings and symposia of the International Water Lily Society include visits to such excellent places as Longstock Water Gardens in Hampshire.

bership of the I.W.L.S. is £12.50. The UK Branch Secretary will be pleased to provide further information: UK Branch Secretary, Harry Hooper, Mill Lane Nursery & Water Gardens, Mill Lane, Bradfield, Nr. Manningtree, Essex. CO11 2QP. Tel: 0206 395586.

Association of Aquarists

The A of A committee for 1991/92 is as follows:
Chairman: Malcolm Goss
Vice-Chairman: Clive Hinton
Secretary: Dilys Hinton
Treasurer: Kate Allen
Membership Secretary: Dave Davies
Sales & Publications: Nigel Ridley
Programme Officer: Tim Allen
Superbowl Co-ordinator: Nigel Aylmer
Committee Member/PRO: Adrian Cooper
Magazine Editor: Ian Legge
Judges and Standards Sub-Committee:
Chairman: Malcolm Goss (Thames Valley Cats)
Secretary: Clive Hinton (Nottingham Aquarists and Hucknall & Bulwell AS)
Member: Andy Pearce (Tongham Aquarists)

For further details contact the A & A Secretary, Dilys Hinton, 45 Wollaton Avenue, Gedling, Notts, NG4 4HY. Tel: 0602 876657.

Diary dates

Association of Aquarists

The next A of A Quarterly Meeting will take place on **7 March** between 10 am and 5.30 pm at Moot Hall, Great Holm, Milton Keynes, Bucks. The guest speaker will be **Pete Moye** who will be talking about his trip to Brazil. For further information, ring 0908 319324.

Birtley Aquarist Society

The 9th Birtley Open Show will take place on **8 March** at the Birtley Community Centre, Ravensworth Road, Birtley. Prizes (heaters, cable tidies, u/g filters, etc), will be awarded for 1st, 2nd, 3rd and 4th places. Further details available from R Flinn, 29 Birch Terrace, Birtley, Co Durham DH3 1 JL. Tel 0632 4106403.

Black Country Aquarists

The Black Country Aquarists will be holding an Open Evening to attract new members on **Tuesday, 3 March** starting at 8 pm. There will also be a Table Show, judged by **Derek Hawkes**, and a slide show and lecture by **Les Crooke.** Venue: Woodside Community Centre, Woodside, Dudley, West Midlands. Further details available from Adrian Round (P.R.O.), 85 Basons Lane, Oldbury, Warley, West Midlands, B68 9SL.

Skelmersdale & District Aquarist Society

The Annual Auction of the Skelmersdale & District A.S. will be held on **Sunday 8 March** at the usual venue: Skelmersdale Labour Club, Westgate, Skelmersdale, Lancs. Booking in: from 10.30 am to 12.30 pm. Refreshments available. For more details, 'phone Ron Lewis on 0695 28971.

Greenock & District Aquarist Society

The 7th Greenock & D.A.S. Annual Show will be held at James Watt College, Greenock, on **Sunday 15 March.** Details available from James Sheekey on 0475 43591.

Rothwell & Wakefield Aquarist Society

The 1992 Rothwell & Wakefield A.S. Open Show will take place at a new venue: St Mary's Catholic School, Royds Lane, Rothwell (100 yards from Blackburn Hall) on **Sunday 15 March.** Full details from Kevin Swinson on 0977 511464.

Amphibian and Reptile Club

There will be an A.R.C. Reptile Show on **28 March** at Elstead Hall, Thursley Road, Elstead, near Godalming, Surrey, between 10 am and 5 pm. Adults: £1; Children, OAPs, Students: 50p. The event is designed both to "inform and educate the public, and handling of the reptiles on show is encouraged ... from large pythons to smaller species". The event is open to trade and private exhibitors, with products and captive-bred offspring for sale. Other clubs and some charities will also be in attendance. Further details from Shiralee Hughes on 0252 702714.

Central Midlands Cichlid Group

The Central Midlands Cichlid Group are holding their annual aquatic auction on **29 March** at Penkridge Memorial Hall, Penkridge, near Stafford. Booking in of lots: from 10.30 am. Auction to start at 1 pm (approx). All aquatic items accepted, with 15% of takings going to the club. No pre-booking necessary. Further details from: 0543 676004; 0889 577958 or 07851 3944.

Anabantoid Association of Great Britain — Members' Weekend

The A.A.G.B. Members' Weekend will take place on **Saturday/Sunday 4/5 April** at Sorby Hall, Sheffield University. Events will include an anabantoid show, auction, lectures (including *Gabon 1990* from **Allan** and **Barbara Brown**) and the AGM.

The weekend is for members only, but new members may join at the event. Day visitors are welcome and overnight accommodation and meals are available. For details contact Chris Clark, 19 Alder Grove, Balby, Doncaster DN4 8RF.

Preston & District Aquarist Society

The Spring Auction of the Preston & D.A.S. will be held at Lancashire Polytechnic, Students Union, Fylde Road, Preston, on 5 **April.** booking in: from 12 noon.

For more information, 'phone 0772 824378.

British Cichlid Association

The B.C.A. Annual Spring Auction will be held on **Sunday 12 April** at the Bulwell Youth and Community Centre, Coventry Road, Bulwell, Nottingham. Doors open: 10.30 am (approx). Further information from Mrs Lynn Fern, 5 Winding Shot, Hemel Hempstead, Herts HP1 3QQ.

Malvern & District Aquarist Society

The 19th Malvern Annual Open Show will be staged on **Easter Sunday 19 April** at the Malvern Youth Centre. Further information available from the Secretary, Mrs Wendy Smith, 49 Lydes Road, Malvern, Worcs WR14 2BY. Tel 0684 567995.

Merseyside Aquarist Society

The 1992 M.A.S. Open Show will be held at Rainhill Village Hall, Dane Court, Rainhill, Prescot, Merseyside, on **Sunday 26 April.** Further information: J Bailey, 11 Auburn Road, Liverpool L13 8BJ. Tel 051 228 8199.

Aberdare Aquarists' Society

The 1992 A.A.S. Open Show will be held on **Sunday 10 May** at the Abercwmboi Rugby Club, Aberaman, near Aberdare. Full details from the Show Secretary, B Rees, 15 Ffrwd Street, Godreman, Aberdare, Mid Glamorgan, South Wales CF44 6DU. Tel 0685 877119.

Preventing Piscatorial Piracy

Alan Evans describes an effective, inexpensive back-up alarm system that can be adapted to protect all our outdoor prized aquatic possessions.
Illustrations by Ian Hunt

Every year many thousands of pounds' worth of fish and other livestock are stolen from sheds, fish houses and ponds, so a very simple alarm system could save you a great deal of money and heartache. Many readers may already have their properties protected by various means but, as these alarms are, in most cases, operated from the mains electrical supply, they will be out of commission during any power-cut. My alarm system could therefore be considered as a back-up costing no more than a few pounds.

Using 12v battery power, the alarm was originally designed for the motorist, but it also makes a first-class low-powered system to protect sheds, fish houses and ponds of all types and sizes.

TREMBLING HEART

At the heart of the system is what is known as a 'trembler'. This is a pendulum housed in a small box that makes contact whenever it is set in motion (as the type of alarm fitted to many motor vehicles). Some are so sensitive that even the draught from a passing car is enough to set them off.

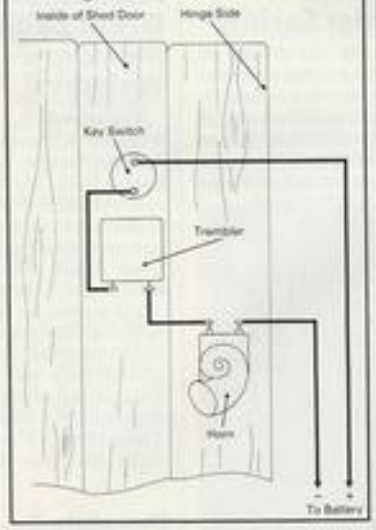
Tremblers are sold under various names: Movement, Shock, Pendulum or Momentum Detectors. All are basically the same, each in a fancy box to catch the eye and pocket. Prices vary, so shop around.

You will also need a 'Key Switch' to turn the alarm on and off. These can only be operated by the key holder. To sound the alarm, a car horn will make enough noise to scare off any intruder. You could even buy the extra-loud type used for car alarm systems if you prefer.

THE IDEA

My pond fish are used to members of my family and will rise to the surface in search of any titbit that may be offered, making no attempt to hide. Fortunately, they are very wary of strangers and will swim around looking for a suitable place to hide and observe the stranger in safety. However, as my pond is one of those fish-only types, there isn't really anywhere for them to shelter. So they cower in the far corners until they think it's safe to come out. This makes them a very easy target for any thief.

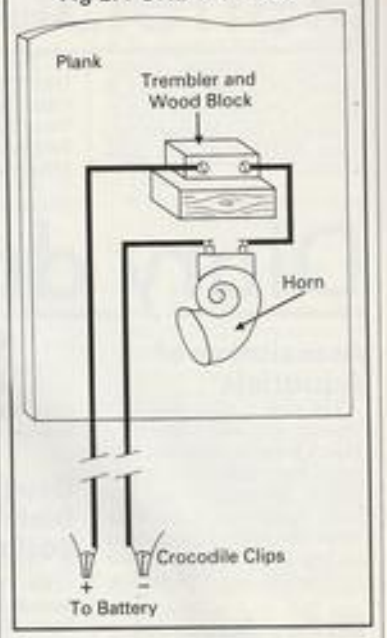
Fig 1. SHED FITTINGS



To reach the garden on the other side of my pond, I have to use a plank across the pond itself for access. I had noticed, on occasion, that the fish hid under this plank if ever I had callers and had forgotten to remove it.

This gave me the idea of how the pond could be protected. If a lightweight plank was fitted with an alarm, a thief would have to move it to net the fish that would be taking cover there. This would set off the alarm and, as most thieves prefer not to attract your or your neighbour's attention, the pond would be safe.

Fig 2. POND FITTINGS



THE PLAN IN ACTION

I now put my alarm plank across my pond every night and whenever we're out for the day. The plank is about 1ft wide × ¾in thick (30 × 2cm) but, really, any sort of lightweight cover could be fitted with this alarm system.

One of our Northern Goldfish and Pondkeepers' Society members is convinced that this type of alarm has rid him of a very persistent heron. The bird would alight on the plank which, to it, seemed a perfect fishing spot. Of course, this set off the alarm which almost gave the poor bird a heart attack! After another three attempts it has given up and gone elsewhere.

SILENT ALARM

If you want to scare off intruders without waking the neighbours, you could fit lights instead of a horn. Personally, I would rather disturb the whole neighbourhood; after all, you have the excuse that their property could be next on the list for a visit.

The 'tremblers' at the cheaper end of the price range will switch themselves off after a few minutes, while the more up-market types keep everyone awake until they are reset by the owner — not a good idea if you're out; there is nothing more annoying than an alarm sounding off for hours at a time.

All the parts for this alarm system can be bought from any motor accessory shop. Some types of 'tremblers' have only one, instead of the usual two, terminals. If this is so, then use one of the fixing holes as the other terminal.

AN OPTIONAL EXTRA

In the event of a power failure, the battery could also be used to provide emergency lighting in your shed or fish house. This extra use of the battery will not interferee with the alarm system and will allow you to attend to your stock without the inconvenience of using a torch or candle. You will need a 12v lamp fitted high in the roof, a light switch and enough wire to reach from lamp to battery.

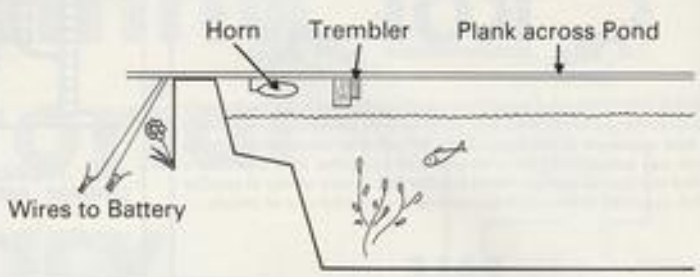
There are pumps, heaters and lights designed to run on 12v. Those of you who may lose valuable stock may find such items the ideal solution. If you do decide to run anything more than lights, I would suggest you have at least one extra battery. (See accompanying Fig 4).

FITTING THE ALARM (SHED)

At a convenient height to suit yourself, drill a hole in your shed or fish house door for the **key switch,** keyhole to the outside. To the inside of the door, fix the **trembler** and **horn**. Put the **battery** away in a corner, so it won't get in your way.

Connect the items together as shown in the diagram. The closer you fix the trembler, key and horn together on the door, the shorter the amount of cable you will need to connect them, so fix them first and then measure the amount of wire you need. The accessory shop will advise you on the correct thickness of wire you will need. (See Fig 1).

Fig 3. THE ALARM IN SITU



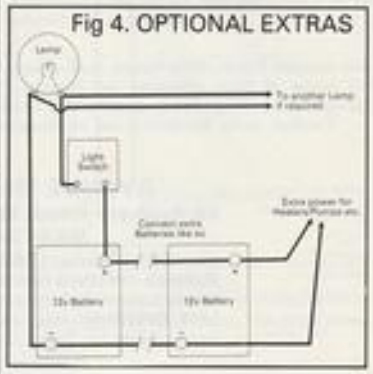
FITTING THE ALARM (POND)

Find yourself a suitable plank. If your pond is on the large side, then a short plank to span one corner will be alright. Provide fish with a place to hide and they will use it. As 'tremblers' should be fixed in a vertical position, a small block or angle bracket will have to be fitted to the plank.

Next to it fix the horn. The key switch can be dispensed with for pond use and the alarm system can be disarmed by unclipping the battery.

Use crocodile clips so that the plank may be removed, leaving the heavier battery at the pondside. Devise some type of cover for the battery, just to keep out the weather. A cat litter tray or a plastic bread bin would be alright. (See Fig 2 and 3).

Fig 4. OPTIONAL EXTRAS



What's Your Opinion?

Billy Whiteside, B.A.A.C.P.

HELPING HEDGEHOGS

In the latter half of last year a colleague came upon a young teenager endeavouring to play football with a hedgehog. Gone, several years ago, are the days when a possible clip on the ear would have provided a short, sharp and educational lesson to the boy in question — and perhaps rightly so, because there are those who label any form of such chastisement under the highly-emotive title of 'child-abuse'. Anyway, my colleague told the boy, in no uncertain terms, what he thought of him and of what he was doing to the poor hedgehog.

Bearing the above in mind, and as I occasionally see a hedgehog in my garden after dark in the warmer months of the year, I was interested in December to receive a letter from **A H Coles** sent to our Editor, John Dawes, in response to the heading **Roasting Letters.**

Mr Coles writes from the British Hedgehog Preservation Society, at Knowbury House, Knowbury, Ludlow, Shropshire, SY8 3LQ, and makes the point that a little cat or dog food left out each night, with a shallow dish of water, can help save hedgehog lives during the winter. Hedgehogs normally hibernate and it is thought that the crucial weight for survival is 1 lb minimum. A leaflet, *Helping Hedgehogs*, is available from the B.H.P.S. at the above address — but please enclose a S.A.E. when writing. Hedgehogs aren't exactly fishy things but I'm sure readers won't begrudge them a mention in this column because numbers of you, like me, may have one of these interesting but shy creatures in the garden (often drinking from our ponds); or like me, you may often feel sad on seeing one lying dead, killed by a car, on a local road.

Incidentally, the headings are added to my feature after it leaves me, so I can make the point that I was not responsible for the incorrect spelling in the heading **Discus in Absentia** in my December 1991 column. However, I know very well how easy it is to miss a typing error. [*That one slipped through our editorial net. Apologies.* **Ed.**]

'SHRINKING' ANGELS

My shrinking stock of Angelfish, currently at three, looks as if it might reach only two within a few days. You will recall that the fish appeared to be permanently affected by my using a popular algicide in their tank some months ago. The fish that die look perfectly healthy, except that they seem to gasp for air at the surface of the water, suggesting that their respiratory organs have sustained permanent damage that takes some considerable time to show.

Of course, the reality with fish is that it is very often much cheaper simply to buy a new specimen than buy treatments to attempt to cure an ailing one. Fish disease cures sold in the U.K. do not contain antibiotics — unlike those on sale in U.S.A. I spent some time in a most interesting aquarium shop in Hollywood, L.A., last summer, and took the opportunity to photograph the colourful display of antibiotics on sale to treat fish diseases. A report of my visit to Oranda Aquarium should appear in a future *A&P*.

ILLUMINATING ADVICE

The latest letter written to me by **Dr Neville Carrington,** of Interpet Ltd., Dorking, Surrey, has just made me realise that Neville must be, without question, my longest contributing letter-writer to this feature. Writing that has just reminded me of the fact that this feature will have been running for 25 years in May 1992. It's hard to believe that it's a quarter of a century since I asked the then Editor of *A&P* if I could try out my new idea for a few months. I should be pleased to hear from any of our early contributors — including Dr Neville Carrington — for the silver anniversary feature in May.

Neville Carrington writes: "In the November 1991 issue, **Dave Kershaw's** letter was very interesting. You may recall that I had difficulty in growing some plants such as Indian Fern at one time, but I have never had a problem with plants which like relatively hard, slightly alkaline water. I still have a flourishing culture of Indian Fern and Java Moss which originated from your stock. I also have some of your Java Fern, but this has never grown very well for me.

"Some plants, like Java Moss, seem to be able to tolerate any water conditions, but I am convinced you must be blessed with fairly soft neutral to acid water, and since I started using water of this quality, I have achieved the same success with tropical plants which I used to have years ago before our water supply changed. The lighting required does, of course, depend upon the sort of plant being grown. As a general rule plants with a broad leaf need less light than those with a narrow leaf.

"I would say that Dave Kershaw's lighting with three Tritons is possibly too high for the average freshwater tank, but virtually ideal for marines. If you bear in mind that the Triton gives out about twice as much useful light as a conventional fluorescent tube, then he has the equivalent of six lamps on his tank. There are very few freshwater plants that need this level of lighting, although our — I believe — mutual friend and distributor in the U.S.A., **Merril Cohen** of Aquarium Products, has *Cabomba* as if it wants to take over the world in a freshwater aquarium with three Triton lamps above it. For plants such as Water Wisteria, I should try one or two Triton lamps left on for 8-10 hours per day. I know you have great success using a lower lighting level than this and am always amazed by this.

"I also totally agree with your comments about over-filtration. I am sending you herewith some of our new pocket leaflets which are part of a new series. In the leaflet on planting and decoration, I suspect that you will find that some parts, but not all, will meet totally with your approval."

I still get good results from ordinary light bulbs costing about 30p each. Some years ago now, my best *Cabomba* plants grew in — wait for it! — an 18in x 10in x 10in (45 x 25 x 25cm) aquarium lighted in the evening by a 40 watt light bulb. The *Cabomba* took over the tank and I removed one plant and laid it in a bath, beside a 12in ruler, to show its length. It was over 6ft long!

Numbers of the plants flowered and produced floating leaves. The specimen shown

BILLY WHITESIDE

Six-foot *Cabomba* grown in an 18 x 10 x 10in (45 x 25 x 25cm) aquarium using one 40-watt light bulb!

BILLY WHITESIDE

Floating leaves and flower buds on one of my *Cabomba* plants.

was removed and submerged in another tank for the photograph.

I have not tested my tapwater or aquarium water for some years, but will do so now in response to Dr Carrington's suggestions. I don't think I've ever bought a pH or water hardness test kit in my life, but did receive a couple quite a few years ago when reviewing products for *A & P*. The pH test kit shows that my tapwater has a pH of 7.4. The carbonate hardness is 1° DH. The little test bottle for testing general hardness was empty, so I was unable to test the general hardness level of the water.

The pH of one of my tanks is 7.2. It houses *Vallisneria* and Amazon Swords that grow quite well. Several other tanks, in which Java Fern, Java Moss, Indian Fern and *Bolbitis* Fern thrive, have a pH of 6.2-6.6 — which is quite acidic.

BILLY WHITTAKER

Healthy growth of Java Fern and Java Moss in one of my 18in (45cm) tanks.

The softness of the water, and the absence of any calcium carbonate (marble, limestone, bone fragments, etc.) in the rocks and gravel, obviously allows the acidic pH to develop and remain. I'm not a great believer, personally, in water changing, or in keeping tanks too clean — which is why I usually add only fresh tapwater and fish food to my tanks. One or two light bulbs, of 40 watts each, lit for about 6 hours at night, keeps the plants thriving under these conditions — and the fish thrive too. I do have a small air-operated outside filter on my smaller tanks, and an outside power filter on my larger tanks. These are on for about six hours daily, too. I do not over-feed my fish.

I think that too many water changes, too much filtration and 'too-clean' tanks probably account for a lot of plant failures. If you cleaned/washed the soil in your house-plants' pots every day, and provided them with nothing but pure water, they would not do too well!

PLANT CHALLENGE

Mr G. Abberley lives at 42 Barry Avenue, Bucknall, Stoke-on-Trent, Staffordshire, and writes: "I was most intrigued by the **Plant Challenge** column in the November **W.Y.O?** I have experienced exactly the same problems as your letter-writer, regarding his inability to grow plants in tropical tanks. I, too, hear of those aquatic gardeners among us who have to thin out and cut back their aquarium plants; and although I have read books on this subject also, I have yet to find the key to successful aquatic plant cultivation." *[I've just removed some Java Moss and Java Fern overcrowding a small 18in tank so I'll drop the plants in the post to Mr Abberley and hope that they will thrive for him too.* **B.W.***]*

Mr Abberley continues: "I have two tanks — 30in x 12in x 15in, and 36in x 12in x 15in (75 x 30 x 38cm and 90 x 30 x 38cm) of freshwater tropicals which are active, healthy and growing, but the plants — what few there are — in both, are completely opposite in condition to the fish. I have even tried the potted-plant method in both tanks, but the potted plants fared no better than the others — except that the die-off point was postponed for a couple of weeks. The only plant that grows to a cutting-back stage is a rather healthy-looking type of Java Moss anchored to a piece of bogwood.

"But what puzzles me even further, as I read on under the heading **Personal Plant Secrets,** is the apparent answer where, to me, aquarium maintenance appears to be twisted to suit the case. You say: 'If you keep your tanks filtered for 24 hours a day and change your tank water so often that the tank is spotless, you'll probably starve your plants to death.'

"I use undergravel filters in both my tanks with powerheads fitted on the up-lifts. Surely, we've been told often enough that to switch the filter off for any length of time can cause the heterotrophic, aerobic bacteria to be destroyed, resulting in a drop in nitrifying potential, which would be detrimental to the fish. Furthermore, we have also been encouraged, by several sources, to do a monthly partial water change of around 25% of the tank volume, and with a gravel washer, sometimes, at that. If this does not disturb any rooted plants or remove life-giving detritus from their roots, I don't know what does. So, come on you aquatic experts, who is kidding whom? I do hope an *A & P* special is produced on this one. Thank goodness the fish thrive on my devoted attention and are not like the plants, otherwise my enthusiasm would have waned long ago. *[There will be a special* **Focus on Plants** *issue later on this year.* **Ed.***]*

"As it is, since I feel that the plants complement the fish, and vice-versa, I am even more determined than ever to get it right. What a fascinating hobby it is — and congratulations on an excellent magazine."

I'm fairly sure I reviewed the very first undergravel filter for this magazine many years ago, Mr Abberley, and subsequently fitted them to all my tanks at that time. Later on, I removed them all and reverted to outside, air-operated filters for tanks up to 24in (60cm) and outside power filters for larger tanks. Some tanks, such as those housing marines or messy cichlids, or very over-crowded tanks, may well need strong U/G filtration and, possibly, other filtration as well. I also tried out a range of fluorescent tubes quite a few years ago, but abandoned them also in favour of returning to light bulbs. I have not tried any of the most recent fluorescent tubes, so cannot comment on them.

Perhaps I'm just old-fashioned. Different methods work for different people. If I find that a newer, more-expensive development gives me no better results than an older, less-expensive one, I'm quite likely to revert to the older method when the newer equipment packs up. A good example is the old bi-metallic strips used in thermostats/thermostatic heaters. It still works well and is reliable — although I recall the exception many years ago when one of mine stuck and my fish got boiled.

If you want a spotless tank, stick with lots of strong filtration and frequent water changes. If you want growing plants, as well as thriving fishes, then don't keep the tank too spotless or you'll starve the plants to death. That's one point on which Dr Neville-Carrington and I agree. (Incidentally, the letter referred to in the November 1991 issue made references to **Dave Kershaw** but was written by **Alan O'Brien** — see p. 77 of that issue of *A & P*.)

FUTURE TOPICS

Mark Watson, B.A., resides at 29 Moatlin Road, Kesh, Co. Fermanagh, Northern Ireland, and his letter includes a couple of questions that I'd like to include as numbers one and two in my next list because it's always interesting to hear other people's opinions — and that's what this column is all about. So, for a future feature, please send me your opinions on the following:

(1) What should one do when the undergravel filter plates in an aquarium need to be cleaned and the tank's contents must be removed?

(2) How often should U/G filter plates be cleaned? (I feel we are talking of the actual gravel here.)

(3) Where can replacement spares be obtained for Nuova power filters?

(4) What postal plant supplier can you recommend?

(5) What foods, other than flake, do you feed to your aquarium fish?

(6) Have you bred Neons, Cardinals or Glowlights?

(7) What is the smallest size of marine tank you would recommend, and how much would it cost to set up?

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

Do drop me a few lines, please.

Koi Calendar

By David Twigg

JOBS FOR THE MONTH

The weather is not a lot better, but the days are getting longer and water temperature, while still being low, is starting to rise. Activity in the pond increases, not only from our fish, but also from harmful parasites and bacteria.

This then is the time of the year when our Ultra Violet steriliser should be working at its optimum to help fight these enemies of Koi. A thorough cleansing of the quartz tube through which the UV light penetrates (and which separates the fluorescent tube from the water) is a way of improving 'kill', but this is no substitute for tube replacement if it has been in long service. A change after six months' use is the accepted norm in Koi circles.

While the unit is stripped down, check the condition of the 'O' sealing rings. If perished, or damaged, which could allow water (remember it is under pressure) to get past, then replace with new items. Water and electricity don't mix well.

Please don't forget the rules when carrying out this task!

Disconnect from the supply before dismantling and don't look at the bright UV light (harmful to the eyes) when reassembled and under test.

The above should really be part of a good spring look-over; all pipework and tanks have been subjected to winter conditions and may have cracked or perished and should be overhauled where necessary.

'LATE' CHRISTMAS GIFT

An unusual and rather lovely item was delivered to me the other day, unfortunately, far too late to mention in the Christmas issue. I guess, though, something like this would make a suitable present at any time of the year.

This real, leaded, stainless glass window panel with a likeness of my favourite Koi being the centre point, was made by **Steve Blanchard.** Steve, who is also a Koi keeper, tells me that if you supply a suitable photograph of your favourite Koi, he can design it into the panel. He trades as the **Glass Koi Co** and can be contacted on **0202 593872.**

SHIRLEY'S SPRING FESTIVAL

The first Koi event of the year is taking place at **Shirley Aquatics** over the weekend of **7/8 March.** This second **Festival of Koi** is taking the same form as last year's highly successful event.

On Saturday there will be an exhibition of Tategoi (unfinished Koi) as well as High-Grade mature Koi. For the would-be Koi judge, there is a chance to have a go at sorting out the best from some good 'Show Koi; not an easy task if my experience is anything to go by!

Sunday brings an auction, with **Bill McGurk** wielding the hammer; 4-12in Koi starting 11 am and Hi-grade and Jumbo Koi after lunch at 2 pm.

On hand over the weekend will be experts from a wide field of Koi keeping. They include representatives from **Tetra, Dr Andrew Worthington** of Spirex Aquatec (filtration), **Peter Bull** of PPI (food and medication), **Nigel Caddock** (Nishikiogi International) and **Fred Slatcher** (fibreglassing).

There is car parking for 120 vehicles on site and **John Cook** tells me that he has arranged for courtesy coaches to run from nearby PH, cinema and hotel car parks, to cater for the expected overspill.

A special weekend hotel accommodation package has been put together for those who travel long distances. **Shirley Aquatics** can be contacted on **021 744 1300.**

RECENT VISITS

My Christmas Calendar was very full in December, but most of it not associated with Koi! One item, though, was and proved to be an enjoyable day out.

The **Japanese Water Gardens Christmas Charity Auction,** in aid of Riding for the Disabled, was held at their premises near Nottingham on Sunday, 29 December.

Staff were in festive spirit and dressed accordingly. The auctioneer was a choirboy (**Bernard Channing**),ably assisted by a Priest (**Paul Stacey**); both were supported by Anne Boleyn (**Sandy**), a Nun (**Gina**), Mother Christmas (**Anne**) who handled the paperwork and money and other members of staff in festive dress.

A buffet and liquid refreshment were laid on by J.W.G. and greatly appreciated by the 100 or so people attending, some of whom had travelled from as far away as Yorkshire.

Lots were donated by **J & K Aquatics, Oranda Imports, Staffordshire Water Life, PWL Fish Industries, Infiltration, Mainline Travel, Gary Bourne, Rolf C Hagen, Aegean Pools, Trust Motors, Dick Warren, Cypriculture, Nishikigoi International, Quality Koi Co** and last, but not least, **J.W.G.** whose Koi earned £675 of the grand total of almost £2,000.

DAVID TWIGG

Flashback to Shirley Aquatics' highly successful 1991 Festival of Koi auction.

DIARY DATES

A few more show dates have been notified and the calendar now looks like this:

17/20 — April — Koi Joy. London Professional Nishikigoi Show.

9/10 — May — Merseyside Section BKKS, Open Show.

6/7 — June — Yorkshire Section BKKS, Open Show.

13/14 — June — East Pennine Section BKKS, Open show.

20/21 — June — Lea Valley & Harlow Section BKKS, Closed Show.

5 — July — Lower Thameside Section BKKS, Open Show.

11/12 — July — Northern Section BKKS, Open Show.

12 — July — Suffolk & North Essex Section BKKS, Closed Show.

26 — July — Essex Section BKKS, Open Show.

15/16 — August — BKKS National, Open Show.

5/6 — September — Mid-Somerset Section BKKS, Closed Show.

September — South Hants Section BKKS, Closed Show.

WHAT'S ON IN MARCH

2 — Kennet Valley Section BKKS. AGM, 8 pm at Newbury Rugby Club, Pinchington Lane, Newbury, Berks. Contact Bob Thompson on 0734 713640.

4 — Suffolk & North Essex Section BKKS. AGM, starting 7.45 at the Prince of Wales PH, London Road, Marks Tey, Colchester, Essex. Contact Dennis Preou on 0371 856450.

5 — Middlesex & Surrey Borders Section BKKS. Monthly meeting at Hampton Football Club. Speakers: **Mark Davies** on *Fish Breeding, Bagging and Handling*. Contact Alan Harington on 0932 845608.

7-8 — Festival of Koi. Shirley Aquatics, just off junction 4 of M42.

8 — Mid-Somerset Section BKKS. Guest speaker is **Dr Andrew Worthington** of Spirex Aquatec. Subject is *Filtration of the Koi Pond*. West Monkton Village Hall, near Taunton. Contact Alan Purnell on 0458 72132.

8 — Lea Valley & Harlow Section BKKS. Dealer visit to Free Roberts Koi, Great Sampford, nr Saffron Walden, Essex. Contact Barry Ford on 0279 419101.

9 — Northants Section BKKS. Monthly meeting. Contact Keith or Jenny Cross on 0604 765856.

11 — South Hants Section BKKS. **How Kang** of How Kang Koi explaining just what goes into setting up a show. Talk will be accompanied by a video of the 1991 show. Denmead Church Hall, Hambledon Road, Denmead, Hants commencing 8 pm. Contact Roy Moody on 0705 450530.

11 — Merseyside Section BKKS. Monthly meeting at the Hare & Hounds, Maghull. Speaker: **Naoki Atsumi** from P.W.L. Contact Phil Adamson on 051 220 2970.

12 — East Pennine Section BKKS. **Paul Stacey** *Koi Treatment and Filtration* at The Phoenix, Platts Common, Barnsley (5 minutes from M12 junction 36). Contact John Timmis on 0226 289507.

15 — Yorkshire Koi Society. A talk *Establishing a water garden* by **Philip Swindles,** BBC Radio Leeds Gardening Expert. Wetherby Resort Hotel, Wetherby (200 yards off A1) at 2.30 pm. Contact Frances Bedford on 0423 869484.

19 — Wirral & District Section BKKS. Monthly meeting at the Lever Sports & Social Club at 8 pm. Contact Jean Moffat on 051 678 1769.

22 — BKKS AGM at the Post House Hotel, Leicester.

25 — London Section BKKS. Discussion on *Preparing for Spring . . . Health and Maintenance*. Ruskin House, Coombe Road, Croydon, starting 8 pm. Contact Pippa Holttum on 081 549 8098.

29 — Essex Section BKKS. I will be relating my *Koi Experiences* in North Stifford Village Hall at 3 pm. Contact Bobbie Barton on 0702 611750 or Margaret Bishop on 0702 522388.

NEW ZEALAND'S

New Zealand exporter **Dave Cooper** introduces one of the most desirable, though 'aggressively' named, native species for the temperate aquarium.
Photographs by the author

Greetings from New Zealand, 'Godzone', the last bastion of the British Empire, a 'clean green', nuclear-free paradise of 3.4 million people at the 'bottom' of the Pacific. However you prefer to think of it, New Zealand is a unique little piece of the Planet Earth, and this is nowhere more noticeable than in its wildlife and, in particular, its fish fauna. Of the native fish species, all but two are endemic and therefore occur nowhere else in the world. Oddly, one of these two exceptions, the Inanga, *Galaxias maculatus*, is one of the world's most geographically widespread freshwater fish, occurring from Pantagonian South America to Australia.

PERFECT INTRODUCTION

Through the limited space available for an article and accompanying photographs, I hope to instill in the reader a little of the new-found enthusiasm that I feel for these fish as aquarium subjects. All the species make suitable aquarium inhabitants and their uniqueness, fascinating life cycle and habitats will, I believe, capture the interest of fishkeepers everywhere.

The Redfin Bully *(Gobiomorphus huttoni)* is, in many ways, a perfect introduction to New Zealand's freshwater native fish. Its partially marine life cycle is similar in a number of aspects to many other New Zealand species and, certainly, in its adaptation to aquarium life, it is typical of this country's fish.

The Redfin Bully is one of the most common and widespread of New Zealand's freshwater fishes, occurring throughout the country in coastal areas, and penetrating upstream a considerable distance, in rivers with no barriers in the form of large dams, etc. This is not to say that it is particularly well known by New Zealanders, who are frequently surprised when confronted with a well coloured male to learn that it comes from their 'own back yard'.

This is true of most native fishes in New Zealand and is partly because the large majority of species are cryptic (well-camouflaged), and partly a result of our national obsession with trout, salmon and other introduced species.

BASIC STATISTICS

Like all bullies, Redfins are sexually dimorphic. The males are larger than the females and display numerous other differences, the most obvious of which being the coloration of the males from which the species draws its name, and which is totally lacking in the female.

The males display the characteristic red fins and also carry a varying amount of blue sheen over their body, which has eight to ten orange/red bands or blotches over the basic browny/grey coloration. The female lacks this coloration, as I said, but both sexes share the markings on the body and, in particular, the diagonal stripes on the cheeks and gill covers which form a distinguishing characteristic of this species, even at a small size.

Speaking of size, Redfins are commonly found at around 70-80mm (c 2.75-3.2in) and the largest ever recorded was a male of 122mm (4.8in) long. Fish over 100mm (4in) are considered big ones.

WATER AND TEMPERATURE

Redfin Bullies are found in a wide range of habitat, but show a marked preference for rapidly flowing, bouldery streams, and seem to be found in greatest abundance among the rocks at the head of rapids. For the aquarist, this means that these fish will thrive in a range of conditions, but the presence of rocks for cover and territory establishment, and a good current from a power filter or airstone, is to be preferred.

A few words here about temperature: New

REDFIN BULLY

Zealand is a temperate country and, as such, all of our native fish are what would be called 'coldwater' fishes. Having said that, I must note that I have kept, not only Redfins, but also a number of other bullies and galaxiids at temperatures in excess of 20°C (68°F) for periods of several months with no obvious ill effects.

Many of the lowland species are able to tolerate temperatures of 25-30°C (77-86°F) easily, but not, I suspect, the Redfinned Bully.

I feel that temperatures below 18°C (c 64.5°F) would be more suitable. Certainly, most species of New Zealand fish can survive water that has a thin coating of ice (the South Island, in particular, gets very cold in the winter.)

DIET

Now, to the ever-fascinating topic of feeding. Redfinned Bullies, like many of New Zealand's fish, are opportunistic, generalised invertebrate predators in the wild, with the vast majority of the diet consisting of chironomid (midge) larvae, mayfly larvae and caddis larvae. In short, they seem to eat anything that comes their way, and I can confirm this from my (and other's) observations in the aquarium.

Captive fish that I personally know of, take *Daphnia*, mosquito larvae, white worms, Bloodworms, ox heart, earthworms (mashed), freeze-dried *Tubifex*, trout pellets, flake and any passing small fish silly enough to get too close!

Gambusia affinis are commonly used for this purpose by New Zealand aquarists for a wide variety of piscivorous fishes in their tanks. As in many other parts of the world, *Gambusia* have been widely introduced to New Zealand for mosquito control, a task at which they seem no more effective than many native species. They have now flourished to the point of being a pest, but are regarded by fishkeepers as an easily available source of livefood.

I neither condone nor condemn the practice of feeding live fish and refer the reader to the editorial published in the July 1991 of *A & P*, and invite every aquarist to make his/her own decision.

It is also worth noting that McDowall in his food studies of *Gobiomorphus huttoni* (see references at the end of the article) also found about 5% of the food items in the studied fish to consist of eggs of their own species. It is unclear whether this is as the result of predation upon each other's eggs, eating of infertile eggs, or some other reason, but it is a relevant fact for anybody contemplating breeding this species.

SPAWNING

At spawning time (winter/spring, July to November) the male adopts breeding coloration which, basically, is a darkening and intensifying of the colours, although the female remains unchanged. He selects a nest site under a flat rock in gentler flowing water, although nests have been found utilising bottles, tyres and other debris. A flow of water through the nest site seems to be essential.

Females produce between 1,000 and 20,000 oval-shaped eggs, and probably spawn at least twice a season. The eggs are attached by a sticky thread to the underside of the rock and the female leaves.

The male remains with the eggs until hatching and defends the nest against other bullies and other predators. Eggs hatch after 2-4 weeks and the fry are approximately 3mm (0.12in) long. It is possible that hatching is stimulated by flooding in the river. After hatching, the fry go downstream

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Top far left, male Redfin Bully *(Gobiomorphus huttoni)* — in dark spawning colours.

Top centre left, the Common Bully *(Gobiomorphus cotidianus)*. This is a gravid female.

Top centre right, the Banded Kokopu *(Galaxias fasciatus)* is frequently found with Redfin Bullies in bush streams.

Below far left, face to face with a male Redfin Bully. Note the diagonal cheek stripes, a distinguishing characteristic.

Below centre, a Torrent Fish *(Cheimarichthys fosteri)* winking, *Corydoras* fashion.

Top right, a site where Redfin Bullies are regularly collected.

to the sea, where they spend the next few months as larvae, feeding on the rich planktonic food source. During summer, the young fish, now 15-20mm (0.6-0.8in) long, re-enter freshwater and make their way upstream to the adult habitat, thus completing the life cycle.

It is worth noting here that several of New Zealand's freshwater fish species share this marine phase of their lifecycle and the returning fry of five of our galaxiid species constitute 'New Zealand Whitebait' and are an important commercial catch. If you've never eaten whitebait fritters, you haven't lived! However, there are landlocked populations of several species that normally experience this marine stage, so it would seem not to be essential to the reproduction of, at least, some of the species.

Lacustrine examples of fish that usually exhibit this marine life phase are typically dwarfed, and it would seem that access to the rich marine plankton is more important than the actual salinity. This is a point to note for the potential breeder; I would imagine that brine shrimp would play an important role in raising the larvae of these fish.

One effect of this marine phase is that the aquarist can use salt in quite large quantities when necessary, as these fish can tolerate seawater as well as freshwater. One could even use them in a brackish tank, of course.

A word here about aggression. Male Redfins, especially, are quite territorial and defend their territories with great gusto. This doesn't mean that you can't keep several in a tank (I do it all the time) but they had better have plenty of space and opportunity to form territories in the form of rocks, etc.

In this respect they are not too different from many of the nest-building cichlids and should not pose a problem to the experienced aquarist.

N.Z. SOCIETY

A recent upsurge of interest among Kiwi aquarists has seen the formation of the **N.Z. Native Freshwater Fish Study Group**. The society is, basically, one of aquarists, but it has also attracted the membership of several scientists working in the field of native fish.

One of the aims of the study group is to achieve the captive breeding of as many species as possible. This has not yet been achieved in the case of Redfins but, because of their colourful appearance and 'perky' nature, these fish are becoming popular as aquarium subjects. In the aquarium, Redfin Bullies adopt the role of the bottom dwelling scavenger, much the same as, say, a *Corydoras* catfish would in a tropical tank.

They make good companions for other coldwater species such as goldfish, etc, but my preference is to keep and display them with some of the other wonderful New Zealand native fish species.

There are 27 species of fish native to New Zealand, soon to be made 31 by the recent discovery of four, as yet, undescribed species. Nearly all of them make good aquarium specimens, with a number of them being outstanding. They are all unique, and the interesting lifecycle of several present the breeder with a true challenge. For anyone wishing to know more about New Zealand fish, I would refer you to *New Zealand's Freshwater Fishes* by R. M. McDowall, which is 'the bible' on the topic and upon which I relied heavily in the writing of this article.

None of these fish is available outside of New Zealand at present, although there are moves afoot to change that. Anybody who would like to know more can contact me via the Study Group at the following address:

New Zealand Native Freshwater Fish Study Group,
c/o The Secretary,
2 St Stephens Drive,
Bombay R.D.
Pukekohe,
Auckland, N.Z.

REFERENCE

R. M. McDowall, *New Zealand's Freshwater Fishes, A Natural History and Guide*, published by **Heineman Reed** (now **Octopus Press**), Auckland. ISBN: 079 0000229 (1990).

EXCAVATIONS: DON'T GET IN A HOLE!

If you are thinking of digging a large pond, particularly one suitable for Koi, go no further until you read the important advice which **Peter Skinner** of Koi Kraft provides in this article

Illustrations by the author

For large excavations it's well worth considering the hire of a digger.

If you talk to anyone who's built a large pond and you ask them what was the most difficult part of the project, they may well say, "Digging the blasted hole" (or words to that effect). It seems that, all too often, the best location for the pond is at the back of the house where poor accessibility can create all kinds of problems.

EARLY CONSIDERATIONS

Appropriate site

One important point to consider before you start digging your pond is whether or not the finished project will look as if it 'belongs' in the environment. For instance, try to avoid building an informal pond at the highest point in the garden. If the pond is to be a formal design, then you will probably be able to get away with it, but always remember that, in the natural environment, you would rarely find a pond at the top of a hill.

One further point regarding the location of the pond: if you intend to have a waterfall make sure that you have a background to it. I once saw a 7ft (2.1m) high waterfall emerging from a pile of soil stacked against a wooden fence. The effect was reasonably good, until a red London bus came along behind the waterfall!

Soil type

Before you begin digging, it is essential that you discover the soil type on the site because this will determine whether the side walls of the excavation will need structural support or not.

If you are in any doubt, dig a hole almost as deep as the pond will be, but keep the sides vertical and then leave it alone for a few weeks; you will soon see what kind of snags you are likely to encounter. Alternatively, you could ask someone who is an expert in excavations to give you an opinion about your soil type.

Pond plans

It is important always to have in hand the plans for the compete system before you begin, so that you know exactly where to dig, and how deep. Not only do you want to avoid doing more work than is necessary, but, more importantly, misplaced excavations can be a problem.

For instance, if you were to dig the hole 24in (60cm) too deep by mistake, you couldn't just throw some spoil in the hole to make it up to the required level before you pour your concrete because it would not then be on a stable footing. Such a mistake could only be rectified by making the bottom of the excavation up to the required level using a material such as 'Type 1 sub-base' and then compacting it well. This material will not settle any further and then the concrete can be laid. All this hassle can be avoided if the site is marked out accurately beforehand, so that you know how far and how deep to dig.

Measurements

All measurements regarding heights should be taken in relation to a fixed point (datum). This can be a gate post, manhole cover, top of a wall, nail in a fence or even a specially concreted-in datum pole. All levels can then be measured from this point.

If you use a pole, you can draw pencil marks on it and write in what they refer to, such as: water level, top of filter, finished paving level, etc. This can simplify things later on and help prevent mistakes.

Water table

A fairly common problem is that of a high water table. When you dig your test hole, you may find a water level. If this is the case, you may be better off calling that level the bottom of the pond and build from there up.

You may be forced into having a semi-raised pond if the water table is too near ground level because it is an extremely difficult and expensive job coping with ground water while building a pond.

Underground services

Once you have decided what kind of pond you want, the next step is to make sure that there are no services underground where you want the pond to be located. If you have little option as to the siting of the pond, and you do have underground services at that point, then you will either have to build an above-ground pond or relocate the services.

If you are dealing with small-bore plastic water or gas pipes, then it is not difficult to divert them (contact the relevant authority for advice). Large water, gas or electricity mains, sewers or cable ducts, would be

Excavations as deep as this should have a perimeter demarcation to prevent accidents.

expensive to relocate, not to mention the amount of bureaucratic involvement.

CONSTRUCTION

Pond types

The simplest method of constructing a pond is to dig a hole, put an old carpet or liner underlay directly onto the dirt, and then install the liner. Although this may be fine for small, shallow, ponds that are informal, it is less suitable for the average Koi pond which will be 4ft-6ft (120-180cm) deep with vertical sides and, consequently, a liner may not be the best choice for sealing the hole.

Construction underway.

If you do want to use a liner to make a deep pond, it will be necessary to slope the sides of the excavation so that the earth does not collapse.

An alternative method of construction involves the use of concrete for the base and concrete blocks for the walls. Once this stable structure is built, it can be sealed by using a liner or by the application of a coating, such as pond paint or fibreglass.

1,000 + gallon excavations

If the pond is to be more than, say, 1,000 gallons (4,500 litres) I would strongly recommend that you have the pond dug by machine if there is sufficient space for access. Nowadays you can hire mini-tracked excavators which will go through a 1-metre (39in) gap and will be able to dig the hole with a fraction of the effort that would be required to do it by hand.

If you do hire a machine, then try to find a good operator because he will make a professional job and do no damage. Trying to learn to drive the machine yourself could well prove to be false economy. With the right soil type, the hole can be dug to an accuracy of about 3in-6in (c 7.5-15cm) which will minimise the amount of backfilling required when the pond is complete.

If your garden is mature and the movement of machinery is likely to do damage to your lawn or drive, then it is worth considering the hire of road plates. These are large mats of timber held together by steel strapping which you lay down so the 'traffic' can run over them without damaging your garden. When you have finished the project, these mats can be removed and the ground can be swept or vacuumed.

Topsoil disposal

If you are digging an informal pond, the first step is to scrape off the topsoil and stockpile it somewhere near to the work site. The rest of the spoil can then be removed and construction can begin. When the pond is complete, you will have some good soil to use for landscaping the surrounding area. If there is any left over, then it is easy to 'lose' it around the garden.

Getting rid of the spoil can sometimes be a problem. If you have plenty of room, perhaps some of the spoil can be used to shape the garden, but if it has to be taken off site, then you will need to hire either skips or a tipper lorry. Bear in mind that every 1,000 gallons (4,500 litres) of pond volume will yield approximately 10 tons (over 10,000 kg) of spoil. In practice, with ponds up to 3,500 gallons (15,900 litres), skips are more cost effective, but for large ponds, lorries will be more practical.

Whichever method you choose, be careful about inviting lorries in off the highway. The asphalt, paving or concrete in your drive was probably not designed to bear the weight of large lorries and could well be damaged. Manhole covers in your drive may be of the thin galvanised variety. These are fine for taking the weight of a Ford Sierra, but don't even think of running a skip lorry over them. If the manhole covers are likely to be in the path of any heavy vehicles then put some thick timbers or a sheet of steel over them.

Costs

To some extent, the method of constructing your pond will be decided for you by the soil type, but also before you begin, you should work out the cost of your chosen design (including topsoil removal) because these things have a habit of working out more expensive than you anticipate.

If the actual pond is completed but your budget has been stretched, the cost of the filter, pipework, pump, etc, could well be a problem. There is nothing worse than seeing a large, beautifully constructed Koi pond being maintained by an inadequate box filter because the preliminary costings had not been done carefully.

Contouring

If your garden slopes steeply and the pond is going to be sited in the bank, then you have a good opportunity to avoid the need to remove quantities of soil from the site. First, the topsoil needs to be removed and then the remaining spoil can be dug out and placed on the lower side of the pond. When doing this, you must put the dirt down in thin layers at a time and then run either the excavator or a vibrating roller over it several times to compact it thoroughly. By this process, you will eventually build up the soil so that you have a level site, the pond dug, and no spoil to remove.

It is intended that this compacted earth should be used to provide new contours for the garden. Be very careful if you wish to use this made-up ground as part of the structure for the pond, because no matter how well you compact the earth, it may settle a little more over the next eighteen months. If this were to happen, it could have catastrophic results with your pond, especially if it is a rigid structure.

The rule of thumb when constructing a pond using blocks or concrete is always to ensure that you begin with a sound footing set in undisturbed ground. If you choose a liner to seal the pond, then a very small amount of movement will not cause a problem.

In-ground filters

If you have an excavator on site to do the digging, then a lot of work can be saved if you are going to install an in-ground filter.

Many people use a machine to excavate the pond but forget about the filter until they have finished the pond. Then they find that

Many hands make light work!

Seaview

By Gordon Kay

CETACEAN FUND RAISER

Regular readers will be more than acutely aware of my fascination with cetaceans — dolphins and whales — but it seems that there is someone out there whose enthusiasm for these animals surpasses even my own. In fact, it could be said that he leaves me standing in the pro-dolphin stakes!

The **Whale and Dolphin Conservation Society** held its annual raffle towards the end of last year (with the first prize being a two-centre holiday in the States — with the second week whale-watching in the Sea of Cortez!). Well, a 22 year-old called **Karl Wenham,** from Rainham in Kent, showed everyone the way by selling tickets worth £525!

This makes me particularly ashamed, because I could only find the time to write a cheque to cover the tickets that the society sent me — and especially so when I learnt that Karl does other things to raise money for cetaceans: things like setting up and manning a display at a local service station, which raised a further £80.

Karl has been a member of WDCS for only a few months, but has, he says, always had a fascination with dolphins and long held the burning ambition to swim with them. Join the queue, Karl! Oh, by the way — Karl does have a connection with this magazine. He works for **Ashford Scanning,** the company which does all the colour separations for us. Good on yer, Karl. I sincerely hope that you fulfill your ambition very soon.

ACQUITTAL

Speaking of swimming with dolphins, you will recall that I have mentioned in the past the case of 'sexual abuse' on Freddie, the dolphin which chooses to live in the waters off Amble in Northumberland.

The trial was held in early December and the newspapers all seemed to carry, at least, one piece on the story. In one paper, I read a very interesting account of the previous day's proceedings, in which the accused was quoted as saying that, while he worked hard campaigning against the keeping of dolphins in captivity, the person making the most noise about what he was accused of was a curator at a dolphinarium. I've checked this and it appears to be true.

Also, at around the same time, I read some guidelines which were produced by **International Dolphin Watch** — Horace Dobbs's organisation, for swimmers who encounter Freddie.

One of the tips reads, and I quote, *"Freddie may expose his penis. This may cause embarrassment but is normal behaviour. He may also attempt to sow you with it. If you find this disconcerting, unhook yourself and swim slowly away. Do not hold onto his penis — such action could be misconstrued by onlookers".*

According to the 'quality' press, the whole case hinged on this very point, and the more I read, the more I was thinking that here, perhaps, was a bloke going through hell for nothing. The prosecution, in summing up, said that it was irrelevant that wild male dolphins hooked divers with their sex organs. I would have thought that there was nothing in this world MORE relevant!

Anyway, **Alan Cooper** was cleared and said that he would celebrate by going to see Freddie. One sad part was that his mother had died while he was awaiting trial, so never saw her son completely vindicated.

FREDDIE'S RECOVERY CONTINUES

And still on the subject of Freddie, I can assure everyone that he is alive and well, and seemingly recovering from his encounter with a propeller in September. Swimmers had been asked to stay away from him, in order that his wounds be given a chance to heal and not get re-opened accidentally.

However, those who know Freddie and his activities said that, even after the accident, he behaved as normal and was still swimming close to vessels at the harbour mouth. In addition, **Horace Dobbs** had the opportunity to swim with Freddie in October and reported that he had got the distinct impression that the dolphin was missing the level of contact he was used to and was deliberately seeking out human company. He even watched him catch a fish, toss it into the air and play with it, before returning to the boat from which Horace was watching. Terrific news, eh?

MARINE TIPS

More 'How To' snippets:

1 Try not to use nets to catch your fishes. Coral fishes invariably possess spines or fine finnage which will inevitably become entangled in the mesh and cause damage to the animal. There is also the stress factor involved — for both fish AND aquarist — in chasing the poor thing around the aquarium with a net. It is a far better idea to use a clear plastic container, in which fish and water can be lifted gently from the aquarium.

2 Coral fishes are very susceptible to shock. Always take care to equalise temperature, specific gravity and pH if necessary, in both the transportation bag AND the aquarium, before releasing a new acquisition. Also, turn off the tank lights first.

3 Always calculate doses of copper-based treatments accurately by using a copper test kit. Copper is only slightly less toxic to fishes than it is to the parasites you are trying to kill. It is, of course, lethal to invertebrates, so NEVER use copper in an invertebrate aquarium.

4 Never toss treatments into the aquarium 'willy nilly', and never use more than one at a time. Always diagnose any ailment accurately before deciding what to treat it with.

Karl Wenham of Ashford Scanning (second from left) presents representatives of the Whale and Dolphin Conservation Society with his 'giant' cheque.

Naturalist's notebook

By Eric Hardy

WETLAND THREATS

Lakes, marshes and your garden pond ... the world's wetlands, are in dire distress, under threat everywhere from 'development' by industry or agriculture.

Cyprus, the third largest island in the Mediterranean, lacked any natural freshwater bodies or indigenous fish until the government increased its dams tenfold in recent years. They are stocked with trout and other sport fish. Sport also dominates fish conservation in Italy — trout, pike, barbel and bass and, according to the director of Rome's Fish Breeding Institute, a poor understanding of fish ecological requirements.

Among more interesting European fish is the freshwater salmon, *Salmo salar sebago*, a land-locked race of Atlantic Salmon in Finland's Lake Saimaa. Pollution endangers the Asp in Finland's northern rivers, while the natural distribution of Whitefish, *Coregonus*, has been upset by conservationists introducing the wrong geographical race to some of its lakes, and foreign introductions threaten other native stocks.

The Council of Europe is concerned about the changing environment's adverse effect on native fishes of no commercial interest, as well as the disappearance of trout from the upper Elbe.

Nearly half of Europe's 393 registered fish species in rivers and lakes are either endangered or exterminated. The Nase, with a bony edge to its jaw to scrape off algae, has its eggs destroyed when spates smother them with silt and clay.

Although conservation proceeds in western Europe with plans like the reintroduction of Atlantic Salmon to the French Dordogne, the financial crises in eastern Europe, and especially Russia, has cut off many sources of grants. Joint French, German and Luxembourg efforts are being made to bring back salmon spawning grounds to the Rhine Basin, which in 1885 had a catch of 250,000 of these fish from a stock of some 800,000. As on many Russian salmon rivers, the migration of these fish was impeded by hydro-electric dams, and severe pollution added its toll. Thousands of fry will have to be released over several years, maybe 20 years. Political changes in Russia removed many of the restrictions on access to waters by visiting nationals.

The problem is not only with fish, but wetland plants too. The rare and declining Bog Orchid which grows in sphagnum near Grasmere, Carrock Fell and Mosedale, in Lakeland, in Teesdale, in Wales on a hill between Dalgellau and Corris, and in the Glaslyn Valley and between Cearn and Llynanafin near Aber, but chiefly surviving in peat bogs in southern England's New Forest, North Dartmoor and Ashdown Forest, has been added to the protected list by the Berne Convention. So has *Gentiana ligustica*, now found only in Italy and France.

The Convention also agreed to conservation of the Pearl Mussel and other freshwater mussels, as well as the haunts of Orsini's Viper in Lower Austria, Hungary and Romania. Some years before the war, the Intendant of the Imperial Castle of Laxemburg, in Lower Austria, offered a bounty on all vipers killed. In a single year, over 1,000 were slaughtered, only to discover the reptiles fed almost entirely on grasshoppers and many mice, but not lizards as supposed. One viper dissected revealed remains of 100 grasshoppers.

EXCELLENT REFERENCE

Wetlands, a magnificent 224-page hardback volume of large format with numerous colour plates, edited by Max Finlayson and Michael Moser and recently published by **Facts on File**, of Oxford, at £19.95, will be a standard authority and reference book on worldwide wetlands for many years to come, with regard to the worldwide problem of saving our swamps, lakes and estuaries.

It is not primarily a bird book. Sections on each of the world regions, edited by specialists, cover the physical and chemical aspects of wetlands, as well as their full flora and fauna influenced by vast industrial and agricultural changes. It appeals to the collector abroad as so many obscure waters are documented. Unfortunately, it uses American plant names even when the species grow here. While the Giant Toad, *Bufo marinus*, is widespread in Latin America, the Giant Frog *(Batrachophrynus macrostomus)* is known only from Lake Junin in Peru. In Asia, Azraq reserve has Jordan's only Marsh Frogs and Black Water Snakes *(Tropidonotus)*.

About 25 frogs are known from Australia's northern territory, where the Black Anal-finned Grunter *(Pingalli)* and the Arnhem Land Blue Eye *(Pseudomugil)* are two fish confined to the region. Further south, invasive Alligator Weed *(Alternanthera)* and alien willows threaten many habitats.

The Chinese Crocodile survives in viable numbers only on Linguasan Marsh in Mindanao and the Siamese Crocodile in a few isolated haunts in Vietnam and Cambodia. The Cuban and the Orinoco Crocodiles are on the verge of extinction.

In Europe, the damselfly *Coenagrion hylas* is confined to south-east Germany.

NEW DISCOVERIES

Chelodina reimanni is a new species of snake-necked turtle from New Guinea, *Plica nigra*, a new lizard from the Guaiquinima Tepui in Venezuela and *Dendrobates sirensis* a new poison-dart frog from the Serrania De Sira in Peru. So not all is lost to the investigative naturalist searching new waters.

Many of these searchers specialise in obscure groups. Most aquarists will therefore have never heard of the Isopod Society, an active little group seeking out woodlice and rock sea-slaters from wet places. They became very excited recently when a member found *Halophiloscia couchi* at St Bees cliffs on the Cumbrian coast, the most northerly known occurrence of this genus in the world. It was already known as the northernmost site of *Trichoniscoides albidus*.

The technique of finding these is to sit on the damp shore, pushing large handfuls of shingle between your legs and catching the slaters before they escape. Fourteen species of slater are known from St Bees shore.

Treadwater