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AQUARIST AND PONDKEEPER

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MARCH 1991 VOL. 55 NO. 12

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CROSSED THOUGHTS

What do you get when you cross a pheasant with a duck? A 'dheasant', of course.

Joking apart (yes, I've been caught out by this one, too!), how would you rate the chances of such a cross ever being achieved? Pretty low, I would suspect. But, is it really impossible? The answer could well be "Probably not".

What if it actually *were* possible? Should such crosses ever be carried out . . . and, if so, what (seriously) would you call the hybrids? Further, would it be ethical to produce such 'monsters', even if they turned out to be sterile, did not survive in the wild, and were produced strictly for distribution among enthusiasts?

When it comes to such matters, there seems to be two main schools of thought. On the one hand, the purists might argue that no human intervention should ever be allowed. At the other extreme, one could argue that, as long as hybrids are produced specifically for enthusiasts, then everything is admissable.

Some years ago, I produced some great-looking fertile hybrids between two species of *Limia*, *L. vittata* (Cuban Limia) and *L. melanogaster* (Blue Limia). I also produced hybrids between the Blue Limia and the Humpbacked Limia (*L. nigrofasciata*) — one of which managed to inseminate a female Sailfin Molly (*Poecilia velifera*) — and between three species of Gouramis belonging to the genus *Colisa*.

In doing so, I learned — among other things — that such fish, along with all their near relatives, should never be allowed to mix if pure lines are to be maintained. I also learned just how exciting it would be to investigate the subject further and produce some really unusual, spectacular, new fish. I never pursued this line of investigation, but I certainly ended up with a genuine appreciation of the feelings experienced by the pioneers of the ornamental fish industry, and all those who have followed them ever since.

From that day onwards, I could never again make categorical statements regarding the absolute rights or wrongs of hybridisations. I still prefer the simple lines of wild-type fish, but am still knocked sideways by the magnificence of many of the fancy fish, both tropical and coldwater, that I find myself judging every year.

I also stand in awe at the knowledge, skills and unflinching determination of those who provide us with such fantastic, colourful fish for our home aquaria. Yet, I still feel that a good wild-type Guppy or plain-coloured wild Goldfish is unbeatable . . .

Where do *you* stand?

John Dawes
Editor

EDITOR John Dawes, **ART EDITOR** Ian Hunt, **ADVERTISEMENT MANAGER** John Young, **PUBLISHED BY** Dog World, 9 Tufton Street, Ashford, Kent TN23 1QN. **TELEPHONE: ADVERTISING AND PRODUCTION** (0233 621877), **FAX NUMBER** 0233 645669, **SUBSCRIPTIONS** £21 per annum post paid. Overseas rates on application. All subscriptions payable in advance to: Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.
Origination by Wishpark Ltd. Printed by Headley Brothers Ltd both of Ashford, Kent.
Distributed by UMD, 1 Benwell Road, Holloway, London N7 7AX. Tel: 071-700 4600 Fax: 071-607 3352

THE FRIGHTFUL MOVING EXPERIENCE

Ever tried moving fish to your new house? **Jason Endfield** has . . . and wishes he hadn't!

"Urgent Help Required; Desperate Times Mean Desperate Measures; Wife, Dog, And Nine Goldfish To Support (they've started breeding). **Please,** Buy My House."

This is a genuine advertisement that I spotted recently in a newspaper. It illustrated the desperation that fish can bring about in a hitherto sane human being; because, although he has a wife and dog to support, take it from me, it is the Goldfish that are pushing the gentleman advertiser close to breaking point.

I believe (and this is a bold statement) that all fishkeepers were sane once. Yes, I really do. Then the fish 'bug' bites and, before we know what's happening, we're incurable aquarists. But what the advertiser doesn't seem to realise is that moving house will not help his problem. Indeed, his troubles will only be starting if he finds a buyer for his house.

Ever had a really bad nightmare? Ever moved fish? It amounts to the same thing. Those readers who have experienced this horror will probably have turned white and fainted by now; for the remainder, are you sitting comfortably? Then I'll begin. Fish don't like being moved (which is why I have great respect for the staff in our shop who catch the fellows with apparent ease), and that said, please allow me to relate my chilling tale.

My experience of moving fish happened several years ago, though I still wake up screaming in the night?! It was a dull, dark, rainy day — the sort of day when lightning strikes overhead with a ghastly cracking sound . . . Inside the vacated house everything was ready.

The fish were the last items to be moved, and, naturally, that task was my responsibility. They had all been caught (this shortens the story considerably, and also saves me from re-living yet another episode of this saga). Two buckets full of tank water and fish stood on the floor. Plenty more water covered the floor. Among it all stood the empty tank and me. The car was outside waiting to take us all the five miles to the new house. Fortunately, there had been three of us to carry the tank, which still contained a few pounds of wet gravel, to the boot of the car, and now I was securely positioned on the back seat clutching the buckets.

The driver (who shall remain nameless to save embarrassment) found two enormous hillocks, and I, in turn, found myself more than a little soaked with water from my buckets. And this was before we had left the driveway . . . it didn't bode well . . . Luckily, the dazed fish remained in the small amount of water that was left, no doubt thanks to the wonders of centrifugal and gravity forces. Why didn't I use plastic bags? I don't know! And anyway, this is no time to ask sensible questions. If we can continue . . .

The journey seemed to take forever, and I am surprised that the water didn't evaporate in the age it took. On arrival at the new house, I wondered whether the Guppies in bucket 'A' were of the same generation as those we started the voyage with.

Well, anyway, the worst, I thought, was now over. Wrong! I took the buckets of fish inside to relative safety, and then went to get the tank from the car boot. I remembered at this point that it had taken three of us to get the tank into the boot, but I had neglected to arrange for two helpers to be on hand at this end. Our helpful driver had conveniently vanished and I was left to manoeuvre the tank myself. A good time to introduce myself to the neighbours I decided deviously, but as I looked around, curtains flickered and people, obviously registering my predicament, were suddenly 'out'. An elderly lady hobbled past. "Erm, excuse me . . ." I began, but then my consideration for old folk got the better of me and I restrained myself.

I began to struggle with the tank. Alone. I lifted it up and felt my back give way. But I had to think of the fish, and continued to heave it out of the boot, cursing fish and life in general. Another passer-by shouted over to me with some ever-so-helpful advice: "Lift it on to your shoulder — it's easier then." He further enlightened me with the physics of this theory, and very nearly got the tank on his head, courtesy of my temper — I just wasn't in the mood for helpful hints.

Nevertheless, where there's a will, there's a way, and I somehow managed to get the tank out of the boot, into the house, and even up the stairs. I've never been quite the same since, though some would say that's nothing to do with moving the tank . . .

Some time later, the fish were safely re-housed. They didn't appreciate the trouble I had been to — fish never do, do they? And I can't tell you how much I dread the day I may have to move them again. Perhaps that's because I now have more tanks. Maybe because I've also got more fish. Or it could just be that I know the horror of it all could prove too much. (At this point, a shudder runs down my spine and a flash of lightning illuminates the sky . . . just to re-create the atmosphere.)

My heartfelt sympathy goes to our poor advertiser friend. Sir — must you move house? I mean, can't you somehow find a way to stay? I warn you — try anything to avoid THE NIGHTMARE OF MOVING FISH . . .

Tomorrow's Aquarist

By David Sands

Last month **TA** was noticeable by its absence, this being due to a real mix-up on my part. I was incredibly busy and somehow living under some illusion that I had sent off my scribbles to our beloved editor! His letter, explaining why **TA** would not be making an appearance in last month's *AGP*, was the first I knew that I hadn't done my work!

Do you ever forget to do work or think that you've done it already? Supposing you forgot to feed your fishes??? They are probably *so* fat that a missed feed would do them some good!

TA CORRESPONDENCE AND THE PEN PAL CORNER

I received a super badge from **Simon Parker** of 47 Springfield Road, New Southgate, London N11. The 'model' badge is of a *Phractocephalus hemioliopterus*, the Red-tailed Catfish, and is three dimensional. My wife, Amanda Jane, is going to pin it onto her long coat alongside her official Red Tailed Catfish Club badge and a New York brooch I bought her some years ago. When I find the chance, I will photograph the badge for **TA** readers to see Simon's handiwork.

I have given Simon's address, in line with the idea already written about in this column, so that those **TA** readers who express a wish to write directly to each other will be able to do so.

Simon says he also draws fish... He has been keeping fish all his life, starting with a goldfish and now a tank of tropicals. His mum and dad don't help him with the fish (they don't even know the names!!!) although dad, according to Simon, buys everything needed for the tank.

I will send Simon a signed copy of *A Beginner's Guide to* Corydoras (*Keeping Aquarium Fishes*), courtesy of Dee Bee Books.

Dr David Ford received a bubbly letter through the 'Aquarian' Advisory Service, from **Miss A Amamasi** c/o Aladunma Hospital, Box 2913, Owerri, Imo State, Nigeria, in Africa. She would like to be pen pals with other young fishkeepers . . I don't know why she writes from a hospital, but she has had a tank and her father has a pond.

Louise Lillywhite writes from nearer home, at Longbarn, Common Lane, Ditchling Common, Nr Hassocks in Sussex, and she thinks the pen pal idea is brilliant. She is 15 and is a member of the Mid-Sussex Aquarist Society.

She hasn't many kind words about a fish shop near to her and would like to work in an aquatic centre (or own her own!) in the future. Louise enjoys giving pet names to some of the 200-odd fish in her care, with two Moors being known as Mr and Mrs Moor, Felix, a Channel Catfish, and a Koi she had called, Jonah.

Louise, in her very interesting, well-written letter, asks why she cannot find different fishes in her local shops. . .she wants Archerfish and Round-tailed Paradise Fish!

Louise currently works at a local kennel/cattery at weekends and during holidays, so her problem is actually reading books when she finally gets to the library.

Louise's one burning ambition is to travel to the Brazilian rainforest and see the Amazon.

Eight year old **Jacob Cowling**, of Sutton Coldfield, sent in an unusual letter about his design for a Piranha tank — or *perrony ah* — (as Jacob also writes, giving people a chance to say the name easily . . .).

Jacob has drawn diagrams detailing anti-bite lights, a built-in medicine cabinet and food unit. Our editor has forwarded some 'perrony ah' *AGP* articles to Jacob.

If any other readers would like to come up with exciting phonetic spellings of fish I will publish the best of them in a future column.

Miss Alison Ronald of Aberdeen, a regular **TA** lady, writes and asks where can she obtain some young Convicts (we have loads at AquaAdventure) . . .

Can any other Scotland-based **TA** readers help?

Another regular writer, **Michael Doney**, from Sheffield, forwarded me some cartoon catfish . . .and an interesting limerick

There was a young plec from Quebec
On his nose was a very big speck
His tail was white, which he knew was not right
'cause it clashed with the hairs on his neck!

I'll reserve judgment on that one . . !

Finally, **Ben Kinsey**, who won the 'Aquarian' Peru Expedition Tee-Shirt competition in **TA**, forwarded me a super drawing of a Glass Catfish which I will send on to the editor because it's excellent.

If any reader does strike up a pen-pal friendship with another **TA** reader please let us know all about your contacts and how communications between you help make the hobby more interesting.

In the meantime, thanks for all your letters and best wishes.

SEA-LIFE CENTRES

Have **TA** readers visited any of the Sea-Life centres (which number a good few) now marking our coastlines? Some weeks ago, I visited the new Blackpool pleasure beach centre which boasts the largest 'shark encounter' tank in the UK.

Rod Haynes kindly showed us round this wonderful aquarium with its open-topped pools cleverly littered with flotsam and jetsam washed up in the gales at Blackpool. One pool has a wave action splashing against a very life-like line of breakers.

DAVID SANDS

Faye, my daughter, getting to grips with a crab in Oban Sea-Life centre's touch pool.

I could not help remembering my first visit ten years ago to the first Sea-Life centre at Oban in Scotland. How this concept has blossomed in the last decade. The original 'touch pools' went down a storm with my young daughter, Faye.

Blackpool's spectacular ray and dogfish pools did not disappoint us. We, as the biggest children at the centre, almost had to be restrained from playing with the biggest rays as they cruised the tank surface.

I can honestly say that Sea-Life centres have a lot to offer any family, with or without any fish interest. I'm told the old Brighton aquarium is about to re-open as a Sea-Life centre. . .

Have any readers been to Sea World in Florida?

I had the pleasure to visit when Shamu, the baby Killer Whale, had just been born and the place was full of baby whale promotional merchandise. I was given an escorted look round this massive aquarium centre, including a huge 'walk through' shark encounter and wondered if Britain would ever have anything quite as impressive.

There have been many ideas for giant public aquaria, both in Liverpool and London docklands. So far, nothing has come of those grand ideas, although Sea-Life at Blackpool makes a great attempt.

Graham Cox, of Sea Aquariums in London, once told me he dreamed of a massive public aquarium, large enough to exhibit every aquatic creature from Sperm Whales to water fleas. The problem with such a costly investment is that the UK probably cannot really sustain a year-round tourist attraction beyond our existing 'national' institutions.

I'm not even sure if large aquatic mammals or fishes should be contained in aquaria, but then again, I am confused about many aspects of mans' relationship with animals these days.

Write to me with your public aquarium experiences and perhaps we can work out a prize for the best letter . . .

COVER STORY — FRESHWATER PUFFER

(Photograph: Hans Reinhard/Bruce Coleman Ltd.)

The Freshwater Puffer (or Globe) Fish (*Tetraodon mbu*) could probably be the perfect answer to snail population problems in freshwater aquaria. The reason for this is that this species appears to relish snails over virtually anything else. The hesitation expressed arises because, unfortunately, *T. mbu* — like most other Puffers — has a snappy disposition and seems to like nipping fins only slightly less than it likes snails!

Lengths of up to around 75cm (2ft 6in) have been recorded for this rotund fish in the wild, but such a size is only ever achieved in captivity when the accommodation is larger than that which most aquarists are able to provide.

Despite its sizeable(!) drawbacks, *T. mbu* is an interesting, attractive, unusual species which can live for many years and is well worth considering by any aquarist who likes something rather special and out of the ordinary . . . and can keep up with the species' dietary demands.

Seaview

By Gordon Kay

Funny how things go full circle, don't you think? Here was I, only last month, bemoaning the fact that news was non-existent and now it is coming out of my ears. To quote our erstwhile leader, it's a funny old world. Get on with it Gordon!

B.M.A.A. BREEDING PROJECT

Things are certainly buzzing within the British Marine Aquarists Association. Membership Secretary Alan Hale and member Roy Swanwick are setting up the BMAA Marine Breeding Group. Alan is a personal friend of mine and, believe me, he talks about nothing else. So, if effort and enthusiasm count for anything, I know that it will be a rip-roaring success. The lads have been working together for some time and have, over the past two years, raised Common Clowns, Yellow-tailed Blue Damsels, Mandarins and Sea-Horses with some success — albeit in relatively small numbers. The aims of the group are:—

1. To provide a focal point within the BMAA for the captive breeding of tropical marine fishes and invertebrates.
2. To encourage an exchange of information regarding breeding techniques.
3. To provide members with a list of people who have spawning animals, for possible egg/fry collection, to enable cultivation attempts.
4. To provide back-up food cultures so as to secure longterm feasibility of the group and to allow transfer of the said cultures when members' cultures are below limits safe for harvesting.

Alan and Roy are attempting to establish a small research unit and are now looking for donations of equipment from within the trade, so, manufacturers, shopkeepers etc. take note. As Alan said, a concerted approach such as this will provide greater chances for success and so I, for one, wish Alan and Roy all the luck in the world. However, I feel that *I* should take some credit here. It was my group of Damselfishes which got Alan interested in the first place! Anyway, all people interested in the above group (and let's face it, we should *ALL* be interested) can obtain further information from Alan on **021 556-0731.** Better still, join the BMAA — what better reason for doing so can you think of? Again, Alan is the man to talk to.

UPLIFTING DOLPHINS

The "Dolphin Man", Dr. Horace Dobbs, is at it again. You may know that Horace founded International Dolphin Watch in 1978. Now there's a new research project (launched in 1987) called Operation Sunflower to explore the possibility that dolphins may be able to help humans suffering from depression.

The uplifting effect of dolphins on humans has been observed since ancient times and Operation Sunflower is seeking to identify and capture this quality and apply it to the relief of psychiatric disorders which are a symptom of the stresses of modern-day living.

During the summers of 1987-89, three people suffering with different types of depression were taken to Ireland. There, they swam with a friendly dolphin and the results were encouraging to say the least. The outcome of their swims with the dolphin were recorded on film and video and provided the basis for a TV film, *The Dolphin's Touch.*

Right from the beginning, it was realised that success would lead to enormous demand for human/dolphin contact which could never have been fulfilled. It was realised that, if the talents of film stars and the genius of composers could be captured on film and record, then it could well be possible to capture the joyful essence of the dolphin.

To test this notion, it was decided to produce a video and an audio cassette called *Video Pill* and *Audio Pill* respectively. These were to be assessed by depressives, the contents varied and their effects monitored. The first returns indicate that listening to the *Audio Pill* may be beneficial to so-called 'Normal; subjects as well as to people suffering clinical depression. Good on yer, Horace. I wish you and everyone concerned every success.

Anyone interested can obtain more info from **Melanie Parker, Secretary, International Dolphin Watch, "Dolphin", Parklands, North Ferriby, Humberside, HU14 3ET.**

If you are interested in dolphins, you really ought to join IDW.

DR. ROBERT GOLDSTEIN

Juvenile Common Clown. The B.M.A.A. hopes to breed this and numerous other species as part of their latest project.

HIDEOUS CREATIONS

All this brings me very nicely to my next item. I read, with great interest, Jason Endfield's piece the **Herring of Hojer** in January's *A&P* and have to say that I could not agree with Jason more. Some of today's creations are indeed hideous.

After reading it, I started to muse over the captive breeding of Coralfishes and wondered whether — after becoming proficient in the art of rearing many species of Angels, Butterflies and so on (which has to be the goal of us all) — we would start breeding weird and wonderful mutations of some of nature's most fabulous creatures.

Bubble-Eyed Queen Angels perhaps, or even Balloon Moorish Idols? I hope to God not.

ECO-LABELLING UPDATE

You will remember that I told you about Dr Elizabeth Wood's **Eco-Labelling Scheme** late last year. Well, things are progressing quite well with that, and I dare say that there will be more about it on this page in the coming year.

However, I have recently been consulted on another, similar, project headed by Nigel Cruickshank and Colin Grist, who is curator of the Marine Land Aquarium in Cheddar Gorge. Although this new initiative is concerned with all sectors of the hobby — as opposed to Coral species in the case of the **Eco-Labelling Scheme** — I was a little concerned when first approached. I felt a certain sense of divided loyalties and suspected that the whole thing would become a competition, with the first to the post grabbing all the glory.

Well, I made my feelings known and was assured that this would not be the case and that Nigel and Colin will, in fact, stand aside on the marine side should their efforts compromise those of Liz Wood. Indeed, there is a meeting planned between the three parties (which may have already taken place by the time you read this) so, maybe, we shall see them working together for the benefit of what is to me, the most significant move our hobby has seen.

Marine aquatics is under increasing pressure on all flanks — not least of which is the coming of 1992 — and everyone concerned has to be seen to be conscientious and caring. I believe that the initiatives mentioned above will go some way towards this.

Meanwhile, I'll see you next time.

QUEST FOR EXCELLENCE

A small group of dedicated UK coldwater enthusiasts are involved in an advanced co-ordinated breeding programme designed to produce Ranchu of the very highest quality — fit to do battle with the best of the best. *A&P* editor **John Dawes** was invited to attend the 1990 autumn show of these superlative fish. He came away considerably wiser . . . and humbler!

(Photographs by the author)

Judging underway — democracy at work!

The head growth in the best Oiya (third year fish) can be truly spectacular.

It is often said that Koi-keeping begins and ends with Kohaku. Well, after recently seeing the best Ranchu I have ever come across in my whole life, I could quite easily believe that Fancy Goldfish-keeping begins and ends with Ranchu.

'UNREFUSABLE' INVITATION

It all started in early September with a 'phone call from Gary Lewis, well-known importer and breeder of top-quality Fancy Goldfish, inviting me to attend an autumn fish show with a difference.

Some years ago, he and another eight or so Ranchu fanatics, took part in forming a small group totally dedicated to improving and maintaining the highest standards of excellence in a line of Ranchu personally brought over for the purpose from Yokahama by the President of the leading club (Kai) in Japan.

Judicious selection and breeding from those original stocks have, over the four years, resulted in Ranchu of unequalled quality in Great Britain.

Every autumn, the group get together competitively (they also meet monthly) at one of the members' houses where, in a long session of very serious collaborative (and highly democratic) judging — the likes of which I have never witnessed before — they select the very best of their first (Tosai), second (Nisai) and third (Oiya) year fish.

The fish — even the non-winners (there are no losers) — are, to say the least,

The fish are judged from above in true Japanese style.

A LUMPY PROBLEM WITH PAINTED GLASSFISH

Stan McMahon, Peter Burgess and **Roy Moate**
of the Fish Research Unit at Plymouth Polytechnic
reveal the true nature of the 'lumps' that often develop on Painted Glassfish.

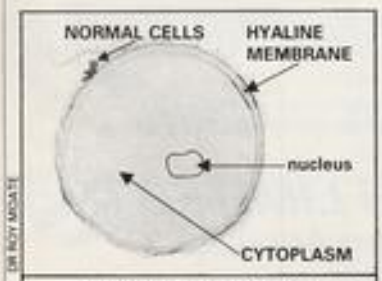
STAN McMAHON

A badly affected blue Painted Glassfish.

What were these white lumps, spots, warts we saw on the Painted Glassfish? We had observed these symptoms on a number of Glassfish (*Chanda* sp.) in aquatic shops in the Midlands, Southwest and Southeast of England and noted that they appeared common on 'painted', but rarely on uncoloured, specimens. Was it White Spot? Maybe it was a trematode infection or, more likely, Lymphocystis (Cauliflower) disease. We decided to investigate.

On reading John Dawes' editorial on Painted Glassfish (*Aquarist & Pondkeeper*, March 1989) we discovered that these fish are either 'painted' or injected with a dye. Such dyes are usually bright and gaudy.

Specimens showing the above symptoms on body and fins were obtained from several outlets. These fish had been coloured with either purple, blue, yellow or orange dyes. The fish were given a light anaesthetic in order to observe them under a low power binocular microscope. The dye in our specimens was definitely not on the surface but appeared to be under the epidermis, in fact, between the epidermis and muscle tissue. Furthermore, the dye appeared fluid and could be moved and concentrated in one area by applying gentle pressure to the coloured region of the body.



DR ROY MOATE

ELECTRON MICROGRAPH I
HYPERTROPHIED LYMPHOCYSTIS CELL
(X200 magnification)

HIGH POWER MICROSCOPY

Some of the white warts were collected from the fish and prepared for observation under the high power electron microscope in order to ascertain whether Lymphocystis really was the cause.

Sections were cut through the wart which was found to be spherical and singular. If this was Lymphocystis, then it was unusual, as the virus tends to cause a clustering of wart-like tissue (Wolf, 1988).

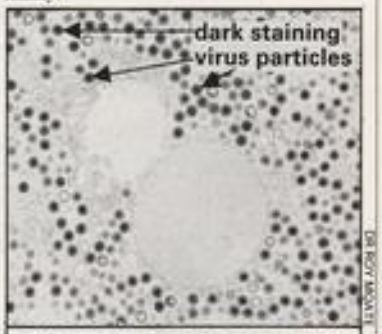
Electron Micrograph No. I gave us the first microscopy clue to our diagnosis. The spherical wart was, in fact, a single cell which had enlarged to hundreds of times its normal size (this process is known as hypertrophy), but what had caused the cell to act in this abnormal way? A higher magnification was required.

Following the preparation of further sections, we obtained Electron Micrograph No. II, giving a magnification of 10,000 times actual size. Here, we observed regular hexagonal shapes within the giant cell. These were the viral particles we had been looking for — millions of them! They had caused the cell to undergo hypertrophy and form a diagnostically typical thick hyaline membrane.

JOHN DAWES

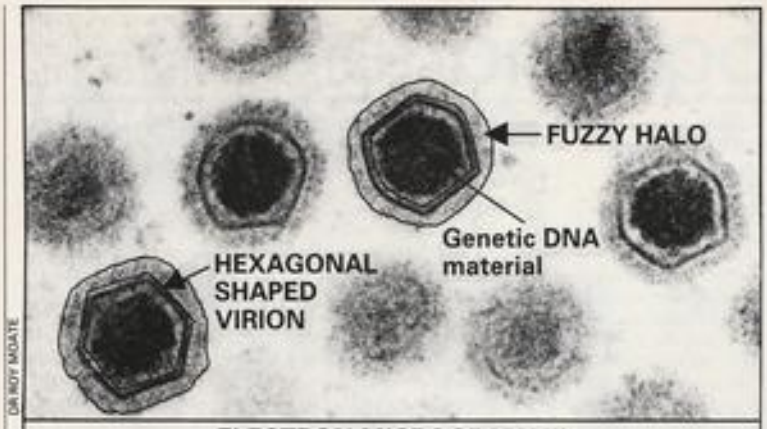
A lymphocystis-free orange/red Painted Glassfish.

Electron Micrograph No. III shows greater detail of the individual virus particles (virions), magnified 100,000 times. The causative agent of the warts can be clearly seen and this is undoubtedly the Lymphocystis virus, a member of the Iridovirus family.



DR ROY MOATE

ELECTRON MICROGRAPH II
Showing numerous viral particles within the giant cell cytoplasm.
(x 10,000 magnification)



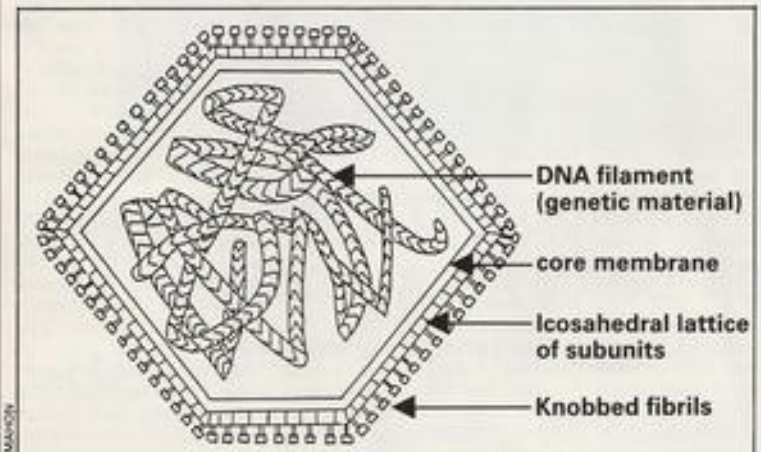
DR ROY MOATE

ELECTRON MICROGRAPH III

Showing details of individual virus particles (= virions) (x 100,000 magnification)

PETER BURGESS

An uncoloured healthy Glassfish.



SEAN McMAHON

Diagram of a lymphocystis virion

Each virion is actually icosahedral in shape but appears hexagonal in the two-dimensional section. Its average size is 200 nanometres (one nanometre = one millionth of a millimetre) and consists of a dense core with two unit membranes (see interpretive diagram). The fuzzy halo surrounding the virion is caused by knob-like sub-units or fibrils which keep the virions apart (Berthiaume et al, 1984). Biochemical analysis of the Lymphocystis virus by Robin et al (1983) shows it to be composed of 42% protein, 17% lipid (fat), and 1.6% genetic DNA material, the remainder possibly being sugars.

POSSIBLE CAUSES Of LYMPHOCYSTIS

Factors such as overcrowding and external traumas (stress) are believed to enhance transmission of the Lymphocystis virus and cause onset of disease symptoms. The virus is spread through contact with infected fish or infected tissue and can invade the fish by entry through breaches in the skin or via the gills. Therefore, any traumatic activity such as netting, marking or tagging, where the skin could be damaged, can result in an outbreak of the disease (Clifford and Applegate, 1970 and others). Perhaps we can now include injecting or painting with dyes to the list of traumas which may exacerbate Lymphocystis disease.

TREATMENT FOR LYMPHOCYSTIS

Chemical or antibiotic treatment is useless against Lymphocystis (and other viral diseases) and surgery to remove the warts is not advisable. In our view, the best action is to isolate any infected fish and ensure that they are kept in stress-free conditions. Eventually, the virulence of the disease should recede and the white warts will slough off the fish (as occurred with our specimens) and, hopefully, in time, this may coincide with the dye fading, leaving a healthy, unstressed, wart-free glassfish-like Glassfish!

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Herpetology matters By Julian Sims

TOAD TUNNELS

At some time during this month, according to the prevailing weather conditions, the mass movement of tens of thousands of Common Toads (*Bufo bufo*) begins in Europe. These mass movements include some very spectacular migrations in various parts of Britain.

The reason for such mass movements of amphibians is due to the fact that adult Common Toads do not always spend the winter near the pond in which they will spawn.

Adult toads may travel quite considerable distances to return to their traditional breeding sites — distances in excess of 2 kilometres (1¼ miles) have been recorded. 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. Toads are not fast-moving animals, and a wide road might take several minutes to cross.

Since 1986, ACO Polymer Products Limited have been developing solutions to the problem of amphibians crossing roads. Polymer concrete does not absorb water in the same way as conventional cement concrete. It is therefore more suitable for amphibians to move along, with a reduced risk of them becoming dessicated.

The first 'toad tunnels' in Britain were laid under the busy A4155 near Henley-on-Thames at Hambledon in Buckinghamshire during 1987. These original toad tunnels were constructed of sections of standard industrial drain — the Q200 — an ACO product. However, much research and development have taken place since 1987, and ACO now manufacture purpose-built amphibian tunnel units, in one metre lengths. Each tunnel unit has 24 slots in its roof, and the top of the tunnel unit lies flush with the surface of the road. The slots allow air and moisture into the tunnel so that conditions do not become too hot or stuffy.

JULIAN SIMS

Ventilated ACO Toad Tunnel near Steyning. The low flexible polythene barrier is visible on the far side of the road.

Another advantage of the specially designed amphibian tunnel is that it can be installed closer to the surface of the road than a drain. As there is less digging to be done, it is quicker and therefore cheaper to lay. There is an unusual 'popping' sound in the tunnel as vehicle wheels pass over the ventilated roof.

In the spring of 1990, two amphibian tunnels, constructed from ACO's new product, were laid under the A283, north-west of Steyning in West Sussex. These proved quite successful during the spring of 1990. Unfortunately, the red triangular road signs which gave motorists advance warning of a 'toad crossing' site, were stolen within days of being erected. It seems that these triangular signs, which have a black toad on a white background, have become collectable items for certain misguided members of the public.

Low walls or barriers are necessary to direct amphibians towards the entrance of a tunnel while, at the same time, preventing them from gaining access to the road. At Steyning, amphibians were directed towards the entrances of the two tunnels by low, flexible barriers made of polythene sheeting. Even though this plastic sheeting was pegged by wooden stakes, adequate tension was not maintained and it buckled in the wind.

However, a hazard to other types of wildlife can arise if a permanent, low wall is erected. For example, a conventional rigid barrier can affect the movement of hedgehogs, beetles and lizards. They might even get trapped on the dangerous road side of the barrier. To overcome this problem, ACO have designed and manufacture a special 'one-way' amphibian fence.

The patented design of the fence allows small animals (including toads) to move off the edge of the road but not onto 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, amphibians cannot climb up the inside of the concave. The fence (and the little poles which are used to support it) are made from recycled plastic.

ACO POLYMER PRODUCTS

ACO Polymer Products' toad tunnels save thousands of lives.

A four-page colour brochure giving further details and technical specifications of the amphibian tunnels and fencing systems that ACO produce, can be obtained direct from the manufacturers:

ACO Polymer Products Limited,
Hitchin Road,
Shefford,
Bedfordshire SG17 5JS
Telephone: Hitchin (0462) 816666

ACO have also sponsored the publication of *Amphibians and Roads* — the proceedings of the Toad Tunnel Conference held in Rendsburg, Germany in January, 1989. This 202-page book contains an account of 23 papers read at the conference. Up to the minute information about the installation of amphibian tunnels and fencing in Belgium, the Netherlands, France, Germany, Switzerland, England and Wales is available in this one concise book.

Copies can be obtained from ACO Polymer Products at a cost of £6 each, which includes postage and packing.

Two types of 'toad conservation' car stickers bearing the messages HELPING TOADS UNDER ROADS and HELP A TOAD ACROSS THE ROAD are also available from the above address. These cost 75p each, but please specify whether you require car *window* stickers **or** car *bumper* stickers.

ACO also market distinctive, good quality T-shirts and sweat shirts which carry the conservation message HELPING TOADS UNDER ROADS. Further details about these products, including size and cost (with postage and packing), can be obtained from **Patricia Grimes** at ACO Polymer Products.

Let's hope that, in 1991, more people become mindful of the problems which toads encounter on their migrations, and that these interesting amphibians receive the care and consideration that they deserve.

COUNTING THE (RUNNING) COST OF KOI-KEEPING

Koi-keeping may be fun, but it's not necessarily cheap, as **David Twigg** demonstrates.
(Photographs by the author)

My pond, showing off my wife's colourful collection of potted plants . . . and a flourishing growth of blanket weed in the watercourse.

Part of my 'shoal' — which includes my fastest-growing fish (the scaled Hariwake (gold/white) which grew from 17in (43cm), when purchased, to the 23in (c58cm) shown here, in nine months.

A short time ago, our editor visited my home and, having had a look at my pond system, made comment to the effect that I must be RICH. Upon my protestation, he modified his words to suggest that I was not poor if I could heat my pond water. I had to agree that, while not poor, I could only afford to keep my Koi in these conditions because I chose to stay at home, rather than jetting off to the SUN for annual holidays and the like. It also got me thinking as to just what I *did* spend on Koi-keeping in a year. So, if you are contemplating Koi-keeping, here are some facts which may help you decide.

'CURRENT' COSTS

I'd like to start off with what is probably the most expensive commodity I am using . . . electricity. It is expensive, and so I use Economy7 electricity at night, and the figures take this into account. Economy7 is currently (Ha, Ha!) charged at 2.38p/unit and day units at 6.62p/unit.

No. 1 son, Alex, preparing the ground to receive its carpet prior to fitting polystyrene sheeting around the walls and then fitting the butyl liner.

I haven't got a lake, so I need to circulate water through my filter system. A pump is needed for this and I use a Dab Nova 300, rated at 375 Watts. Cost to run continuously = £(0.375 x 7 x .0238) + £(0.375 x 17 x 0.0662) = £0.4845 per day.

Due to arrangement of facilities, I cannot make use of the main pump to provide power skimming and therefore use a supplementary pump. I use an aquarium power head and this is rated at 6W on the label. Assume 50% usage and cost = (0.006 x 7 x 0.0238) + (0.006 x 17 x 0.0662) / 2 = £0.0039 per day.

To ensure sufficient oxygenation of pool and filters, I continually run (output adjusted to suit conditions and time of year, a HI-BLOW air pump rated at 40 Watts. Cost = (0.04 x 7 x 0.0238) + (0.04 x 17 x 0.0662) = £0.0517 per day.

I heat my water using a 6KW swimming pool heater and this costs 92p when on continuous E7 use at night. The last 12 months have averaged £1.20 per day, as during the deepest parts of winter, the thermostat cuts in during the daytime to maintain my selected temperature.

Last autumn I decided to grow on most of my own fry rather than pass them on to Koi-keeping friends and, consequently, during the autumn and winter months, my 150W aquarium heater was on almost continually to keep the temperature up at 15°C.. Assuming, this time, 75% usage, we have Cost = £(0.150 x 7 x 0.0238) + £(0.150 x 17 x 0.0662) x 3 / 4 = £0.145 per day.

Running Total No. 1

Totting up this bill so far, amounts to £689.85p per year, or £57.49 per month, or £13.27 per week, or £1.89 per day!

FOOD BILL

Now, that figure is before I start to feed my fish. I am a little short on facts here because, while I have kept an accurate log of quantity of food purchased, I did not think to record the cost.

My feeding regime is one of variety. It is based on the principle that, if I purchase a mix of food, then not only will the fish not get fussy about any particular pellet, but they will also get a mix of vitamins, minerals, proteins etc.

Because I heat my water, the fish are eating nearly all year round, albeit at a greatly reduced rate during the winter months of December, January and February. I have purchased 70Kg of pellets during the last 12 months, ranging from Hikari Gold, to BP Beta trout pellets, and if I use £4 per Kilo as an average price, then that is another £280 to be added to the electricity bill.

This diet is supplemented by luxuries as oranges, lettuces, brown bread and cockles, to name but a few, and I would find it difficult to put a cost on them. However, for the sake of argument, let's say £20. Therefore, my total food costs are £300 per year.

Running Total No. 2

Totting up again, this amounts to £989.85p per year, or £82.49 per month, or £19.04 per week, or £2.71 per day!!

CLUB EXPENSES

There is yet another expense which springs to mind: membership of 'clubs' to further one's knowledge, and to enjoy the social atmosphere which follows from it. B.K.K.S. membership: £12.50; B.K.K.S. Section membership: £7.50; M.K.A. membership: £8.50 — an annual total of £28.50.

Running Total No. 3

Totting up yet again, this amounts to £1018.35p per year, or £84.86 per month, or £19.58 per week, or £2.79 per day!!!

SUNDRIES

Medication for fish and/or pond treatments, such as "Refresh", for those who wish to use it, will be an additional expense on which I cannot put a figure, but it should be borne in mind.

Another is the cost of running a Jabsco, or similar, vacuum pump for cleaning the bottom of the pond.

We visit Koi shows and dealers eachy year, which involves the use of petrol, incurs entrance fees and the inevitable raffle tickets, cups of tea, coffee, orange squash, etc.

We purchase books, magazines and make regular trips to friends' homes to admire their new fish, or filter arrangement, or whatever. This all costs money. Say, £300 per year.

Running Total No. 4

Totting up one last time, this amounts to £1318.35p per year, or £109.86 per month, or £25.35 per week, or £3.61 per day!!!!

KOI COSTS

An item I haven't mentioned is the cost of KOI! I have a collection which, until these last few months, grew at about two fish per year. I have just purchased 5 smaller fish (5 to 12in — 12.7 to 30cm) which are now well settled into their new home.

A very personal thing this; some will be buying very small fish to grow on, while others will go for the highest quality they can afford. I guess this is one cost which only you, the Koi-keeper can quantify.

The afore-mentioned expenses are the day-to-day costs of keeping a collection of Koi in 6,600 gallons (29,700 litres) of heated water. If any reader out there is contemplating moving from a mixed ornamental pond to a specialist Koi pond, he/she is looking to spend at least a thousand pounds to do it properly. Winter covers (home-made or polytunnel, etc) don't come cheap either.

HOLIDAYS. . . WHAT HOLIDAYS?

Well, for the mathematical geniuses among you, it will be clear that I spend a lot of money on keeping my Koi in the manner to which they have become accustomed; over

No. 2 son, Giles, shoring up the excavation during a lull in the day's digging. The temporary home for my then-existing collection of fish can be seen top left.

£1300 this last year . . . and no account has been taken of the time that I spend doing the almost-daily chores necessary to maintain good water quality. Enough of that, though, it is time I had a holiday . . .in Japan! "The fare is only £1000 my love, each . . .! Ouch, that hurt". "No, honest my love, I WAS only JOKING!"

I know that it is not necessary to go for a pond the size of mine, which requires larger everything from airpumps (A) to waterfalls (W) — I can't think of anything for X, Y or Z — or to heat the water in the way that I do. It is possible to keep these wonderful, colourful and friendly fish in smaller, shallower ponds and get just as much enjoyment from them.

In fact, that was my original intention, until my two (then) teenage sons got hold of the hose which I was so carefully laying out on the lawn. "If you want to keep good big Koi in the pool, Dad, you need it bigger than that", they said and the outside dimensions leapt from about 6ft x 16ft to 10ft x 20ft. I was foolish enough to say OK, provided that they dug it out; and they did!

I have written this article with a light-hearted, tongue-in-cheek approach to prevent myself from crying, as the actual cost of pursuing my hobby has emerged. If, after reading this, you are still wishing to become a Koi-keeper, then I welcome you to the poor man's club, where holidays are never mentioned, let alone taken, and where a day out for the family is a day trip up the M1, M6, M25, M62 or any other motorway you wish to think of to visit one of those well-known Koi dealing establishments, to continue a never-ending search for the PERFECT KOI!

Summary of average costs for 6600 galls (29.5 tons) heated Koi pool

	Daily	Weekly	Monthly	Yearly
6KW Heater	£1.20	£8.40	£36.50	£438.00
Other Electricity	£0.68	£4.80	£20.80	£249.60
Food	£0.82	£5.75	£25.00	£300.00
Membership Subs	£0.08	£0.55	£2.38	£28.50
Misc. Expenditure (books, petrol, etc)	£0.82	£5.77	£25.00	£300.00
Sub-totals	£3.60	£25.27	£109.68	£1,315.50
Purchase of Koi	?	?	?	?
Totals	The choice is yours . . . !!!			

JOHN DAVIS

The Asian Bonytongue is still on Appendix I — except for the Indonesian population which has recently been transferred to Appendix II.

I AM A FRIEND OF THE EARTH . . . AREN'T I?

(Part 1)

Dave Keeley, of Underworld Products, begins a series of thought-provoking personal articles based on his paper delivered at the autumn, 1990, seminar held by the British Marine Aquarists' Association at London Zoo.

Please indulge me while I relate a small, but important, part of my life history. I hope that its relevance will soon become apparent. Back in 1969, I was studying at college to become a lawyer, while my father was running a moderately successful general shop — he sold newspapers, confectionery, toys, stationery and cigarettes.

One morning, aged 40, he collapsed. He was hospitalised and diagnosed as having lung cancer (perhaps not surprising, since he smoked 40 a day) and was given only a few months to live. The consequence was that I sacrificed my dreams of becoming Perry Mason — Rumpole had not been invented then — and returned to manage the family business, both throughout his terminal illness, and for a year or so after his death, while my mother picked up her life again.

So, at the age of 21, I found myself running a newsagency, whose only saving grace was being surrounded by piles of sweets and chocolates, as well as a wide variety of reading material, from *Woman's Weekly* to *Playboy*.

The major disadvantages of the shop were:

a) that I had to get up seven days a week at 6 am; and

b) that I had to sell tobacco.

It was in the late sixties, when, for the first time, cigarettes were attracting bad publicity, and the general public was becoming aware of the true extent of the harmful effects of smoking; indeed, my father was 'living' (or dying) proof of these consequences. And though those people selling cigarettes never had guilt labels hung round their necks (nor have they even today), I was conscious that I was, in part, earning my living from what, to me, was a very undesirable product. So every day that I was in the shop I was plotting of ways to be 'released'.

Since my education had been interrupted, the only experience or training that I had was that of running a shop. So, armed with this knowledge and a starting capital of £300, I turned my then hobby into a business, and, in 1971, opened a retail tropical fish shop. I can still remember to this day the relief which I felt on the day that I stopped selling cigarettes and swore to myself that never again would I be in a position where my day-to-day life was in conflict with my conscience.

Growing apprehension

So, how naive was that promise? For the last twenty years I have earned a living from dealing in all types of tropical fish, in particular, in marine fish, and, more recently, in aquarium support products. Gradually, but relentlessly, over the last couple of years, I am feeling more and more 'threatened', from outside the trade, and, yet again, I seem to have 'guilt labels' attached round my neck. I am being told that I, along with all the other people in the ornamental fish trade and hobby, represent a danger to the world's wildlife, and that the career I turned to as one of the least controversial available, is, in some quarters, being put on a level footing with, say, the ivory trade.

In the early 70s, it is very true to say that the environment and conservation issues were hardly considered relevant to our daily lives, and I, certainly, have no recollection of considering myself as being a part of a planet for which I bore a small measure of responsi-

CORAL WORLD U.K.

Most stony corals are now listed in Appendix II — even though the vast majority of 'coral' used in the trade consists of coral sand!

bility. Twenty years later, and older, and with a couple of children to alter my perspective, I now look at myself as merely a custodian of the planet, and that, at the very least, I should be handing it on to my heirs in at least as good a state as I found it.

So, once again, as I did 20 years ago, I find myself on an ongoing basis questioning my mainstream activities. But should I be? Am I raping nature, and ruining our heritage, by being active in the ornamental fish trade and hobby, or am I, and indeed, you, just a victim of wild, misplaced attacks by people who do not know better? Am I conveniently ignoring my involvement in the destruction of the planet, or should I be more resilient to the specific conservationist attacks against fishkeeping, and either ignore them or even actively challenge them?

The only real way to answer the above questions is to look at some of the charges levelled against the aquatic trade and hobby, and, in particular, the marine fish part, by various individuals and bodies, to determine (maybe) in as balanced a way as possible, their validity or otherwise, and then try and reach some meaningful conclusions.

When one is discussing what, after all, are moral issues, there will never be a right and a wrong answer, and there will always be opposing shades of opinion. But I know lots of people in the trade, and indeed many, many hobbyists, who are asking themselves these same questions, and who are seriously wondering how best they should continue with their interests.

Main issues

As I progressed down my road of self doubt, it also became apparent that there are really two quite separate issues which need addressing:

1) conservation; and
2) welfare.

These are easily confused, both by the prosecution and by the accused. If I remove a fish from the wild, which is in any way an endangered species, then that is a conservation issue. And, since the vast majority of marine fish and invertebrates in captivity are wild-caught, we surely have to ask ourselves

a) is it acceptable to remove the fish from the wild in the first place?; and if the answer is yes,
b) what responsibilities then attach to this right?

It is true to say, however, that a large majority of the fish in the hobby as a whole are farm-bred, and so conservation is then not the primary issue. If I maltreat a fish, whether wild or cultivated, which results in its premature death, then welfare issues are at stake, and different arguments have to be discussed. It is not that easy to look totally objectively at the issues involved, and to separate different arguments into separate categories.

Evidence/charges/arguments

One of the first steps is to gather together samples of the charges, arguments, evidence, etc, which have been levelled against fishkeeping in general, and marine fishkeeping in particular, in order to determine whether the criticisms are valid or otherwise. So, I have gathered documentation and made contact with a number of representative organisations and individuals, and, at the end of the day, I must say that I am somewhat surprised at how little solid comment I have been able to put my finger on. There is a general reluctance on the part of both conservation bodies and the trade to share information, and it is apparent that this thorny issue makes people of all persuasions very defensive.

I have divided my findings into three groups, as coming from:

a) comparatively responsible organisations;
b) more dubious organisations;
c) individuals.

In group (a), I have, for the purpose of this discussion, narrowed the field down to just two: CITES, and the Marine Conservation Society, as representing a broad cross-section of 'Green' viewpoints which have something useful to contribute to our particular hobby. If we had the space I could just as easily present documentation from the World Wide Fund for Nature, the Fauna and Flora Preservation Society and others, all of whom could contribute to the debate. I have deliberately shied away from the RSPCA and similar organisations who are primarily concerned with welfare rather than conservation.

I have looked at the two named organisations in turn, and have tried to determine their standpoint and comments as regards ornamental fishkeeping.

CITES

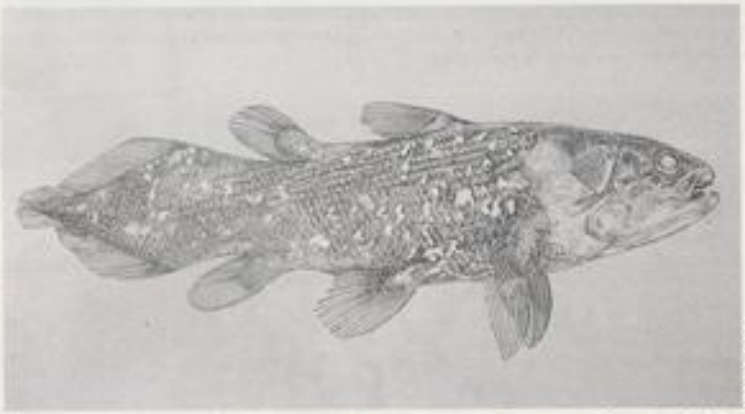
CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, is a highly visible and reasonably well-regarded international organisation, which publishes three APPENDICES of animals.

Appendix I comprises animals which are considered in imminent danger of extinction, for whatever reason. All signatory countries of the Convention agree not to trade in any of the species on this list. African elephants are a prime and topical example.

Appendix II comprises those animals less imminently threatened but, nevertheless, species whose populations are decreasing, and over which, at the very least, limited controls must be exercised. Animals on this list need a licence in order to be exported. An example is the Indian Rat Snake, which is caught extensively in order to be turned into handbags, and thus is in short supply for other less final business interests, such as the pet trade.

Appendix III consists of species over which local rules on export or import apply, as opposed to international agreements. A fishy example would be the ban by the United Kingdom of the importation of Zander, *(Stizostedion lucioperca)* the pike-like fish which is fast destroying all other fish in the Norfolk Broads.

So, what has CITES to say about fish? In fact, there are very few fish on either *Appendix I or II*. The Coelacanth (*Latimeria chalumnae*), variously known as Old Four Legs or Bony Lips is one of these few. I do not really think that there are a great number of fishkeepers who have attempted to keep one of these in their marine tank, and even the most hard-bitten, reactionary trader could have no objection to its protected status. The Coelacanth is on *Appendix I*, along with the Giant Catfish *(Pangasianodon gigas)*, the Asian Bonytongue or Dragonfish *(Scleropages formosus)* — but not the Indonesian population which has been moved to *Appendix II* — and a few other species.


S. PRITCHARD

The Coelacanth is now on CITES Appendix I. Few people would quarrel with such a decision.

On *Appendix II*, even though there are also only a few fish, most of the hard or stony corals are listed, A number of these were put onto the *Appendix* in 1985, and the remaining unlisted species were added in 1989. The consequence of this is that one needs a licence to import these corals into the EC. Corals have been traditionally an integral part of marine fishkeeping, initially as dead coral heads providing sterile decor, and more lately, alive as the backbone of the mini-reef culture. Their future continued use may, therefore, well be the main bone of

contention between aquarists and the greens.

Misleading statistics

A discussion of an organisation such as CITES inevitably leads to the problem of sorting out facts from feelings. Sometime ago I obtained a summary of the 1989 CITES Conference as reported to its members by the PTIA — the UK Pet Trade and Industry Association, of which I am a member. The PTIA is now the sole national organisation representing the UK Pet Trade, and as the only unifying body in the trade, it is fairly influential, though it does fail, in my opinion, adequately to represent fish interests, being very cat and dog orientated.

As a member of the public I read reports of the CITES Conference in my newspaper; I also heard and saw summaries on TV. It is very easy to assume immediately that such a widely reported and well attended conference, which seems to have such honourable intentions, must be correct in its conclusions.

Yet the PTIA summary is, to say the least, highly critical and not a little sarcastic. I do not want to go into details of the critique, the actual wording not being that relevant, but the report does highlight the conflict between our trade and the 'Green' movement. And, though my heart naturally wants to ally with the non-commercial group, leaving my head and my wallet in the trade, the following paragraph brings into focus some unwitting but misleading information from CITES, and serves to demonstrate how careful we must be to accept statistics at face value:

"When the remaining unlisted species of stony corals were added to Appendix II *in 1989, 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 fact that coral sand is a coral product and is listed against the species from which it is derived had escaped the notice of most delegates. It was also accepted that the entire world trade in* live *coral could be satisfied by a portion of reef of only two square kilometres. This would be on a sustainable basis, as only a surplus would be taken, not the whole reef."*

I think that the above case clearly highlights one of the problems we have. As a human being I want to be labelled 'green' and a conservationist; I want to believe in well intentioned bodies such as CITES, and I want to defend it against reactionary attacks. On the other hand, as a keen member of the Marine Fish Industry, I have a natural tendency to fight back at any outside interference with my livelihood, and I resent outsiders acting in lieu of my conscience. And, so, when CITES makes a serious error such as above, it is very easy to dismiss all its findings as misplaced and inapplicable to me. There is a lot to be said for having a completely blinkered approach to life.

A pamphlet issued by Ornamental Fish International clearly shows that I am not alone in feeling threatened. Just read this: *"If the environmentalists and politicians get their way, this very enjoyable and educational hobby will soon become extinct."*

The emotional pleas on the reverse make no attempt to differentiate between conservation and welfare, all the supposed attacks on the trade being lumped together, with poorly presented counter arguments. It also demonstrates very clearly that the stance taken by the PTIA is by no means unique, as this equally unequivocal statement shows: *"OFI intends to dispute and provide evidence against all allegations made by environmental groups with regard to her members' inhumane treatment of aquatic animals."*

Perhaps my problem is that I can see both sides of the debate, and I could never see myself feeling so strongly that I would dismiss *all* accusations carte blanche.

To conclude on CITES, it is fair to say that, at the moment, the ornamental fish trade and hobby are only in danger of 'conflicting' with CITES as regards certain corals, but not as regards fish. It is perhaps a good time to refer here to the President of CITES, Prince Bernhard of the Netherlands, who commented in his opening address at last year's convention in Lausanne, that CITES could only retain its credibility by making its decisions on **scientific evidence,** not **political or commercial expediency or emotion.** I have to say, that as I gathered in material for this paper, I found more and more of the latter, very much at the expense of the former.

(TO BE CONTINUED)

Reflections

By David Sands

FINAL IMPORT REFLECTIONS

The deafening uproar over my November **Reflections** has reminded me of how sensitive the aquatic industry is to criticism. It also reminded me that it is dangerous to make 'off the cuff' statements. I *do* have an opinion; everyone has an opinion, but perhaps some opinions are best left at home.

Despite what I have said, I do believe that Singapore supplies the basic needs of fishkeepers, and I am aware that many of the popular species commercially farmed come from other areas in the Far East. In America and Germany, I have met and spoken with many Far Eastern exporters.

One real problem lies in the difficulty to insist on a particular shipper. When I first started importing in 1979, I had a choice of several Singapore export houses. Ten years later, I found that my local monopoly clearance agents insisted that I use one particular shipper. The reasons behind this are probably to do with discounts.

The wholesaler I "found problems with" treated most of his fish with antibiotic and used salt 'across the board'. I am well aware that I could have used other wholesalers but, perhaps, that was difficult at the time. I am grateful nonetheless for the support and for some of the constructive criticism. In future all my **Reflections** will be thought through. It is dangerous to think out loud!

Finally, the letters and comments I have received relating to November's **Reflections** can be split in two. Trade people, on the whole, condemned me — with a couple of exceptions. Hobbyists, on the other hand, queued up to tell their pet stories, some of which confirmed some of my arguments.

I must state that when some of the discussions came about, I found myself agreeing with one or two of my critics. There cannot be generalisations. There will always be exceptions to the normal.

Although my comments could only be taken to be negative, it is ironic that I meant them to be positive; I made some of those points in the hope that positive action would flow from them.

I have since heard that the OFI (UK) have a working party looking into fish stocking standards etc in the hope that future imports will be policed in some way. I applaud any work that has the fishes' interest to the fore. For too long it has been pounds and pence, in some people's eyes.

I would welcome any letters from fishkeepers, in the trade or not, who can suggest ways to improve the lives of the fishes we are in the hobby to keep. I would also welcome critical letters on the things I write or say because that is the best of democracy. . . we can all have a say. We may not be right, but we should always defend our right to say so. . . apologies to Voltaire.

I would like to think these comments can be the end of the matter as regards myself. It's time to move on to more positive thoughts!

PERU CATS

My Peru expedition results and effects relating to the non-existence of *Corydoras weitzmani* at 12,000 feet are still sinking in.

Despite writing to Chicago and Amsterdam museums, both institutions remain deafeningly quiet. Maybe they don't like being proved wrong, or maybe they don't want to let me know their thoughts, but I'm still waiting . . .

I do have one pair of an unidentified *Ancistrus*-like species surviving from a slightly lower altitude, and I see them as the answer to algae in coldwater aquaria. When I find the time to key out the species and to set up a fast-coldwater tank to breed them in, I will let you know!

Next time, if there is ever another 'next time' in South America, I will go somewhere warmer and more inviting . . .

I'd rather be in Peru!

CAPTIVE-BRED FISH

On a *very* positive thought, many people serving the aquatic industry, and on the buying end, will be aware that some of the future will depend on UK-bred tropicals. It has rarely been cost-effective to breed fish in the UK on a commercial basis. On the continent, importers/rare fish collectors, such as Heiko Bleher, have often passed unusual and fish in short-supply out to specialist fish hobbyists/breeders.

This is certainly very shrewd business because the profit on a couple of 'one-off' rare fish may end up to be a lot less than the potential 'on-going' profit from a regular supply of tank-raised stock. On a great number of occasions, maybe, it's the only way to guarantee that a special fish will be available in years to come.

Larger importers and some retail shops have *cultured* fish breeders in a similar way, but rarely on a grand scale. Tom Horeman once operated a British freshwater tropical fish breeding company and supplied wholesalers. Few people have been able to provide tank-raised marines on a commercial basis, although one or two exceptions have been able to produce Clownfish, and in future this, too, may change.

Tank-raised fish have a great many advantages over wild-caught or farm-raised fishes. They do not have to endure a difficult air journey or poor holding facilities, they should not need to adapt to local water conditions and, finally, they should be fairly disease-free and feeding well.

Some fish species do not produce many fry and it can be difficult to produce quantities that wholesalers would require at the price they require. Unlike Far Eastern or Florida commer-

cial breeders, UK hobbyists have to pay for the energy to heat water. Running a fish house can be a very costly business as I, and many other fishkeepers, have found out over the years.

To produce a similarly priced and sized 'bread and butter' fish (livebearers, gouramis and tetras) as the Hong Kong, Malaysian or Singapore breeders, might just be beyond anyone in the UK without some kind of energy subsidy. I have often wondered if there is not some offshoot use of energy created by power stations etc that could be harnessed. I know some projects relating to coldwater species have occurred.

Sometimes it has been cost effective to produce tank-raised stock from rarer species that have yet to be farmed in commercial quantities. Certain Tanganyikan cichlids, for example, have always been popular with breeders.

Some retailers have occasionally short-changed breeders in the past, failing to give them a fair price, or offering in-shop credit which, in effect, is costing them less. On the other hand, it can be difficult for a retailer, who has spent all the available money on existing stock, to splash out on extra fishes, simply to suit a breeder who wants to offload excess stock.

At AquAdventure I used a system which I believed was fair to both sides. I allowed the breeder to help me fix the retail price. Sometimes the breeder would undervalue his/her stock and want to set a low retail price. On other occasions the price suggested might have been too high and would not have encouraged a reasonable turnover. Once that figure was agreed I would ask how many fish would be supplied and give the breeder a receipt for them on delivery.

The breeder received 50% of the set retail price but only on sale (or, if previously agreed, on part of the sale). That way I was not restricted on numbers to take and the breeder could bring along large or small quantities to suit him/herself. I had not laid money out and the breeder could release raising-on tanks for future fish youngsters.

I found this system extremely workable and well-accepted by breeders. It can be difficult to bring fish on to size and to a more sellable size, unless they are moved into further tank space. In some instances I found myself growing on tank-raised Angels and receiving an even better retail price.

I sincerely believe the future livestock aquatic industry would benefit from a good relationship with breeders. In fact, I know some large companies that have already begun to establish links with fish breeders to encourage growth.

I would very much like to hear from ANY individual or company in the UK/Europe who already breeds fish to sell to retail, or who intends to organise a business or hobby-based fish breeding system. I just may have some special news that would interest everybody involved.

CHANGE OF SCENE

I am leaving the aquatic retail business, not through heeding the calls for me to do so, but out of necessity. My workload and family life (with a one-year-old baby) has become so great that I cannot give the same hours that I used to be able to do.

I have also started work on a zoology degree, and the discipline required is yet another pull on my limited time. I enjoyed retail aquatics because it put me in the 'front line', so to speak. It gave me the opportunity to listen to problems and have to take direct action or give advice. Retail also gave me the chance to see new fish and photograph them for future articles etc.

The gentleman, **Alan James,** taking over AquAdventure, has completed a Sparsholt College course and is very enthusiastic. I hope he has much success; I will certainly keep myself involved enough to pop in from time to time.

It was gratifying to see many of my old Aquarium World customers again. One pair of friends, **Mr and Mrs Baron,** said it was the "best news all year" when I took up the consultancy position with AquAdventure.

With customers like them, I will be sorry not to be in the 'front line', but future weekends will belong to study or my son, William Robert.

Happy fishkeeping. Until the next time.

Books

Two Blandford Favourites Make a Re-appearance

Keeping Goldfish

(An Aquarium Guide)
By: Dick Mills
Price: £5.95
ISBN: 0 7137 2250 9

Keeping Marine Fish

By: Graham Lundegaard
Price: £5.95
ISBN: 0 7137 2251 7

Few coldwater or marine aquarists can be unfamiliar with these two titles — originally published by Blandford in 1985.

Over the past twelve months or so, however, stocks of both have been running pretty low, making life difficult for all those new hobbyists who are constantly being advised by established aquarists (and editors) to obtain a copy of one or other of these great little books as an ideal introduction to the particular branch of the hobby of their choice.

Full marks to Blandford, therefore, for replenishing the stocks by re-issuing these two undoubted favourites. Less than full marks to Blandford, however, for not updating **Keeping Marine Fish** at all (with the exception of the addresses at the end) and for allowing only modest revision of **Keeping Goldfish**.

As a result, **Keeping Marine Fish** is as useful as it ever was . . . which was very useful, but not quite as useful as it could have been if updating to take account of the latest filtration media (such as the open-pore sintered glass medium, Siporax), allied to some treatment of the latest equipment and reef tanks, had been catered for in the reprinting budget.

Nevertheless, the contents list embodies all the important aspects of basic tropical marine aquarium-keeping: The Seawater Environment, Fish and Invertebrates, The Aquarium, Heating and Lighting, The Purpose of Filtration — the Nitrogen Cycle, Filtration Equipment, The Toxic Tank Syndrome, Setting up your Aquarium, Your First Fish, Routine Maintenance, Test Kits and Trouble-shooting, Equipment Chart, Useful Addresses and References, this last section only featuring two 1979 (!) titles under the Books subsection.

Keeping Goldfish goes a bit further in that Dick Mills has been able to get some updates accepted. I have always felt that this book represents great value for the new Goldfish keeper, and therefore always put it at the top of my 'Recommended List', along with Chris Andrews' **Fancy Goldfish**.

My enthusiasm remains undiminished, even though my feelings about the Lionhead/Ranchu photographs on page 85 remain unchanged, ie, I still think that the top fish (which is supposed to be an English-type Lionhead) is a perfectly passable example of a Ranchu, while the bottom one represents a somewhat mis-shapen specimen of the same variety.

Still, that aside, you won't find much amiss with this book, as its contents list demonstrates: The Goldfish as an Aquarium Fish, Goldfish Anatomy, Selecting a Tank for Your Goldfishes, Water, Aeration, Aquarium Plants, Lighting, Filtration, Aquarium Decoration, Setting up your Aquarium, Feeding your Goldfishes, Aquarium Management, Diseases, Breeding Goldfishes, Varieties of Goldfishes, Useful Addresses, References.

Things move fast in the world of aquarium-keeping, with new products making an appearance every month and techniques constantly being refined. It is, therefore, a shame that the well-respected and 'thoroughly-up-to-date' authors of both these titles were not given the opportunity to revise the original texts as they deserved. Having said this, though, both **Keeping Goldfish** and **Keeping Marine Fish** should still be regarded as absolutely essential reading for anyone entering aquarium-keeping for the first time.

John Dawes

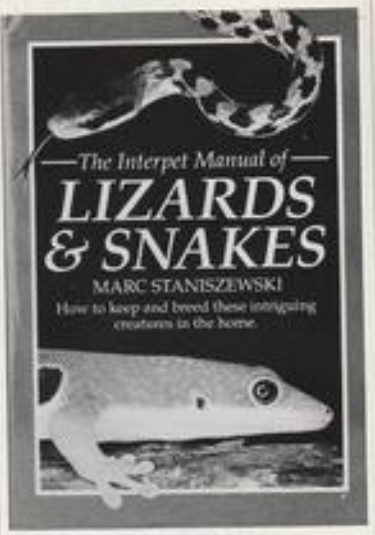
Interpet Manual of Lizards and Snakes

By: Marc Staniszewski
Published by: **Salamander Books Ltd**
Price: £14.95
ISBN: 0 86101 511 8

If you flick through the pages of the December, '90, issue of *Aquarist & Pondkeeper*, you'll come across an article on European Newts of the genus *Triturus*. Go through it and you will, no doubt, agree that it is one of the most thorough articles published in the popular literature on these delightful amphibians. One of the many good points about it is that the author has managed to get in a tremendous amount of good, solid, sound information in what is, after all, a very limited space.

The link between that article and **Lizards and Snakes** is Mark Staniszewski, the author of both. With considerably more room for manoeuvring, Marc has been able to bring his very considerable experience and expertise to bear on some of his other favourite animals, lizards and snakes, at considerable length in this book, with great success.

Everything that is important in this branch of herpetology appears to have been included in this excellent 156-page book which, coming from Salamander, is every bit as colourful and packed . . . and good value for money, as we've become accustomed to



expect from this publisher over the years.

I was particularly pleased to see the author including sections under the heading, What are Lizards? and What are Snakes?, this approach being one that I've often adopted in lectures and some articles myself in the past. I was also pleased to see good sections on the health of both types of reptiles, each including the advice that concerned hobbyists should contact a vet, not necessarily for precise diagnosis (when this falls outside the area of expertise of the vet in question), but certainly, at least, for a demonstration of treatment procedures, administration techniques, or for details of specialised practitioners.

Lizards and Reptiles is divided into two parts, the first dealing with the former and the second with the latter. Both parts are identical in format, starting off with an introductory two-page spread on lizards (or snakes, as the case may be), following this up with chapters on: What are Lizards (or Snakes?), Buying and Handling, Housing, Heating and Lighting, Furnishing the Vivarium, Feeding, Breeding, Health Care and, finally, a Species section.

All the chapters are tackled with Marc Staniszewski's characteristic attention to detail and are written in a very authoritative and eminently readable manner.

In the past, I've been highly critical of publishers who have placed authors in an impossible position by asking them to deal both with amphibians and reptiles in a single book. In this case, I commend Salamander for resisting the temptation, particularly when the author in question can write well about both major groups of herptiles.

Perhaps, they've already got plans for a similar book entitled Frogs, Toads, Newts and Salamanders. If so, then that, too, will be well worth looking forward to.

John Dawes

A SET-UP FIT FOR GOLDFISH

Our resident coldwater expert, **Pauline Hodgkinson,** provides sensible, easy-to-follow guidance for first-time goldfish keepers.

First STEPS

LAURENCE PERKINS

A magnificent specimen of the Common Goldfish — the ideal variety for a newcomer to this branch of the hobby.

The old wives' tale that affirms that goldfish are the easiest species of fish to keep in aquaria, so making the need to consider water quality and environment unnecessary, must surely have been rumoured by an old wife who had never actually kept these fish! Once you embark into this branch of fishkeeping, it is soon evident that such rumours bear little resemblance to the truth, and attention *must* be paid to basic rules, if the fish are to remain healthy and have a long life expectancy. Goldfish are prone to health problems, just as their tropical cousins, especially if water quality deteriorates.

MISCONCEPTIONS

I am sure that the misconception arose from the fact that goldfish have been kept as pets for hundreds of years without the luxury of sophisticated equipment. The heater and filter were not even invented, and it was the fashion in the Orient to keep ornamental fish in terracotta pots.

In more recent times, when glass objects became cheaper to mass-produce, the small containers for keeping fish in was imitated in this material, and so, the goldfish bowl was introduced. But for how long did these poor unfortunate creatures live? Was their life expectancy days, weeks or months? Judging by my own experiences, a few months might be as much as they could hope for.

EARLY LESSONS

The first fact I quickly learned was that it is pointless simply to add a few fish into a container of water and just let them get on with it. Without proper maintainence, conditions very quickly deteriorate; the water becomes cloudy, and is eventually unable to sustain life.

The second lesson was never to be tempted to introduce newly-acquired fish, from no matter what source, into the midst of established stock without proper and adequate quarantine. The temptation to waver from this rule is, of course, very strong, but the consequences can be, and often are, fatal. You can lose your entire stock by introducing just one apparently healthy-looking fish into the community. It is possible that the newcomer may be carrying a virus, or have contracted a disease, or might be host to pests such as flukes.

In my opinion, it really is important to quarantine fish for about six weeks. To many people this may sound excessive, but it has been my experience that fish which have appeared perfectly well for the first few weeks after they were purchased, have sometimes later developed a truly destructive viral infection which eventually wiped out the whole lot. Thankfully, none of the infected fish had been allowed to mix with my own, established stock.

PAULINE HODGKINSON

Young Pearscales. These are becoming quite widely available these days and are becoming very popular among aquarists looking for something a little different.

The third lesson is not to over-stock. I am often shocked to learn how many fish some people are attempting to keep in an area only capable of sustaining a very small number. Of course, it is tempting to go on adding beautiful and interesting subjects to our collection, but fish are only able to tolerate such conditions for a limited time.

It is important to remember that our fish must live their lives in the little world we create for them within the confines of the aquarium. Like humans, and most other creatures, the space allowed for each individual must be adequate, otherwise, the stress of living too close to our neighbours will eventually reduce the quality of life. Stress reduces the body's resistances and health quickly deteriorates.

Another problem caused by overcrowding is the pollution of the environment. Water quality suffers, making more frequent water changes necessary, and stringent tank maintainence essential if the fish are to survive.

Another important point about an aquarium suitable for goldfish is its size. That little niche might just be an ideal site to fit an aquatic display, but small tanks are quite unsuitable for members of the carp family. You must consider the fishes' potential growth; the idea of deliberately stunting an animal's growth is, I think, morally wrong. Besides, small volumes of water pollute quickly because they are much more difficult to keep under control; more so, I think, for a novice.

MAKING CHOICES

When setting up an aquarium for goldfish, care must be taken when choosing equipment to maintain them in the most suitable conditions (ie) to sustain them in good health, where they can grow and flourish and reach their true potential.

Tank and Hood

Choose the largest tank you can accommodate; certainly, nothing less than 24 x 12 x 12 in (60 x 30 x 30cm) is, I believe, suitable. A hood is very important; not only does it add the finishing touch cosmetically, but it is necessary to house the lights which will illuminate the aquarium, and it will keep out dust and household aerosol sprays. The hood must be fitted with a condensation tray to prevent water splashing on the lights, and thus protecting the electrical wiring.

Lighting

If you wish to grow real plants in your aquarium, then lighting is very important if they are to flourish. To use light to its best effect, it should be directed down into the water; this is the reason for their location in the aquarium hood.

The most popular form of lighting is provided by fluorescent tubes. They are the most popular because they give an even spread of light which is beneficial for the plants, and give a more pleasing picture to the overall concept of the aquatic display. Yet another advantage with using fluorescent tubes for a goldfish aquarium is that they are cool-running, and so will not transmit excessive heat to the water. They are rather more expensive than tungsten lamps, but they are long-lasting and the light they give is much more flattering to the colours of the fish.

The amount and length of time the tanks should be illuminated will be a matter of experiment. You will find that your aquatic dealer will have different types of fluorescent tubes available; white light gives good illumination, while a pinkish glow will enhance the colours of the fish. As a rough guide, you could allow about 15-25 watts of fluorescent light per 12in (30cm) length of the aquarium. It is usual to illuminate the tank for about 10 hours a day. To run the lights, you will need a choke or an auto-transformer. This should be sited within the compartment which is built into the hood.

Siting the tank

When deciding where to situate the aquarium, you must take into consideration a few very important points. Make quite sure that, if the tank is not going to be supported on an aquarium stand, or fitted into a cabinet, the site is capable of holding the weight.

Water is surprisingly heavy: 1 gallon (4.5 litres) weighs approximately 10 lbs (4.5 kilos). Add to that the weight of the tank, gravel, rocks etc and you could have a very heavy item indeed.

I well remember a friend who set up his aquarium on a 'too-flimsy' piece of furniture. All appeared to be well until the early hours of the following morning, when he and his wife were awakened by a crash that made them think that their house was falling down around them. They quickly discovered that it was, in fact, the tank which had proved too heavy. A big clean-up operation had to be mounted, with silent meals for the next couple of days, while his wife came to terms with the broken furniture and ruined carpet.

Avoid placing the aquarium where direct sunlight will fall onto it. Sunlight has two disadvantages because, not only will it encourage unsightly algae to flourish, but it can heat up the water, causing unhealthy, fluctuating temperatures. In fact, placing your tank in a dark recess has its advantages, because you will have more control over the amount of light given and, with a little experimentation, you can judge just the most suitable amount to yield good plant growth without excessive algae.

A tastefully arranged Shubunkin aquarium.

It certainly is a good idea to locate your set-up close by an electrical power point in which to plug in lights and filter connections. Also, do make sure you have easy access for maintainance or any job you might need to do in or around the aquarium.

A good tip is to stand the aquarium on a level surface (a spirit level comes in very handy here), because it is a real pain to discover, after all the preparation and setting up, that when filled, the water level is at a sloping angle, thus spoiling the entire look of your display.

A sheet of polystyrene with the same dimensions as the tank, placed under the base, will act as a cushion, absorbing any unevenness, and so avoiding stress on the glass which could result in a crack or breakage.

One last word about location: avoid placing your tank close to room heaters, central heating radiators, etc or by a door where it could be draughty. Both situations are unsuitable as they cause rapidly fluctuating temperatures within the aquarium which will have a very bad effect on the fish and cause many health problems.

Furnishing

Most people will choose to have a furnished aquarium, rather than the bare tanks used for breeding, or those in operation in the fish house where the aquarist needs to keep unnecessary cosmetic items down to a minimum for ease of maintainence because of multiple aquaria.

Gravel is the usual choice for the base of the aquarium; it is in this medium that plants are rooted. Aquarium gravel and other media are obtainable from aquatic dealers and come in several grain sizes. Probably the most suitable size grain to use is around 1/8 inch. If the grain size is larger than this, small particles of food will fall between and may be overlooked, and would then pollute the water. If the grain size is too small, it will clog the filter bed should undergravel filtration be used.

Before the gravel is added to the tank, it must first be thoroughly washed. This procedure must be carefully done because there will be a great deal of dust and dirt which must be washed away; otherwise, the water within the tank will be cloudy and, even if the sediment settles, it will be easily stirred up. I have found the best method is to wash small amounts with the use of a plastic bucket and a wooden spoon which I use to stir up the gravel when submerged in boiling water. The debris will rise to the surface and can be poured off. I then change to cold water, continuing to stir, and allowing the water to overflow. When I am quite satisfied that the gravel is thoroughly clean (and this must not be skimped on — it will only mean the taking down of the whole set-up if the job is not properly carried out) I can then begin to fill the base of the tank.

If you have chosen to filter your aquarium with an undergravel filter, this should be placed into the tank before the gravel is added. The undergravel type of filtration is biological, utilising bacteria which become colonised within the filter and break down toxic waste. An u/g filter (basically) consists of a plastic plate with a hole where the airlift tube is slotted in position. This will carry water which has passed through the gravel, up the tube, and back to the higher levels of the aquarium.

The gravel bed should be a depth of between 2 to 3 inches (c5-8 cm), sloping from front to back. This serves two purposes, as it encourages dirt and waste to collect at the front of the tank where it can be more easily siphoned away, and also gives the picture a sense of perspective.

Other items such as rocks are decorative and give a natural look, but care when choosing this material is very important. Rocks should not have sharp edges, and they must not give off toxic substances which will poison the fish. Safe to use are Westmoreland Granite, water-worn sandstone and slate. Many people find sea shells beautiful, but they have no place in the freshwater aquarium, in my view.

If you are intending to use several pieces of rock, a good idea is to stick them together with aquarium sealant which you can purchase in tubes from your dealer.

This can be used to very good effect to create natural-looking rock formations and avoids the risk of the rocks being disturbed and spoiling the scene.

Some people prefer to adorn the aquarium with decorations such as plastics divers, mermaids etc and, if those are your choice, fine; your aquatic store will have a large selection.

Plants

Most hobbyists like to grow plants, but your success rate can depend on how much interest and trouble you lend to the subject. I suppose growing any variety of plants, be it those in your garden, house plants or aquatic plants, if you are keen and interested in their

propagation, can be enjoyable, and yield some degree of success. As with any other form of gardening, you must choose plants which will flourish in each particular location. Therefore, you should select aquatic plants which prefer cool temperatures. There are many to choose from and a list of such plants can be found in any of the books dealing with aquaria. You can purchase plants already rooted in little plant pots; I, personally, like these as they give the plants a good start.

I have no qualms about the idea of mixing real and plastic plants. Some of the plastic types are very realistic, quite like the real thing, once the set-up is established and a thin coating of algae has formed.

Before planting commences, the tank can be filled up to a depth of a few inches with water. If a piece of polystyrene is first placed on the gravel and the water gently poured onto it, the gravel will not be disturbed, and craters which would ruin all the work gone before, will not appear.

Next, you can arrange and plant, choosing tall specimens for the back and sides. Group them in clumps as found in nature, but leave the front and centre free so that it will give the fish room to swim freely, and so that they can be viewed without obstruction. If the plants are not in pots, they can then be anchored down into the gravel with plant weights, again available from the aquatic store.

Aeration/Filtration

After planting, the tank is filled with water before the air-stone is introduced. However, if you have decided to use one of the mechanical filters, an air-stone may not be needed.

Mechanical filters can be the simplest form of filtration, and are very effective. Most such filters are made of plastic; often a box filled with material such as foam, filter wool or ceramic pieces. Tank water fills the box, passing through the medium, and is then pushed out, up through a tube, to the higher levels of the aquarium. Solids are collected in the medium, so they must be washed away when the routine weekly maintainence is carried out.

Another kind of mechanical filter is filled with a sponge shaped into a cylinder which is pushed onto a plastic tube. Water passes through the sponge, and into the tube, where it is pushed out, travelling upwards to the water surface.

Power filters come in the shape of a plastic canister which can contain different kinds of materials; often two or more are used in conjunction to filter mechanically and biologically. These filters have their own electric motor, and therefore do not require an additional air-pump. This type of equipment can be operated from either inside or outside the aquarium and a good idea is to have the returning water which has gone through the filter pass back through a spray-bar located across the back of the length of the tank to dissipate it evenly.

This will avoid a single, too-powerful jet of water which would create a strong current that the fish would constantly have to swim against. This would be quite unsuitable for goldfish and would certainly reduce their life expectancy.

It is very important to keep the filters running 24 hours a day and not to switch them off unless, of course, they are being stripped down for cleaning during tank maintainence. If filters are stopped, the bacteria which live upon the filter medium and break down the toxic waste will be starved of enough oxygen to keep them alive. This will have an adverse effect and could act as a source of pollution.

To operate filters other than the power filters which, as I said earlier, have their own motor, you will need an air-pump. Even without a filter, the tank should have an air-stone because aeration is very important, as it facilitates the assimilation of oxygen, as well as circulate the water itself. This is also important because it actually pushes carbon dioxide to the surface, where it is able to escape.

TETRA

Always use a good-quality commercial food . . . and feed sparingly.

I, personally, think that filtration should be regarded as essential in aquaria; it gives the aquarist better control over the condition of the water and is an important aid in maintaining the best possible environment in which the inhabitants can, not only survive, but flourish. After all, it is vital to understand that the whole basis of successful fishkeeping relates to the question of water quality and suitability, just as good atmospheric conditions and pollution-free air are vital to our own survival.

There is a wide range of air-pumps to choose from, so it really is a matter of personal choice, but the good news is that most pumps these days are of excellent quality and are very reliable. Many retailers have a display of pumps actually operating, thus giving the customer a better guide on the final choice. One criterion I think the pump must have is to be almost silent when running; otherwise, it will be a constant irritation.

Unless the air-line (the narrow plastic tubing which carries air from the pump to the tank) incorporates an anti-siphon valve which prevents backflow, the pump should be positioned at a higher level than the aquarium so that, should the pump stop running for any reason, water will not flow back into it causing an electrical short circuit.

MATURATION AND STOCKING

When the tank is set up and filled with water, it should be allowed to mature and the plants to settle before the fish are introduced. It is preferable that this period take about a week, though 48 hours would be the minimum length of time that I would advise before it would be safe to introduce the fish.

The aquarium will go through several changes before conditions are suitable. You will notice that many air bubbles will develop on the gravel, rocks, and on the sides of the tank. If fish are introduced too quickly they may also have bubbles collecting on their finnage and, although these will eventually disperse, I am not convinced that they are not harmful to them in some way. After a couple of days, the water usually begins to look less clear, almost milky. This is caused by bacteria and is quite normal; it will clear again very quickly.

You must calculate very carefully just how many fish your aquarium will accommodate. I prefer the rule of thumb which allows at least 30 square inches (approx. 76 sq cm) of surface area to 1 inch (2.5 cm) of fish. This gives the fish room to grow, giving them slightly less restriction than they might otherwise have in more crowded quarters. It also gives you, the aquarist, a much better chance of creating and maintaining a suitable environment.

MAINTENANCE

As I have stressed before, maintenance is vital, both for the health of the fish, and for the good looks of the display. Even with a filter, regular maintenance must be carried out. Small partial water changes are advisable at least twice per week in a goldfish aquarium. I like to change about ¼ of the volume, topping up with clean fresh water at approximately the same temperature.

Every other week, one of these water changing exercises should be much more extensive, with a clean-up of the gravel, using a gravel cleaner. The mechanical filter can be cleaned out, and its medium swished out in lukewarm water, at a temperature that will not destroy the bacteria which will have colonised it. Once back in operation, the filter, after its clean-out, will again be running at its peak.

When it comes to feeding, particularly if you are a beginner, choose one or other of the several top-quality commercial preparations. They contain all the nourishment goldfish need and should keep you going until you have gained enough experience to begin developing additional diets. Always feed sparingly, providing only sufficient food for the fish to clear up *completely* in a few minutes.

CAMEROON

Troubles at the Source of Life

(Part 1 — The Crater, Its Secrets and its People)

Nearly everything about Baromi Mbo — a mysterious, mist-shrouded lake in a crater in south west Cameroon — is unique to it, from the fishes in its depths to the culture and religion of the people who live on its shore. But, like any ecosystem that is small, ancient and self-contained, its balances are easily upset — by a little pesticide, for example, or a pipeline to a nearby town. **Dr Gordon McGregor Reid** and **Moise Shewa** report on a lost world that is inexorably being found.
(Photographs by Edward Parker)

The Barombi live at the remote northern end of a lake which provides their only means of existence. Indeed, this very small ethnic group call it the "source of life", regard it as a spiritual entity and have always worshipped it.

LAKE LEGENDS

According to tribal legend, the waters of Mbo (Pronounced *imb-oh* and meaning 'deep') were brought to the area from far away by Ntanga, an elderly lady. She was driven out of her original home by her husband, who wanted to take a younger and more beautiful wife. Ntanga fled in great shame and annoyance, carrying with her a wedding present from her grandfather — the stream that flowed beside her hut.

After a long journey through the rainforest, Ntanga became tired and dizzy and fell into a pool in her stream. She struggled to get out with no success. In desperation, and not knowing what else to do, she tried to sustain her life with the juice of the coco-yam leaves which she was carrying. As she raised the succulent foliage to her lips, a magic arrow earlier dispatched by her husband pierced the green bundle. The sap spilled out, flowing endlessly, and old Ntanga cried for help.

A passing hunter heard the calls and rushed to her assistance, only to be engulfed in the watery flood. Somehow struggling to the shore, they found themselves in a deep hollow from which there was no escape. They decided to settle by the lakeside, produce a family and make this place their home.

After some time of happily living and working by the shore, Ntanga again tumbled into the water and, this time, drowned. The hunter could not save her but, wading in to the rescue, he found strange fish instead. From that day, the hunter became a fisherman and the tradition was passed down by his family to their descendants who came to revere the lake and celebrate its mystical origins.

Today, the life and customs of the Barombi people still centre around the worship of a crater in which they drink, bathe and fish. The powerful Ndengo cult, which binds their society together, is the sole religion of the Barombi.

The sacred hollow remains as mystical as ever — constantly wreathed in mist and surrounded by dark rainforest, giving it an eerie atmosphere. The glistening, opal-green waters stretch about 2.5 km (c1.6 miles) across the volcano and fill it to a depth of about 110 metres (around 360 ft). The shore can be reached by a narrow footpath which descends for 3 kilometres (nearly 2 miles) from the rim of the crater. The downward slope is so steep that 19th Century German explorers hammered iron hoops into the sheer rockface to serve as footholds.

The early severe difficulties of getting in and out of the crater have undoubtedly produced and maintained its cultural and biological isolation. But while time stood still for the lake dwellers, a major urbanisation developed only 8 kilometres (5 miles) away at Kumba.

Top left upper, Golden Barb *(Barbus batesii)* **— rainforest form. Length of specimen: c 35cm (c 13.8in).**

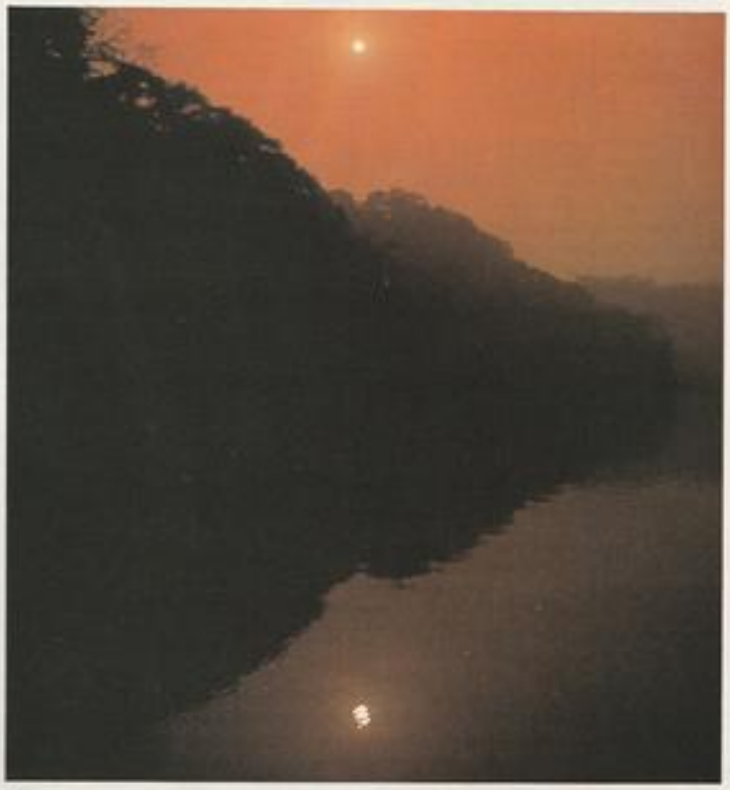
Top left lower, Suh *(Barbus* sp. cf. *batesii).* **This form, isolated in Barombi Mbo, has shorter barbels on the jaws and differs from the widespread 'rainforest form' in colour and other respects. They turn over bottom stones and feed on insect larvae. Length of specimen: c 17cm (c 6.7in).**

Top right, Lake Barombi Mbo at sunset — a lake wreathed in mystery . . .but for how long?

Centre right, Barombi Mbo; aerial view of the mist-shrouded crater lake.

Near right, Pungu *(Pungu maclareni)* **— found only in Lake Barombi Mbo. This distinctive species uses its 'rubbery' lips and forward-pointing teeth to dislodge small, seemingly inedible, freshwater sponges from rocks. Length of specimen: c 12 cm (c 4.7in)**

Far right, The Nsess *(Stomatepia mariae)* **is an offshore predator which includes fish in its diet. It also often eats terrestrial insects which drop into the water from rainforest trees. The loss of this source of nutrition could bring about a decline in the species. Length of specimen: c 19cm (c 7.5in)**



FISHING TRADITIONS

In some respects, the growth of a modern town nearby is a boon to the Barombi, for it peovides a large and convenient market for their fish — and hence, cash to buy the things they need or want. Though the trading fishermen traditionally retreat back to the solitude of their village in the crater, their lives are already touched by Kumba.

The looming urban values of a new Africa may soon call into question the continued existence of this small rural community. So far, Barombi society remains resistant to external pressures and, loyally, their Kumba-educated children say: "Our fathers have always gone to the town and returned, and so shall we. Yes, we will only leave when the lake runs dry."

Certainly, the tribe manage their sacred resources very carefully. Ever-watchful eyes have prevented outside migrant fishermen from gaining access and despoiling the waters by ecologically unsound methods. The villagers have harvested the lake over countless generations without risking the extinction of any of the rare species of cichlid fish which they catch.

Elsewhere, rainforest people have used poison to catch fish; first, natural plant juices and, now, synthetic chemicals. The Barombi spurn such lethal and environmentally harmful techniques, preferring hand-woven gill nets and traditional basket traps. There are usually about seven gill nets set permanently — each about 100m (c330ft) long and 2m (c6.5ft) deep, with a stretched mesh of 5cm (2in). The nets are inspected every day and are only removed for cleaning and repair, about every four weeks. This ages-old system effectively captures fish of specific sizes in particular habitats only; the smallest and largest fish escape, and the deeper waters remain an untouched sanctuary.

Two-chambered basket traps are used to catch some of the larger fish in deeper waters and also some kinds which live close inshore. Bait is placed inside and the fish wander in through the first funnel, then the second. Those of an ideal size cannot make their way out, but the small fry can escape through the loose wickerwork to grow and form future generations of fish. These selective basket traps are attached to strings and tied to the shore. The method is so easy that even children of four years can manage to haul in traps full of gleaming spiny-finned cichlids such as Pungu, Pindu and Kululu.

DEEP SECRETS

The Barombi are a unique and specialised fishing community, and they have always been aware that many of the fish which they catch are found only in the crater. Strangely echoing ancient legends, Dr Ethelwynn Trewavas — a scientist, now 90 years old — has become fascinated by the limnology of Barombi Mbo and she has confirmed that eleven species of tilapiine cichlid and one clariid catfish are found nowhere else on earth.

The endemic 'tribe' of closely related cichlids is apparently as isolated as the human tribe with which it co-exists. It remains a mystery as to why the fishes stay only in the lake and do not leave via the outflow stream to set up colonies elsewhere. This extraordinary 'species flock' phenomenon is now famous worldwide as evidence for 'explosive' biological evolution — and has recently been the subject of a study by a WWF Research Team, with a view to conserving the volcano-lake and its special denizens, both human and fish.

Patient study of the golden-coloured Pungu (*Pungu maclareni*) may explain why they have evolved to feed (with protuberant teeth and 'rubber' lips) on tiny, seemingly unpalatable, freshwater sponges. Exploration of the oxygen-starved depths of the lake may fully explain how its cousin Dikume (*Konia dikume*) can survive below ten fathoms feeding on ghostly, translucent insect larvae. In the same situation, other fish would surely suffocate. Preliminary investigations indicate that the secret may lie in Dikume's haemoglobin blood pigment, which is amazingly efficient at holding oxygen in the body. Other research reveals an odd symbiosis between endemic cichlids and Kibje, a freshwater crab; but it is hard to explain how such a relationship could have developed.

The lake holds many other scientific mysteries. Formed over a million years ago in a fiery volcanic eruption, further study of the geology of the crater could provide valuable insights into the genesis and stability of the chain of still-active volcanoes of southern Cameroon. One of these, Lake Nyos, in recent years produced a massive release of carbon dioxide gas, decimating the fish, the local villagers and their livestock. The natural origins of this catastrophe have since greatly puzzled earth scientists. Locked up in lacustrine sediments, fossil plant material may yield vital information on the important question of the age, original nature and continuity of West African rainforests, including Korup and Oban.

(TO BE CONTINUED)

ACKNOWLEDGEMENT

The text of this article (along with Part 2 — to follow), plus several of the photographs, was first published in *BBC Wildlife* Vol 8, No 9, September 1990, pp 602-604, and is reproduced by kind courtesy of the editor, **Rosamund Kidman Cox.** For further details of *BBC Wildlife* contact the editor at: **BBC Wildlife Magazine, Broadcasting House, Whiteladies Road, Bristol, BS8 2LR. Tel 0272 732211.**

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Edward Parker is a professional photographer, based in Surrey, who has worked on several scientific expeditions to the rainforests of South America, Africa and Indonesia. A graduate in environmental science, Edward's outstanding photographs on aspects of ecology, agriculture, fisheries and ethnobotany have been published in countries as far apart as China and the United States of America.

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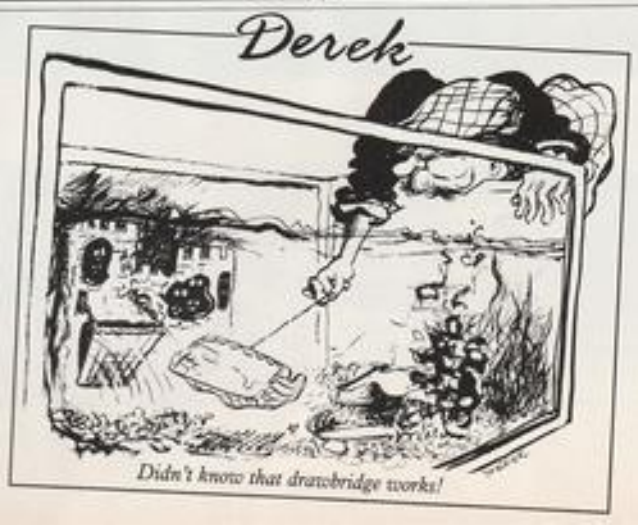


Didn't know that drawbridge works!

Spotlight Special: Pond Equipment

CHOOSING A POND

A & P editor, **John Dawes,** takes a look at some of the factors that need to be considered when choosing a patio or garden pond.

JOHN DAWES

Few materials can match cement for durability. The small pond located between the two flights of steps in Gibraltar's Alameda Gardens was built in the 1820's and is still going strong!

Despite gloomy economic forecasts, the upsurge in interest in pondkeeping and watergardening that we've experienced in recent years is likely to continue this coming season. And that does not just apply to the UK alone, where only some five years ago there were about 1·5 million ponds, with the figure, today, probably being in excess of 2 million. In Germany, for example, forecasts indicate that there will be no less than 4·5 million ponds in private gardens by 1995!

With this current, and expected, expansion, comes an ever-increasing range of ponds, pond materials and water features, such as tubs, millstones, etc. Therefore, we could hardly say that we are going to feel starved of choice. If there is a problem at all, it's in knowing where to start, or what to choose. However, help is never far. In fact, it's no further than the nearest garden centre or bookshop.

For some time now, garden centres everywhere have been expanding their aquatics sections, to the point that we are fast approaching the stage where no such enterprise can consider itself complete without, at least, a watergardening department. Along with this expansion, has come a noticeable improvement in the standard of watergardening advice available, particularly since the setting up of specialist aquatics franchises, staffed with their own trained personnel, started gathering momentum a few years ago. The recent trend has also resulted in other branches of the aquatic hobby being brought to the notice of a wider public. Add to this a steady growth in the number of specialist watergarden centres up and down the country, and you can begin to see why pondkeeping, watergardening and aquariumkeeping are all experiencing a surge in popularity.

LOTUS WATER GARDEN PRODUCTS LTD.

Prefabricated ponds take the sweat out of planning an attractive shape. Nowadays, even models which are deep enough for Koi are widely available.

CHOICES

The focal point of every water or patio garden is, of course, a pond or some other suitable alternative. If space is no problem, then the sky's the limit, as they say. If space is restricted, however, this need not mean that a water feature is out of the question. Far from it.

Virtually any non-toxic waterproof (or 'waterproofable') receptacle can be transformed into a small water feature of great beauty. Half-barrels, water butts, ceramic sinks and baths — even refrigerator linings — can be, and have been, used to great effect.

The field is wide open for the keen D-I-Y enthusiast, but if you are not that way inclined, then fear not; there are some excellent commercially-produced tub and sink ponds around, as well as millstone and pebble fountains in kit form. All of these are ideal for any small corner. The former can be planted with dwarf water lilies and other equally spectacular alternatives, while the latter will provide all the soothing qualities of moving water, but without the plant and animal life. Some models will even allow for the installation of coloured underwater lights to bring an added dimension to any patio during our all-too-rare balmy summer nights.

Turning to ponds, the choice is excellent these days. Cement, concrete blocks, plastic, fibreglass, liners — even wood — can be used to build a pond and associated waterfalls, water courses or cascades. In the case of fibreglass and some other compounds, you don't even need to design the system yourself. It comes ready-made, leaving you to choose where and how to install it.

All pond materials have advantages and disadvantages, so, at the end of the day, it will come down to personal preferences, circumstances, available skills and funds.

Concrete

Concrete and cement, for instance, can be worked into any shape one can think of. They are therfore considerably more flexible than their final stone-hard finish would indicate. Concrete and cement are also very long-lasting. On the debit side, though, it

takes a special type of expertise to work with these compounds.

They are also highly toxic to aquatic plants and animals when in the raw state. This need not, however, be a problem, because there are highly effective sealants on sale which will provide an impermeable, non-toxic coat that will allow such ponds to be safely stocked within days of construction. Maturation of such ponds — until the potential toxic effects have been removed or diluted down to safe levels — is, nevertheless, advisable.

Liners

Should cement / concrete / bricks / blocks not be your scene, there are always pond-liners. Here, the choice is between straightforward polythene, rubber-modified polythene, PVC (polyvinyl chloride), nylon- or terylene-laminated PVC, or one or other of several types of butyl.

All can be used to line excavations of any size or shape, but butyl is about the most durable of the lot. It is also the most expensive.

BABYLON ARTS

An 'instant' pond . . . in kit form.

Prefabricated Ponds

Prefabricated ponds come in a range of materials, shapes, sizes . . . and prices. The three main compounds used, in order of price, are plastic, fibreglass and polyester. In terms of durability, fibreglass and polyester can be regarded as more permanent than plastic. They also have other advantages. For example, ponds constructed from these materials can be larger and deeper than plastic ones, this last factor being a very important one in terms of winter survival of fish, or where Koi are to be kept.

ESSENTIAL CONSIDERATIONS

Among the earliest decisions a prospective pond owner has to make (certainly before *anything* is bought) is how to make the best use of the space available. Top of the list must be a genuine regard for the needs of the plants and animals seen in the mind's eye as forming the ideal combination for the pond in question.

Fantasy and reality must be brought as close together as possible, since failure to do so, will invariably result in inappropriate decisions, with inevitable distressing consequences. We must always remember that plants and pond animals cannot complain. They just die if conditions are seriously out-of-step with their requirements.

Having decided to have a pond or other water systems of whatever kind, two alternative approaches are possible.

(1) One can start from the human standpoint by saying, "I am going to have a pond measuring x metres in length, x metres in width and x centimetres in depth, and I am going to stock it with 200 large fish of different colours . . ."

(2) The alternative approach views the matter from the plants' and animals' point of view, as well as the human, and goes something like this: "I would like to keep a number of varieties of Goldfish (or Koi, or whatever) in attractive surroundings which should include colourful Water Lilies and marginal plants. What sort of pond would meet the plants' and fishes' requirements as well as my own?"

If the first approach is taken, there is likely to be a marked mismatch between what the pond owner wants and what the pond inhabitants need. This mismatch will make its presence felt sooner or later (usually sooner). The problems can be ironed in time and, once they are, one usually ends up with a pond that suits both the owner and the inhabitants, though considerable hardship and distress wil have been experienced on the way. Of course, the other possibility is that the whole project will be given up as a bad idea after a brief, unhappy relationship.

Much of this can be avoided by following the second approach outlined above. It is not foolproof, but the mismatch is likely to be minimal, the experience enjoyable, and the relationship long-lasting. It is possible to have an attractive pond well suited to all parties concerned. All it requires is that most valuable of human qualities — common-sense!

This applies as much to new ponds as to those inherited when one moves to a new property. With the latter, one should note what stocks the inherited pond holds, ask the necessary questions about the suitability of the existing conditions for the inhabitants, and oneself, and then alter things accordingly, if necessary. But there is such a wide range of possible arrangements that making fundamental decisions is often difficult.

The fantasy/reality relationship mentioned earlier plays a very important role here too. You may want a wildlife pond, but if your garden is set out in a formal fashion, it would look totally out of place. If so, you must reassess your priorities. The ideal decision in this case, from the pond's point of view, would be to reorganise the garden, converting it completely into a wildlife garden, or, at least, one in which a section can be allocated to wildlife.

Though deciding about the type of pond may prove difficult, it must not be rushed. Remember that mistakes made at this early stage can prove difficult and expensive to rectify later. It's therefore both sensible and worthwhile to spend some time thinking about as many variables as possible before choosing a pond. Then, having done so, speak to someone who can advise you accordingly.

It will have become apparent in the preceding paragraphs, that the decision to install a pond cannot be based purely on impulse. It is fair to say that many of us (most?) start off by feeling some desire to own a pond. Unless a truly genuine desire exists, though, there is little point pursuing the subject any further.

Although uncommitted people can, and usually do, grow to like their pond after it is installed, the risks of things going wrong can be high and, quite frankly, not worth taking, unless the decision to proceed is firm. If the decision *is* firm, it should be followed by a consideration of several important questions. Some of these are outlined in the accompanying Checklist, but I should emphasise that they are intended purely as a guide and not as an inflexible set of rules.

CHECKLIST OF EARLY STEPS AND CONSIDERATIONS

1. Do you really want a pond?
2. If so, what type of pond — e.g. informal, wildlife, formal — would you like to have?
3. Do you have a preference for any particular type of material?
4. Is your preference compatible with the type of pond you envisage? For example, polythene — **unless it is rubber-modified and UV stabilised** — is not stretchable or indefinitely resistant to the sun's rays and is therefore not the best material to choose for a large, deep, permanent pond, while butyl may not be the ideal thing to go for if you are planning a small temporary set-up.

A pebble fountain/log water feature suitable for a small corner of a patio or garden.

(5) What range of plants, fish or other organisms will the pond be stocked with?
(6) What are their requirements and characteristics? For example, Koi need deep water, semi-aquatic/amphibious wildlife require a pond with gently sloping sides, some marginal plants only do well either in moist conditions or under no more than a few inches of water.
(7) Can these requirements be met adequately in the space you have available for construction/installation of the pond?
(8) If not, what is the maximum space that can be made available, and what would be a realistic revised stocking level?
(9) Are the revised stocking possibilities acceptable to you?
(10) If not, what other types of plants and animals could be accommodated instead?
(11) Having arrived at a reasonable stocking level for the available space, will the type of pond you now envisage be compatible with the pond inhabitants and your existing garden/patio layout?

NOTE: Native species in formal designs are not generally considered appropriate. Conversely, a wildlife pond stocked with, e.g. Koi, is a contradiction in terms. Informal ponds in formal settings usually look disharmonious.

(12) Once a compatible combination of organisms and pond designs has been established, what construction materials are most appropriate or desirable?
(13) If, after considering all the above, your space still does not provide you with the type of pond you envisage, how happy will you be with the alternatives?

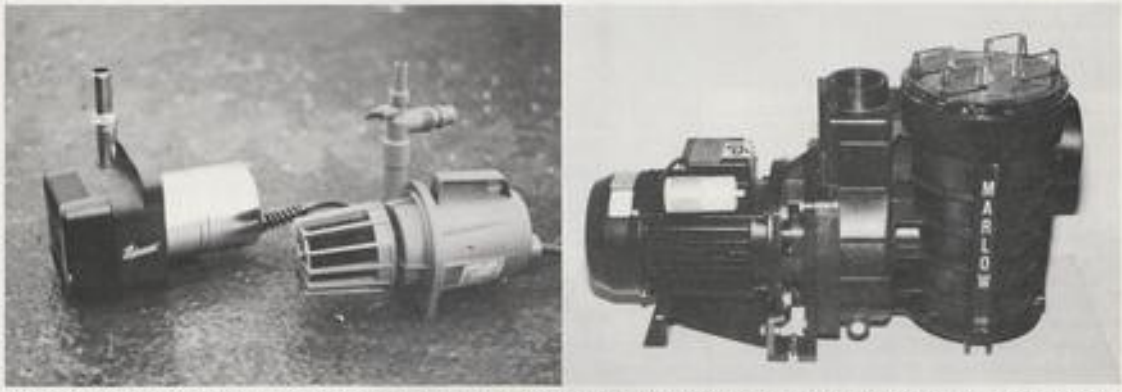
NOTE: If you feel unhappy, then a complete reassessment of the situation must be carried out. If no acceptable arrangement providing adequate conditions for the fish, etc. can be found, then the temptation to proceed regardless must be resisted. However desirable the concept of a pond might appear, it is far better not to have a pond at all than to have one that causes distress and hardship all round.

(14) If no pond is possible, why not install a water feature such as a pebble fountain?
(15) Even if a pond is possible, why not install a water feature in any case? These deserve full consideration in their own right, and could well have appeared near the top of the checklist (depending on your response to Question 1).

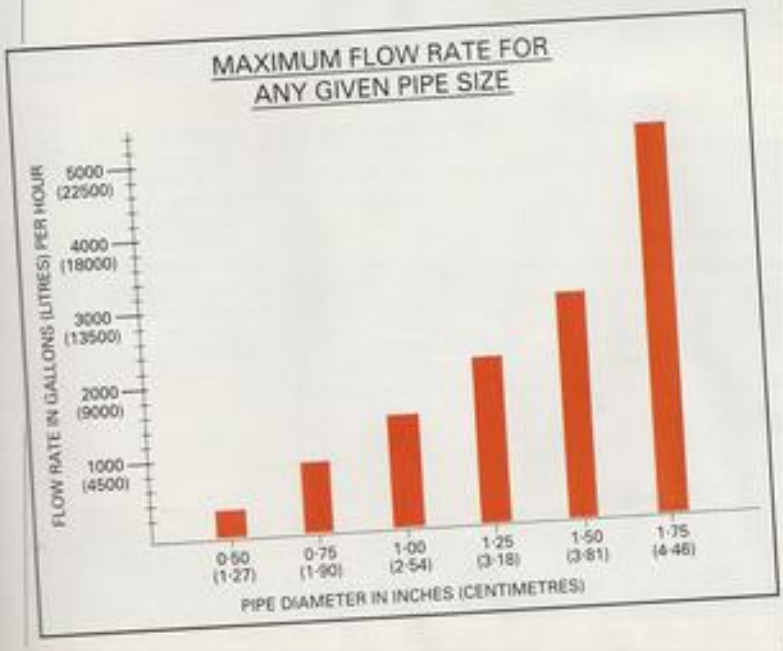
Spotlight Special: Pond Equipment

CHOOSING A POND PUMP

Peter Skinner, of Koi Kraft, provides some useful guidelines on buying a suitable pump for your Koi or garden pond.
(Photographs by the author)



Left, submersible pumps are more suitable for smaller installations. Right, surface pumps can generally handle larger volumes of water than submersible models.



WHEN you last purchased a pump, what criteria influenced your decision as to which model would suit you best? All too often, not enough consideration is given to selecting the best pump for the job, which seems odd because it is, in fact, the heart of every good pond. It is responsible for circulation, aeration, and running the filtration, not to mention any special effects. Yet, many people end up with the wrong pump.

SUBMERSIBLE V SURFACE PUMPS

The first hurdle is to decide whether a submersible pump or a surface pump would be better. A submersible is a totally watertight unit which can be immersed in the water, with only the cable and, possibly, the delivery pipe being visible above water level. A surface pump must be located in a dry place, and therefore will have to be mounted, either in a dry pit beside the pond, or in a suitable building.

The installation of a submersible pump is simplicity itself, but beware of some surface pumps because, invariably, they require many more fittings to complete the install-

ation, some of which can be very expensive. That pump that you bought at a bargain price may not turn out to be such a good deal after all.

SOME CONSIDERATIONS

Proper matching

It is difficult to generalise as to the best type of pump to buy because each has its own merits. Before you buy a pump, be sure to know exactly what you need it to do. For example: if you are only supplying a filter, then the pump size should be matched to the flow requirements of the filter. If the pump has additional tasks to do, such as fountains and waterfalls, then the flow requirement will be greater.

Operating pressure

Another consideration regarding the choice of pump is the operating pressure. If the water is being pumped only a few inches vertically above water level, then the pump will deliver optimum volume, but when the delivery point is much higher than water level (such as in a waterfall), then the back pressure will reduce the performance of the pump. This height is measured vertically from water level to the height at which the water is delivered. The actual measurement is known as the 'head'.

Most pumps come with a data chart showing the flowrate in gallons or litres per hour at any given head. Another factor affecting the flowrate is the bore and complexity of the pipework. It is essential that tubing of sufficient diameter is used, otherwise the resulting restriction will cause the pump to be straining and the life of the motor may be reduced. One must also remember that the fewer elbows and bends there are in the pipework, the more easily the water will pass through.

Tubing

Generally, it is unwise to use ½" flexible tubing (particularly in hard water areas) because deposits will form on the walls of the pipe and these will encourage the growth of algae which, eventually, will block the pipe.

Consumption

When purchasing a pump, ask the dealer what the electricity consumption will be, because if you stop and work it out, your pond could be responsible for a large part of your electricity bill.

For instance, I know of a popular pump that delivers 1000 gal/hr (4500 litres/hr) and uses 200 W, and of another that delivers 1070 gal/hr (4815 litres/hr) and uses 100W. Although the latter is more expensive, it has double the guarantee period. It would therefore appear to be false economy to buy the first one if financial considerations are a determining factor.

Noise level

Noise is another consideration. If you go for a surface pump, be sure that it runs quietly because, no matter how beautiful your pond and fish, the effect will be spoilt if there is a loud whirring noise in the background.

Ease of maintenance

Whatever type of pump you use, it is inevitable that it will need attention at some time. The inlet may need cleaning or the impeller may need checking to see that it is not clogged. The impeller in a pump revolves at an extremely high speed, and it only takes a tiny piece of grit to get stuck in one of the flutes to cause an imbalance which will seriously reduce the performance of the pump. The smaller the pump, the more it will be prone to this type of problem.

It never ceases to amaze me how little consideration is given to choosing the correct pumping system and then looking after it. If you choose the wrong pump, you may experience endless problems and breakdowns, and your garage could easily become a graveyard for old pumps while your quest for satisfaction continues.

There are some wholely unsuitable pumps around but, conversely, there are some superbly engineered machines available which could be the answer to all your prayers.

PUMP COMPARISON CHART

		SOME ADVANTAGES	SOME DISADVANTAGES
1	**Submersible pond pumps**	Silent Low cost Reliable (most models) Simple installation Compact Self-priming Fairly economical	Not high pressure Unsightly in pond
	COMMENTS: For the smaller installation, these pumps take some beating.		
2	**Submersible cellar pumps**	Silent Low cost Simple installation Self-priming	Not economical (some) Not high pressure
	COMMENTS: This type of pump was not really designed for constant use and therefore sometimes suffers reliability problems. Spare parts and servicing on some models is non-existent. Running costs may be high.		
3	**Submersible fountain pumps (professional quality)**	Silent Compact Simple installation Self-priming Very economical Very reliable	More expensive
	COMMENTS: These pumps are ideal for small to medium-sized ponds. The extra purchase cost is offset by the excellent reliability and low running cost.		
4	**Surface pumps**	High pressure (some) Can be hidden	Must be kept dry Not economical (some) Can be noisy Expensive Unreliable (some smaller models) Not self-priming (most)
	COMMENTS: For small to medium-sized ponds these are less suitable than the submersibles. Better than submersibles for larger ponds.		
5	**Swimming pool pumps (surface)**	High pressure Extremely reliable Good service and parts Can be used for vacuuming	Must be kept dry
	COMMENTS: These pumps are ideal for the larger pond.		
6	**Central heating pumps (surface)**	Cheap to buy Economical Silent	No warranty available Must be kept dry Tiny impeller blocks easily
	COMMENTS: Mainly suitable for small indoor systems.		

JOHN CUVELIER

My home-made pre-filter consists of a stainless steel washing machine drum filled with hair rollers. The feed pipe comes into the base.

POND FILTRATION

John Cuvelier discusses the ins and outs of this sometimes confusing and controversial aspect of successful pondkeeping

There has long been a belief among fishpond owners that the use of a filter system is only the preserve of the so-called 'Koi Nuts'. Nothing could be further from the truth, as I shall attempt to show in this article. A filter can be of enormous benefit to even the smallest and most basic garden pond.

Reading through some of the amateur society magazines, the prospective pond owner could be forgiven in thinking that even a simple filtration system would require, at the minimum, possession of an MSc in order to understand the basic operation principles, as the highly complex and scientific arguments rage backwards and forwards between the protagonists almost every month, each trying to out-argue the other with a staggering display of knowledge (!?) All this, of course, helps the average pond owner not one jot, so let's try and put the subject into perspective.

REASONS FOR A FILTER

In simple terms, a filter is coupled to a pool for three main reasons:

1 to remove from the water all the suspended solids which are the result of the natural breakdown of organic matter within the pool and which is kept in suspension by the movement of fish, wind etc., thus imparing the vision of the owner in seeing his/her fish;

2 to remove the urine/solid waste products produced by the fish in surprisingly large quantities during the 'season', this removal being carried out by a simple chemical conversion process which takes place within the filter, where ammonia in the water is converted to nitrite and then to nitrate before being returned to the pool in a non-toxic condition;

3 by thus conditioning the water, the pond owner is able both to encourage better growth in the fish and, at the same time, considerably increase the number of fish kept in a given volume of water.

FILTRATION/PURIFICATION PROCESSES

The cleaning process is carried out by passing the pond water through a chamber, or series of chambers, filled with media, of which there is a bewildering choice available, ranging from pea gravel, through to 'high tec' materials such as plastic ring media. The media within a filter form the heart of the system as, after a period of time in contact with waste-laden pond water, bacteria begin to colonise the surfaces of the media and, provided that oxygen is present in the water, will eventually begin the work of chemically converting the 'nasties' into non-toxic highquality water, in a very similar manner to any sewage treatment works which we are all more or less familiar with.

It should be noted that any water being thus treated must contain at least a minimum of oxygen, otherwise less kindly bacteria will develop which could lead to a poisoned filter and polluted pond. Such filtration systems are known as biological filters, sometimes shortened to 'bio'.

In an 'ideal' filter, all the solid waste products will have been removed from the water prior to it entering the biological stage of treatment because bacteria are unable to break down a large amount of solid material. Unprocessed solids can build up to the point at which they block the water flow path completely, hence the importance attached to the matter of settlement chambers within a filter system.

In the early days of pond filters, this meant having one or more chambers containing nothing except, perhaps, a couple of baffles which slowed down the flow of incoming water, allowing the heavier solids to settle to the bottom before being manually removed. Nowadays, it is much easier to remove solids by merely using commercially available filter brushes or sheets of open-cell foam which can be easily cleaned periodically. It is important to remember when considering using foam that ordinary polyurethane, such as that used in furniture, is not suitable, as much of this type of foam (although very much cheaper) is actually toxic to fish. The correct material is custom-made for its task and is obtainable in three grades of porosity, coarse, medium and fine.

FILTER TYPES

Having dealt with the why's and wherefore's of filters, I will now have a look at what is available commercially and have a quick

look at what can be done on a DIY basis.

For the very smallest of ponds, or should I say puddles (?), not being in any way unkind, the most basic filter can consist of a block, or multiple blocks, of foam attached to the inlet of a submersible pump. Several pump manufacturers supply these as integral units and, within their designed capabilities, they do a very good job.

Theoretically, these foam devices could become biological but, in practice, they tend to block up with debris long before this stage and need to be removed and cleaned to prevent the pump from being starved. In effect, these units are primarily mechanical filters, and will generally do very little to improve the chemical quality of the pond water.

Moving a little up in style, there are now countless numbers of commercial 'one tank' filters available, some of which make quite amazing claims as to their effectiveness. Provided that these units are not overworked by being used on ponds which are far too large for them, they will do a perfectly acceptable job.

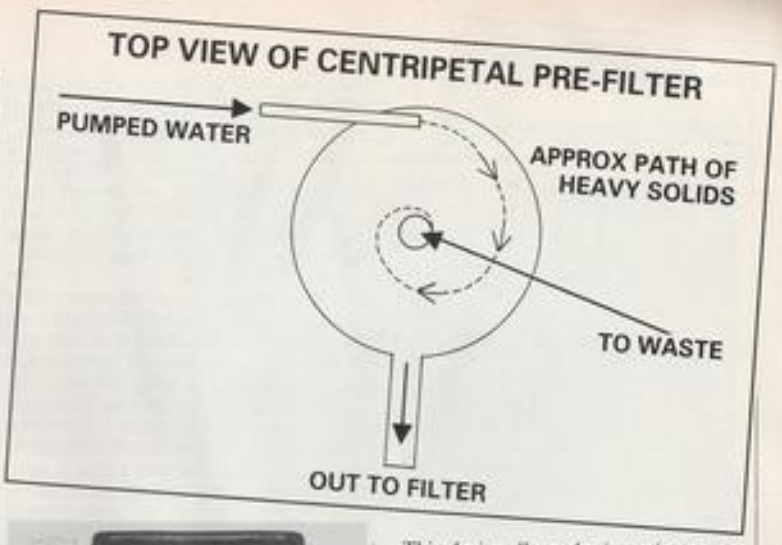
However, logic should tell us, for example, that, say, a two cubic foot tank cannot possibly be expected to filter a pond containing perhaps 1500 gallons of water, plus plants and fish effectively, this size of pond being relatively small! Much disappointment will be avoided by opting for one of the larger models, some of which incorporate brushes for primary filtration and even UV sterilizers (discussed in the last issue of *A&P*).

An alternative to buying a larger model is to use two or more smaller filters in tandem, though this can cause difficulties with the 'plumbing' in obtaining a correct flow pattern. Many of these proprietary systems use the previously-mentioned open-cell foam and, unless an effective solids removal pre-filter is used, fairly frequent cleaning will be required to maintain operation, not the most pleasant of tasks.

Moving even further up market, the larger pond will require proportionately larger and more sophisticated filter systems, some of which can be quite astronomically expensive. These are usually prefabricated in GRP and are intended for use with a gravity-fed system, as opposed to the previously looked at models, which are invariably pump fed. (See **Peter Skinner's** feature on pumps).

JOHN CLOVER

A DIY plumbers' tank filter. The staggered height achieves gravity flow from the pumped inlet via the pre-filter (seen at the far end).



ROBELL LTD

Commercially produced third-stage fine mechanical filter.

Usually supplied as self-contained modules with integral settlement chambers and multiple media chambers, they are normally installed close to the pond in such a way as to match the top water level with that of the pond, thereby achieving true gravity feed, so this entails great accuracy when installing. The main advantage of such modules is the fact that the necessary transfer ports which allow the water to get from chamber to chamber, and the media support trays, are built in during construction. This saves an awful lot of work, compared to a DIY installation. Disregarding the initial cost (if you can), there's no doubt that these units are a most valuable asset which do a first class job of filtration.

As stated earlier, pre-removal of solid matter is vitally important when biological filtration is used, and it is in this sphere that the costs of a system can really take off! From using an extra tank or two filled with filter brushes (which themselves can be costly when sufficient numbers are used), the filter designer can take advantage of a device which goes under the title of either a centrifugal (strictly speaking, this is incorrect), or — more correctly — centripetal, pre-filter.

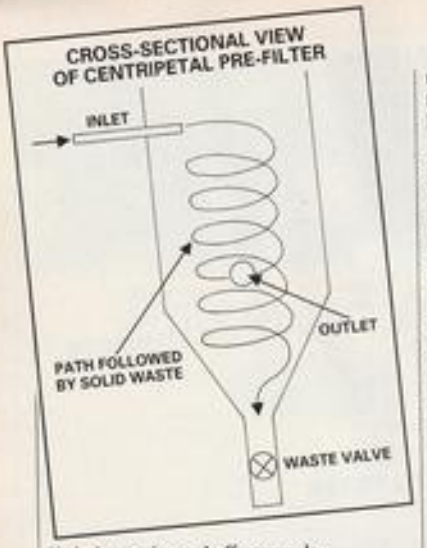
This device allows the incoming waste-loaded water to spin in such a manner that it gravitates towards the centre and downwards, where it can be drawn off. Basically an upright cylinder with a cone-shaped bottom, the incoming water is piped in at a tangent, the theory being that any solids are drawn to the centre by the circular motion of the water, away from the exit pipework. While there can be no doubt that the theory works with solid 'lumps', the reader should bear in mind that many of the extra-fine suspended solids entering the device will be in the form of dust-like particles which will merely stay with the spinning water. A pool containing a quantity of very large Koi, for instance, would benefit from such a pre-filter, but for a small or average sized pool, such an expense would, in my opinion, be more debatable.

D.I.Y. APPROACH

Having looked at the various commercial options available, what of the dedicated DIY pond builder? There's always a special satisfaction in standing back to look at the results of one's own work, and filter construction is no exception, as there is no limit to what a

JOHN CLOVER

My below-ground gravity fed multi-chamber filter. Note the two rows of brushes for pre-filtration.



little ingenuity and effort can do.

Whether one constructs a system using ordinary 'plumbers' water tanks or goes for a concrete block construction, the nett result will be the same, an effective system at a fraction of the cost of a commercial equivalent, with the bonus of proudly being able to say, "I did it my way" (Sorry Frank)!

The plumbing tank system can prove a little tricky to build as the usual examples of these are made from polypropylene, a notoriously difficult material to use if adhesives are needed, so any pipework must be fitted using the correct fittings (difficult when using, say, 4-inch pipe), although this can be fitted by forcing the pipe into an undersized hole and sealing by means of a glue gun.

One of the pictures shows an example of five tanks thus connected, pump-fed via a pre-filter with a gravity flow-through. This system has been in use for eight years, with no problems. Such a system, of course, needs to be above ground, both for ease of construction and maintenance.

The alternative is an in-ground filter constructed using concrete blocks and floor, the entire unit then being skimmed with Fibromix. Transfer ports and partitions may be cast in a mould using Fibromix, or, alternatively, may be made from corrugated asbestos roofing sheet which is cut to size and cemented in position. You might be surprised to know that such a filter is easier to build than a plastic tank version as, among other things, you don't get any distortion problems caused by the weight of water etc.

As with any work connected with flowing water, care in getting all the levels correct is essential if any hair-tearing is to be avoided. The illustration is of my own in-ground concrete filter which has proved very effective at around £100.00 total in cost.

What about media you may well ask? As you can see from the illustrations, I'm a dedicated hair roller person, having proved how good they are over a number of years. However, if you don't mind very heavy work every couple of years in digging out and cleaning gravel, the type known as Canterbury Spar is the one to go for. Failing that, you've a choice of Litag (expanded clay pellets, used by horticulturists), cut up land drains (tedious), Flocor, the industrial ring medium, Siporax (open-pore sintered glass), Springflo (the very latest medium, consisting of a calcium carbonate buffer/polypropylene composite 'ribbon' — see next month's **Product Round-up** for full details), or indeed anything which is non-toxic and offers little resistance to the flow of water.

This very brief look at filter systems should be enough to get you thinking. My last word of advice would be to obtain a good book on the subject, such as *The Interpet Guide to Koi*, by Barry James (Published by **Salamander**), an excellent volume which could save you both heartache and expense.

GREENWAY FILTERS

Some of the latest pond filters come complete with a U-V sterilising unit.

Coldwater jottings

By Stephen J. Smith

POND PROJECT WINNERS

Although my own garden is well-ensconsed with Goldfish-rearing ponds and a Koi pond (still under construction), there just had to be one corner dedicated to "anything aquatic which will survive in there — except fish".

The result — a not unattractive green puddle which is a haven, not only for blanketweed, but also for tadpoles and frogs, 'newtpoles' and newts, diving beetles and dragonfly larvae, and an assortment far in excess of the handful of 'waterweeds' which we put into the pond when it was made.

But my own little conservation corner is humble when compared to the sterling efforts of the **Bruton** family in Stroud, Gloucestershire, who won the title of "Wildlife Pond of 1990" and a prize of £1,000, in a competition organised by The Wildfowl and Wetlands Trust and sponsored by the Shell Better Britain Campaign.

Building the pond took the family the whole of last year and transformed a neglected corner of the garden into an attractive wildlife haven. Even one of Britain's most threatened amphibians, the Great Crested Newt, has adopted the pond, along with an assortment of frogs, toads and newts.

So it looks as though this spring will be a busy time for the Brutons, while their scrapbook will be used to record the spawning activities of the pond's inhabitants as well as the multiplication of plant species. And the prize money? That will also be put to good use as they intend to use it to develop new wildlife habitats in their garden and to continue their conservation work by breeding threatened newts.

"... BLUETITS AND BUMBLEBEES"

The above phrase would mean very little to the majority of people, least of all to pondkeepers. But that is just the phrase used by **Jill Turner** as her reasons for entering last year's Pondwatch Award scheme.

Jill, from Sutton Coldfield, Birmingham, won the garden category of the competition and, in just eighteen months, she and her family created a seven-metre long pond in which they established colonies of native water plants, beetles and a frog population which, at the last count, was no less than 35!

Chairing the judges, **Chris Baines,** landscape and gardening expert (and presenter of the BBC TV series "Bluetits and Bumblebees" which inspired Jill's entry) complimented Jill on her efforts. "This is a superb example of what can be achieved with enthusiasm and dedication," he remarked. "This is a great Wildlife pond, having gently sloping sides, soft edges and only native species."

Jill will have a busy year ahead of her this season: she plans to use her prize of £250 to "develop a boggy bit next to the pond."

Nine-year-old Molly Bruton receives the award of "Wildlife Pond of the Year" on behalf of her family, with, left to right, Roger Pittaway, Shell Better Britain Campaign, Simon Bruton, Cilla Bruton, Caroline Aistrop, Pondwatch Officer, and Chris Baines, wildlife and gardening expert.

"Garden Wildlife Pond of the Year 1990", which was built by Jill Turner and her family to attract "bluetits and bumblebees".

CATEGORY WINNERS

Praise should also be extended to the following category winners:

Farm Ponds: **John Strachan,** Tullo Farm, Inverurie, near Aberdeen. John created a thriving network of 14 ponds on land previously used for arable farming.

School Ponds: **Coleraine Girls' Secondary School,** County Londonderry, Northern Ireland. In an ambitious project to develop a pond nature reserve on an area of waste ground, the girls of Coleraine Secondary School united children from all parts of the local community with schools from Eire to work towards a common aim.

Community Group Ponds: **Normandy Pond Trust,** near Guildford. **Ann Adey,** with the help of her friends and a wide range of organisations, fully restored a derelict pond, inspired by a 1908 photograph which showed a large pond at the centre of the village.

Conservation Organisation Ponds: **Thurston WATCH Group,** Bury St Edmunds, Suffolk. In 1989, the children of WATCH were unleashed upon a three-quarter acre area of ex-farmland. They 'fund-raised', dug holes, planted trees and had a thoroughly good time.

Let's see if your pondkeeping activities can put your name on the list for 1991. For further details of this year's Pondwatch awards, contact **Caroline Aistrop** at **The Wildfowl and Wetlands Trust, Slimbridge, Gloucester GL2 7BT. Tel: 0453 890333.** (Please enclose a stamped addressed envelope if you are writing.)

TAILPIECE

Find out more about pondkeeping at a **Talking Fish** evening organised by Tetra at Manchester Polytechnic on Wednesday, 20 March, commencing at 6.45pm. Yours truly will be talking about *Making the most of your pond*, providing support billing to a film entitled *Battle of the Duck Pond* and a talk *Avoiding pond problems* by **Dr David Pool** of Tetra. Look forward to seeing you there.

Koi Talk

By John Cuvelier

FISH-KILLS

I heard an interesting and worrying report from the Granada TV area to the effect that one of their programmes had reported a large number of fish-kills among ornamental fish and that preliminary investigations reportedly blamed a combination of acid rain and conifer trees! Unfortunately, I have been unable to learn any more about this, so if any reader in the Granada area cares to enlarge on my information I'd be most grateful.

Since my report of my own fish-kill in the January issue, a number of people in my own area have reported similar losses, again without any indication of cause, all very worrying.

PRE-SEASON TASKS

With a new Koi season just around the corner, as it were, it's an appropriate time to review any steps we can take to ensure a trouble-free and pleasant Koi-keeping year.

My annual programme begins in April, weather permitting, with a blitz on my filters. However efficient any pre-filtering precautions are in use, there will, inevitably, be a build-up of 'gunge' just waiting in little corners for rising temperatures to commence increasing the population of anaerobic bacteria, those little beasties which can cause problems if they get out of hand.

I know many pundits advise against disturbing a filter unless it's really necessary, but my own feeling is that if it gets to that stage, it's too late anyway.

Both my pools are served by multi-chambered filters, each having five media chambers containing hair rollers. At weekly intervals, a chamber is emptied of its hair rollers, which are placed in an old bath kept for this purpose, where they are very lightly hosed down to remove any heavy concentration of dirt, but leaving just a little in place, complete with some bacteria. The joy of using hair rollers, of course, is that being so light, one's back does not suffer in the way it would if one was using gravel medium.

The chamber itself is then carefully washed out and the medium replaced. The weekly interval prevents too great a shock to the pool's ecosystem, each chamber in turn only being out of service for about an hour.

Another most important part of my pre-season start-up programme is that of cleaning the filter feed pipe and return stream. It really is quite amazing how much crud can adhere to a feed pipe, even during the winter months when you'd think that, with minimum feeding taking place, there wouldn't be many suspended solids about.

Those of you with a bit of knowledge of pipe hydraulics will realise that liquid flowing in a pipe moves more slowly away from the centre and that, at the outer edges, it can be very slow-moving, thus encouraging any suspended solids to grab and adhere to the pipes' surface, hence the need for cleaning.

As I've mentioned before in this column, I use a foam 'pig' for the job, and very efficient it is. The gravel bed of my stream is next in line for cleaning, this being simply a matter of shutting pumps off for half an hour, stirring the gravel with a rake, and vacuuming the dirt before it resettles. short of some major disaster, these preparations always ensure a happy year for both Koi and keeper.

TRANSCONTINENTAL GOLDFISH

Having an unexpected need to make an overnight visit to Yorkshire recently (very rare, as we're virtually housebound), I took the opportunity to visit **Ian** and **Lynne Brown** of Transcontinental Goldfish Ltd. at their new premises in Huddersfield. I've known them for many years while they occupied their original premises at Shepley, which, incidentally, was originally an old textile mill, and you could almost still smell the wool! They now occupy a large area within Hampsons Leisure World, Long Lane, Dalton, Huddersfield.

Ian and Lynne are 'old hands' in the ornamental fish business and this shows throughout their new complex which boasts a splendid array of so-called dry goods, in addition to an amazing assortment of fish, ranging from Koi through to marines and invertebrates.

I had hoped to include a picture but when my camera was unloaded, found that the film had not wound on. Nevertheless it's well worth a visit, especially for the kids, who will love all the other pet animals on display.

My trouble when visiting places such as this, is that though primarily interested in anything appertaining to Koi and the care of same, I find it difficult to drag myself away from anything aquatic, and so, waste much valuable time gazing into dozens of tanks containing marine fish of which they have a dazzling assortment. They tell me that, by Easter, they will be fully into operation, which means me finding an excuse for a return visit!

UPDATE

The latest update on my last season's spawning is all good news (for a change). Having passed on a number to friends, I left myself with 15 in the aquarium, and they are all doing well, apart from the usual disparity in rates of growth. There's quite a wide variety of colour now showing, with gold, blue, black and silver very much in evidence.

Strangely enough, neither my, nor my friend's, fry have shown any evidence of deformity, and only one, as yet, has died. Lengths vary from 2in (5cm) down to less than an inch (around 2cm), yet they were all from the same hatch. Feeding now consists of frozen *Tubifex* and *Daphnia*, together with ground-up Tetra sticks, a diet which appears to suit them.

I'm really looking forward to the coming spring, just so I can try out my new spawning medium, courtesy of **Dave Woodward** (thanks pal)!

Just a final reminder, keep those KOI QUESTIONS for **Your Questions Answered** coming in. As you've probably gathered over the past couple of years, we don't profess to know everything, but we might just be able to help you!

JOHN CUVELIER

Hair rollers are light and easy to hose down — both definite advantages when it comes to filter maintenance.

Spotlight Special: Pond Equipment

POND ACCESSORIES

Assuming that you've got a pond, a pump and a filter, what else do you need?
Dick Mills reviews the best of the rest.

PORSCHE

Artificial water lily pads offer protection and colour throughout the year.

"Hello," said the voice on the phone (it was 'He Who Must Be Obeyed'). "We're planning the March issue and the situation is this: I'm doing pond materials; we've got filters and pumps already covered, so can you do the rest? You know, anything and *everything* else to do with a pond."

Such is a typical comprehensive briefing for *A & P* articles(!), the only further piece of forthcoming information (other than a bit of flattery about how one is the best possible person to do the article) being that the deadline is rapidly approaching! Faced with such a challenge, where to start? A long list of products would not make easy reading, but then it occurred to me that the things one eventually accumulates in and around the pond can be broken down into: Essential, Useful and Downright Luxuries.

LITERATURE

One of the most essential factors (in whatever fishkeeping circles you move) is preparation, and top of everyone's list should be a good assortment of **catalogues,** especially for anyone planning to install a pond for the first time.

Excuse me a moment; there's the 'phone again — sorry about that. Oh, yes, I'd nearly forgotten to mention a **good pond book** — 'H-W-M-B-O' has written an excellent one! (*Flanerer — Ed*). Then there's *A & P*, of course!

WATER TREATMENTS

For those renovating, or 'spring-cleaning' an existing pond, advance preparation is also needed well ahead of the fishes' arrival, so that they can be introduced with the minimum of stress. To this end, **dechlorinators** and other 'pre-aquarium-use' water treatments are a must, particularly where today's domestic water 'quality' (as regards its suitability for fishkeeping) is concerned. Similarly, a biological filter **maturation additive** might also prove to be helpful in getting filterbeds up and running quickly.

One further advantage of treating the pond water right at the earliest stage is that you will become immediately acquainted with the one fact that the majority of pondkeepers (me included) lack: exactly how much water their ponds hold! This magic figure can be calculated quite easily for formal, regularly-shaped ponds, but the best way of doing so for those varying-depth irregularly-shaped ones is to count the number of bucketfuls it takes to fill or empty it. This is more easy than it seems — measure the time it takes to fill a known bucketful from the hose, and the time it takes to fill the pond from the hose, then do this simple sum:

$$\frac{\textit{total time}}{\textit{bucketful time}} \times \textit{number of gallons/litres in bucket}$$

You will need to know the figure if, and when, it becomes necessary to treat the pond for any ailments.

PLANTING AIDS

Bordering more on the useful side of essential are **planting baskets:** these are invaluable for restricting rampageous lilies and, for ease of planting and subsequent maintenance, curved segment-shaped baskets are ideal for planting and installing marginals on the 'shelves' of ponds. The advantages of using baskets are that changes to the planting arrangements can be made easily (tie ropes on to middle-of-pond baskets for easy retrieval) and that, as there is no substrate on the bottom of the pond to muddy up the water (unless biological in-pond filtration is used), removal of debris is made very simple.

Once the fish and plants are established, all you need then is some long summer evenings to 'pool-sit' by.

Now comes the next essential-useful accessory — **pond food.** It may not have occurred to you, but pondkeepers have one big advantage over indoor aquarium-keepers — they can monitor their fishes feeding so much better. Floating pond foods have the added bonus of bringing the fish up to the surface where you can see them and have a slightly closer contact with them (Koi-keepers will be much more aware of this). By watching to see how long the food lasts, it is easy to see whether more, or less, should be given at feeding times. Not only this, in the event of overfeeding, any uneaten food is easily visible and just as easily removable.

ALGAE AND DEBRIS

During summer months, everyone seems plagued by green water. Following a typical cold winter this shouldn't develop too strongly, providing the pond is planted with an adequate amount of plants — fast-growing oxygenators and some lilies for shading purposes. (In larger, public water garden displays the use of **ceramic magnets** incorporated into the water supply is said to be effective, both against algae and limescale build-up.) If the winter has been extremely mild, then more drastic actions may have to be taken. **Algicides** are certainly effective, but you should be aware of their after-effects, if any. It is no use killing the algae (simply to clear the water visually) if you then allow all

the dead material to fall to the floor of the pond to decompose and use up vital oxygen.

All the dead material should be siphoned or pumped out. Removing such unwanted debris from the pond is an essential chore, but this can be made less difficult by using a **pond 'vacuum-cleaner'**. There are two types — one fits on to a hose from the coldwater mains tap, while the more expensive model is used in conjunction with a pond pump. Late autumn is one of the best times to remove dead leaves and other rubbish from the pond floor, as these will turn foul during winter and use up the oxygen in the water.

WINTER CARE

To prevent things like autumn leaves getting into the pond (and cats getting the fish out) a **pond net** can prove invaluable if you are prepared to put up with a slight impairment of the pond's visual beauty.

INTERCEL LTD

An igloo-type anti-freezing device will ensure an open ice-free hole even during the most severe winter weather.

As the cold days approach, you might consider covering the pond with a swimming pool type **bubble-sheet cover** to keep in the warmth and prevent freezing-over. Another solution is to fit either a floating **pond heater** or a floating polystyrene **igloo,** both of which will maintain an ice-free hole on the water surface, thus allowing oxygen in, and any foul gases out.

HANDLING AND SPAWNING

Handling fish at any time is a stressful experience (and not just for the fish), so be sure that your **nets** are up to the task. Where large fish in large ponds are concerned, then something approaching an angler's landing net is called for. Never lift a fish out of the water only supported by a net (especially something heavy like a prized Koi) as it will probably suffer scale/fin damage at worst, jump out and/or break the net at best! Keep the net in the water until some other supporting medium can be slipped under the net to take the strain.

Spawning fishes are a joy to behold, and controlling their spawning conditions and saving the eggs is vitally important for the more serious fish breeder. **Spawning mats** and **brushes** are essential items in this respect; they can be used to build localised spawning areas and make ideal 'egg-traps', enabling the fishkeeper to manage breeding procedures much more efficiently, and again reducing stress to the fishes.

HEALTH AND REPAIRS

It is unlikely that your pond will survive indefinitely without a health setback of one kind or another. Attention to regular maintenance and care when introducing new fish to the pond should cut these down to a minimum, but there are many tried and tested **remedies** available to combat any disease.

Don't forget, it is important to dose the pond accurately; now is not a good time to realise you don't know the pond's capacity!

Similarly, a wide range of **plant foods, pond-soils, pond tonic salts** and **vitamin food additives,** will also maintain the water, plants and livestock in tip-top condition.

Apart from health problems, more mechanical troubles can occur; elsewhere in this section, attention has been drawn to the virtue of maintaining pumps, fountains and filters in good working order but should, say, a leak occur, then plastic, PVC and fibreglass **repair kits** (and **re-sealing compounds** for concrete) will effect an efficient local repair job without the need to install a completely new pond.

POND SURROUND

By now, if you have become the owner of a pond to be proud of, you may start setting your sights beyond its edges to enhance its appearance even further. Probably the first thing to add is a **garden seat,** and then it's but a short step away to **pergolas, gateways** and **statuary.** Once these are installed then it would be a pity not to accentuate their beauty with some **garden lights** (you'll notice that I've taken for granted that your pond, fountains and waterfalls are already similarly lit!)

SECURITY AND SAFETY

At this moment in time, too, you might be forgiven the thought that there's much more of value *outside* the house than in, and **pond security** could well figure next on your 'what-to-get-next? list. **Infra-red activated passive detectors** will warn of night-time intruders (natural or human) encroaching on to the pond's borders by switching on poolside lights; **trip wires** (of dark cotton threads, or even the low voltage electrified type) should deter cats and herons — you could always try a life-size imitation heron.

Plastic floating lilies serve two purposes: those modelling flowering specimens keep the pool's surface looking attractive during the winter months, while the plain lily-pad forms provide a very unstable, yet fish-sheltering barrier against predatory cats.

Returning briefly to **lighting,** a mention must be made about **electrical safety.** If royalties were paid on copyright phrases, then most aquatic authors would be very comfortably off on the proceeds of *'water and electricity make a bad combination'.*


BLAGDON WATER GARDEN PRODUCTS LTD

Underwater lights will add a new and colourful dimension to any pond.

It is vital that all electrical connections are soundly made, with **waterproofed connectors** and **switches. Power breakers (RCCBs),** are a good investment and **power-breaking alarms** may also be considered. Pumps and lighting may also be advantageously powered by **low-voltage systems,** but bear in mind provision has to be made for the weather-proofed siting of the necessary 'step-down' transformer.

Finally, don't forget that **cordless telephone,** so that while you're down at the poolside, you can still take orders from 'He Who Must be Obeyed!'


BILLY WHITESIDE

Netting may not be to everbody's liking, but it serves the dual purpose of preventing falling leaves from polluting a pond, while, at the same time, protecting the fish from predators.

ENVIRONMENTAL HEALTH FOR NATIVE MARINES

(7: Troubleshooting)

In this concluding article, **Andy Horton** analyses what to do when something goes wrong, investigates the causes of some of the more common problems, and suggests a maintenance programme for native marines.

(Photographs by the author)

Water quality is of paramount importance when 'Troubleshooting' for health problems in the fish and invertebrates in a native aquarium. It is only after checks for deterioration in aquarium conditions have been carried out that the biology of the various species, and the consideration of the possibility of disease, need be investigated.

HEALTHY BEHAVIOUR

Fish usually develop symptoms before their demise, although the aquarist may not recognise them until it is too late. Before the diagnosis, it is pertinent to examine a fish when it is healthy, so that a comparison can be made with one that is suffering from a deterioration in the water quality, or a disease aggravated by poor water conditions.

The Bullhead (= Sea Scorpion) *Taurulus bubalis*, will be used as an example here. Healthy specimens will have clear eyes. However, at the first signs of unacceptable stress, the Bullhead will refuse to feed. Later the eyes will begin to cloud over.

A freshly collected fish may experience a mild form of stress because of the trauma of capture, or because it needs to adjust to the new environment in the aquarium. Conditions should resemble those found at the time the fish was caught. For the first two days, the fish may hide away, but after this period, all suitable 'aquarium' fish should start actively feeding. With crepuscular (twilight) and nocturnal species like the Rocklings, this may occur at night.

PROBLEMS

Problems will be examined in what I feel is their order of importance, the most likely faults being considered first.

Temperature

Many marine fish and invertebrates have evolved to live in a narrow range of temperatures and will perish if the water gets too hot or too cold. During the summer months, keeping the temperature down is the major problem of this branch of fishkeeping. In my 1986-89 survey I found that as many as 50% of the most commonly kept creatures could be detrimentally affected in this way.

Research into the living habits of the various fish and invertebrates is fundamental to the British native marine aquarist. It is essential to maintain the approximate temperature in which each species is naturally found. Compare the temperature charts in the **Keep it Cool** article in the November

Top, Shaldon Beach, Devon. UK coastal sea temperatures are rarely higher than 16°C (61°F), even in summer. In rockpools, though, things can be very different.

Left, Hermit Crabs such as *Pagurus bernhardus* only do well in the long term if factors like the pH of the water, are kept under control.

SEA SURFACE TEMPERATURES IN AUGUST

North Scotland	13°C (c 55.5°C)	Cornwall (Eng Channel)	16°C (c 61°C)
Northumberland	14°C (c 57°C)	Southern Ireland	15°C (59°C)
West Scotland	14°C (c 57°C)	Bay of Biscay	18°C (c 64.5°C)
Isle of Man	14°C (c 57°C)	Northern Spain	20°C (68°C)
London (Thames Estuary)	16°C (c 61°C)	Gibraltar	22°C (c 71.5°C)
Sussex	16°C (c 61°C)	Naples	25°C (77°C)

1989 *A & P* with the distribution charts shown in the best guide books. The highest temperatures are usually recorded in August.

These temperatures were recorded offshore; temperatures of 2°C (3.6°F) higher could be recorded in coastal waters.

It is, obviously, very important to identify the fish and invertebrates correctly[1] because this has a direct bearing on their tolerance levels. The Bullhead (*T. bubalis*), for example, has its most southerly point of distribution in Northern Spain. Temperatures should therefore not exceed 20°C (68°F) for this species, although, for short periods (for a few hours on an occasional day) 22°C (c 71.5°F) can be permitted.

Heat stress is characterised by increased respiration and internal damage, especially to the ovaries. In both fish and anemones, the first signs are a refusal to feed.

Remedies: Install a 'cooling unit' or return the fish/invertebrate to the sea.

Oxygen Content

Symptoms of insufficient oxygen are easy to detect in free-swimming fish, as they are likely to gasp at the water surface. However, many rock pool fish are bottom dwellers, without swim-bladders, e.g. the Bullhead and the Gobies, and these will rest on the floor of the tank. If there is insufficient oxygen for their requirements, they may suddenly rush to the surface and take a gulp of air.

Remedies: Ascertain cause which could be:

① Overstocked tank. If so, transfer fish and the larger crabs to a bigger tank with plenty of aeration.

② Dead animal, possibly a bivalve mollusc. Remove dead animal and any scraps of uneaten food. Increase aeration by installing an air-stone attached to an air pump just below the water surface, or use an injection air device, or venturi (available on most makes of powerhead).

③ Excessive feeding. Increase aeration.

④ Excessive temperatures, resulting in decreased oxygen content. Increase aeration.

⑤ Breakdown of filtration equipment. Repair, and remove fish to another tank until conditions improve.

Oxygen demands of invertebrates, especially the smaller species, are likely to be lower than those of the fish. It may therefore be possible for invertebrates to remain in the aquarium.

Oxygen test kits and meters are available and these should be given serious consideration.

Salinity

Salinity should be monitored using a hydrometer. British offshore seas vary between 3.4% and 3.5%. Some species like the Common Goby, *Pomatoschistus microps*, are euryhaline, and will live in salinities as low as 3%; but for most fish, it is suggested that you keep the salinity between 3.3% and 3.5%, replacing losses in hot weather with fresh tapwater.

At 15°c (59°F) at 3.4% salinity, the hydrometer should read 1.025. At 20°C (68°F) the reading will be 1.024. A variation of 0.001 corresponds to approximately 0.1% salinity. The higher the specific gravity (S.G.) reading, the saltier the water.

Fish will frantically try to escape from water that is too dilute, jumping out of the water in the process. (*This has only been observed in natural estuarine conditions when the sea had receded at low tide, and fresh river water dilutes the shallow sea.*)

Some invertebrates are intolerant of long-term immersion in low salinity. Such species include the common Beadlet Anemone, *Actinia equina*.

Remedies:

Too saline: Add fresh tapwater.

Too dilute: Make water change, with salts at a higher density.

Ammonia

Ammonia is highly toxic to marine life at low levels. Often, these levels are too low to be recorded, however. If the ammonia is recorded as high on the test kit (over 0.4mg/litre total ammonia), symptoms often proceed so rapidly that the fish is dead before any remedial action can be taken (statement based on one test on the Two-spot Goby, *Gobiusculus flavescens*, only). Some species, including most crabs, are more tolerant of higher ammonia levels.

Remedies: Ascertain the cause and make sure that it does not happen again. Causes could be:

① Breakdown of filtration equipment. Deaths are likely to be from oxygen shortage. Install duplicate filtration, and stock spare powerheads in case of emergencies.

② *Nitrosomonas* bacteria not sufficiently established in new aquarium, or an aquarium restarted after pump malfunction.

③ Large introduction of new animals at one time.

④ Natural seawater introduced into an aquarium after being stored in the dark for an insufficient period of time.

Ammonia test kits can be useful in diagnosis after an unexplained death, although the readings will often be nil.

Hydrogen-ion balance (pH)

The pH of the water should be maintained at a level between 8.0 and 8.3, best done by regular monthly water changes.

I can find no direct link between falling pH levels (water becoming more acid, something that is inevitable in aquariums with successful biological filtration) and the loss of British species of fish. However, I have established an empirical link between making regular water changes and greater success in keeping Hermit Crabs, *Pagurus bernhardus*, if these changes are made.

The pH should remain stable. Exell[2] explains the need to maintain a constant pH level, which is particularly likely to be crucial to the success of developing eggs and young fry.

Remedies: Change the water. 20% per month. Institute regular pH monitoring to ensure water changes are sufficient.

Unfavourable water conditions will result in fish like the Bullhead, or Sea Scorpion (*Taururus bubalis*) refusing to eat and soon developing signs of ill-health, such as cloudy eyes.

Nitrite/Nitrate

Although I have never been able to establish a direct link between high levels of nitrite and nitrate and the demise of British sea life, the long-term effects were not considered. High nitrite levels are only likely to occur after a heavy feed, or if the biological filtration is not working successfully.

Modern biological filtration media can remove nitrates from the water so these problems should no longer arise.

Remedies: Monitor nitrite/nitrate, if you wish, as an added safeguard, and treat high levels (over 1 mg/litre) as a warning sign!

Malnutrition

Do not be too cautious. Life found in British seas is highly competitive and the fish and crabs have enormous appetites. If you do not feed them enough, they will start eating each other! This does not mean that you can put vast quantities of food in all at once, though,

MAINTENANCE PROGRAMME (Undergravel System)

DAILY TASKS:

① **Feeding:** Small amounts of food should be given to the fish and invertebrates twice during the day. Check that all species are feeding. Remove uneaten food.

② **Head count:** At feeding time, check that all the fish etc, are present.

③ **Equipment:** Check that Powerheads and diaphragm air pumps are working.

④ **Temperature:** Check temperature to ensure 'cooler' is working, or to decide if some fish and invertebrates should be returned to the sea.

WEEKLY TASKS:

⑤ Stir up established filter bed which may have become compacted with detritus. The purpose is to aid circulation.

⑥ Clean algae from viewing glass.

⑦ Check salinity and replace losses which have occurred through evaporation with fresh tapwater.

MONTHLY TASKS:

⑧ Check pH.

⑨ Make 20% water changes, and clean detritus from the gravel at the same time.

⑩ Check diaphragm pump filter pads, and remove dirt from inlet pipes to external filters, coolers etc.

ANNUAL TASKS:

⑪ After a year, and certainly after three years, so much dirt will have accumulated in the coral sand, or gravel, that a partial clear-out must be considered, before the gravel becomes too compacted for continual, even circulation of water. Transfer inhabitants to another aquarium, and make a more thorough clean, with an 80% water change, but still keeping most of the sand substrate with its valuable nitrifying bacteria.

as this will cause a serious deterioration in the water conditions.

If a fish is not getting enough to eat, it may mean that the more aggressive species are depriving it of its share. A varied natural diet is advised for most species. Flake food will be eaten, but most species thrive best on boiled mussel.

Fish that receive an inadequate diet are often thin around the face. This is more likely to occur in juveniles. The cause seems to be that the diet of these small fish (e.g. Wrasse) consists of small planktonic animals, e.g. copepods etc, and it is not until they are larger that they will readily take flesh foods like mussel. Some fish, like the Sea Stickleback, *Spinachia spinachia*, and the various species of Pipefish, are exclusive live feeders on small animals. Others have specialist diets, including all species of Nudibranchs (Sea-slugs), and some bivalve molluscs like the Mussels, which filter phytoplankton.

Glossary

Conditioned aquarium is defined as one in which the filter bed bacteria are in equilibrium with the routine input of their energy sources. (Spotte.)

Ecydsis is the final stage of the moult of a crab or other crustacean, when it leaves the old exoskeleton. The newly-moulted animal remains soft and vulnerable to attack from predators like Wrasse, Blennies and other crustaceans.

Some anemones (this is *Sagartia troglodytes*) can tolerate lowered oxygen levels.

Remedies: Research into the food requirements of unusual species *before* you stock them. Watch carefully to ensure that all the creatures get sufficient food. Collect live food from the shore, or purchase fresh or frozen uncooked fish, or gamma-irradiated frozen special foods.

Stress

Serious consideration must be given to providing a natural home for the various species. Blennies, for example, feel safer when there are holes to retreat into. This also applies to the crabs, all of which will hide under rocks. Of course, they will need to hide away before and after ecdysis (moulting).

Compromises need to be made in some cases. Wrasse, for instance, are inhabitants of weedy areas. As coldwater microalgae (seaweeds) are difficult, or impossible, to grow, the aquarist should try to mimic the rock arrangements so that these fish can feel safe. The green alga *Caulerpa* from tropical retailers, will survive — at least for a time — in coldwater aquaria. A few of the more delicate species of seaweeds from British shores like the Irish Moss *Chondrus crispus*, *Ceramium rubrum*, *Codium*, and others can also be tried.

Some fish will demonstrate territorial behaviour during some periods of their life. They will live together peacefully for several months, and then be compelled to attack and intimidate their rivals to such an extent that the weaker fish will die if they are not removed. This is best seen in the Corkwing Wrasse, *Crenilabrus melops*, but will also occur in the Common Goby and the Cornish Sucker (= Clingfish) *Lepadogaster* species. If predators like the Bullhead are kept in the same tank, smaller fish may also succumb to stress-linked diseases because of the presence of the 'villain'.

Remedies: Research and experience into the needs of various species. Look for forthcoming articles in this magazine.

Diseases

Only after the above factors have been ruled out, can the possibility of a specific disease be considered. Three common examples were discussed in my previous article[5]. These three ailments ('black spots', 'white spots', eye ailments) are likely to be found in wild-caught specimens.

However, some diseases are only encountered in aquaria: the unusual white dust covering (similar in appearance to the tropical *Oodinium*) found on fish like the Bullhead, is probably a result of inferior water quality. Likewise, a discoloration of the skin, to a paler hue, found in Blennies, is almost always improved by changing the tank water, or reducing the stocking levels in that aquarium.

These seem likely to be diseases exacerbated by poor water. Nematode worms inhabit the guts of many shore fish and feed on the food meant for their host but don't often cause serious problems.

Injuries occur frequently, even in compatible aquariums. The combinations of fights are too numerous to record here. One result in fish is a fungal infection at the site of the injury. If the original injury is on the body of the fish, or consists of small nips in the caudal (tail) fin (Wrasse and Sea Stickleback are the principal offenders), this infection will clear up completely if the fish is placed in a clean tank, indicating that poor water conditions are partly to blame. In severe cases of Tail Rot, the fish will not recover.

Chemical treatment should never take place in the display aquarium. It should also be remembered that medications containing copper sulphate are harmful to invertebrates. For details of how to diagnose and treat all the more common diseases, consult the book referred to under 3, below.

Notes and References

[1] This can be difficult. For fish, I recommend *The Key to the Fishes of Northern Europe* by Alwynne Wheeler (**Warne**). For invertebrates, the **Collins, Reader's Digest** and **Hamlyn** guides provide a starting point. More specialised texts are available through the **Marine Conservation Society,** and Public Libraries.

[2] *Manual of Fish Health* (**Salamander Books 1989**). Dr Chris Andrews also explains the diagnostic procedures and examinations of fish under the microscope in this book.

[3] **Environmental Health:** Part 6. *A & P* (November 1990).

OTHER ARTICLES IN THIS SERIES

Further details of all the major factors covered in Andy Horton's series **Environmental Health for Native Marines,** published in *A & P*, are contained in the following features:

1. **TEMPERATURE** — February, 1990
2. **OXYGEN** — April, 1990
3. **FOODS AND FEEDING** — May, 1990
4. **WATER** — July, 1990
5. **CORRECT MAINTENANCE** — September, 1990
6. **LIGHTING, INTRODUCING SPECIMENS, STOCKING LEVELS** — November, 1990

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.

COLDWATER

TENCH IN TANKS

I have recently bought a small Green Tench and think that it is a very charming fish. I intend to keep it in a large aquarium once it begins to grow and would like to know the best conditions for it.

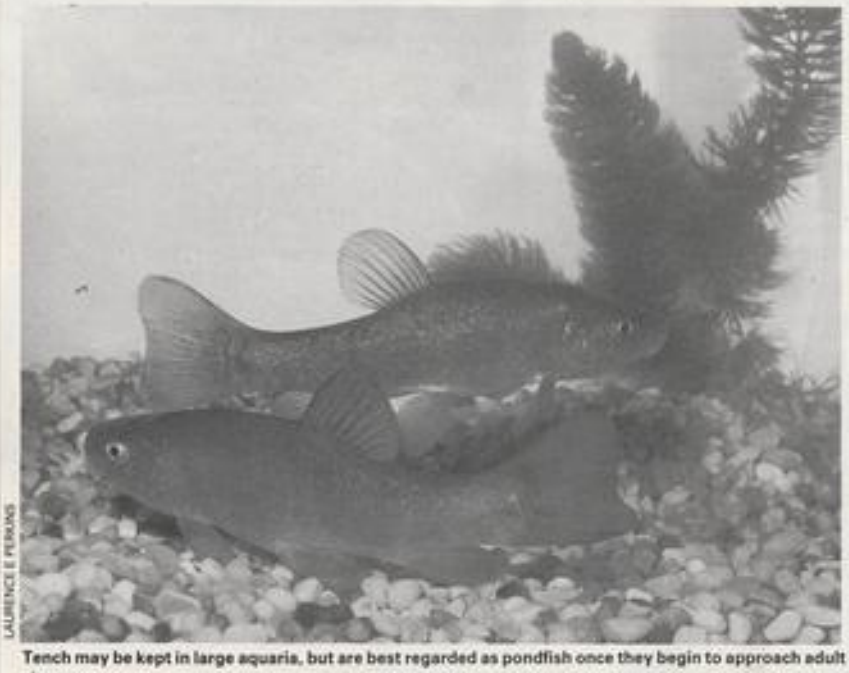
At the moment it is on its own. Will it prefer company? I am feeding it a varied diet consisting of dried and live foods. Is this OK?

The Green Tench (*Tinca tinca*) can be found in our native waters and can grow quite large (up to around 70cm — c27·5in). The Golden Tench is a cultivated variety and is the one usually kept by aquarists because it is rather brighter in colour. These fish are members of the carp family and have a short barbel at each corner of their mouths.

Feed as you would goldfish; your choice of food is excellent and will help to keep them in good condition. Tench are not normally solitary animals and will therefore appreciate company; they appear to keep in small groups in their native waters.

In the wild, they are found in shallow lakes, gravel pits and slow-moving rivers, so furnish your tank in a similar manner (eg) gravel on the base of the aquarium with smooth, rounded rocks (river-worn are ideal) and plenty of pond weed. *Egeria densa* or *Elodea canadensis* are two well-known plants, with *Vallisneria gigantea* being an easy, fast-growing plant to give variety. Plants do better in bright light. Artificial lighting does give the aquarist more control over the amount of illumination the tank receives and can be adjusted to suit the plant growth.

Keep the water in good condition with the aid of a filter. There is a wide choice of types, but a simple box filter can do the job quite well. Partial water changes, removing about ⅓ of the volume about twice a week, will also help to maintain good conditions for your fish.


LAURENCE E PERKINS

Tench may be kept in large aquaria, but are best regarded as pondfish once they begin to approach adult size.

HARMLESS PATCHES

Just recently, my two smallest goldfish have developed some tiny dark flat patches on their backs. Could these be caused by new scales coming through where others have been damaged, or could they be caused by parasites? I'd like to know before I treat my fish.

I do not think you have anything to worry about concerning the little dark blotches on your fish. You are quite right, of course, to seek advice before you start to treat your fish with all kinds of treatments which could cause them stress.

When goldfish are babies, they are a dark greenish colour which, as time passes, changes into their adult colours of either yellow, orange or silver, or even a combination of orange and silver. Sometimes in later life, normally when they are young adults, little patches of black return for a short period of time. There have been many ideas as to why this happens, but injury seems rather likely. These small patches usually disappear after a period without any treatment.

MARINE

AWKWARD ANGELS

I am writing for some information (the correct information!) on the Bi-Colour Angel Fish (Centropyge bicolor). *I have been trying to read up on this fish as I intend to buy one. The information I have obtained from my books differs somewhat.*

One says they are aggressive, can be kept in pairs, are hard to feed, are very difficult to keep, and you need to have an aquarium set up for at least two years.

The other one says the opposite: very easy to keep, easy to feed, very peaceful but must never be trusted together.

Please could you send me the correct information on this fish?

MAX GIBBS, THE GOLDFISH BOWL

The Oriole or Bicolor Angel *(Centropyge bicolor)* — not for the beginner or unadventurous fishkeeper as this beautiful fish can be a difficult feeder.

Undoubtedly, the best 'doer' of the *Centropyge* genus is the Coral Beauty Dwarf Angelfish *(Centropyge bispinosus)*. The Dwarf Oriole Angelfish *(Centropyge bicolor)* is one of the most difficult or awkward to keep, unless you intend keeping a specimen — or a mated pair — in a well-established (ie at least 6 months old) *invertebrate aquarium* of generous dimensions. I wouldn't consider keeping a single fish in a tank smaller than 48 x 18 x 18in (120 x 45 x 45cm), (56 gallons = 255 litres gross capacity), and I certainly wouldn't invest in a mated pair of Oriole Angels unless the tank was at least 60 x 18 x 24in (180 x 45 x 60cm) (93 gallons/425 litres gross capacity).

I would never attempt to keep this Angelfish in a fish-only set-up because it would be unlikely to survive for more than a few weeks.

For best results, quarantine the fish for 7 days, adding suitable safeguards such as Octozin, and then transfer to your invertebrate aquarium. This should be done as early in the morning as possible so that the Oriole has ample time to memorise the positions of all stinging anemones, living corals, etc before the lights are switched out that evening.

NITRATES. Please make sure that the NITRATE (No_3) content of your invertebrate aquarium isn't any higher than 50 ppm/mgs per litre. This is achieved, either by regular algae harvesting, or by regular partial seawater changes.

It goes without saying that the nitrites (NO_2) must be absolutely zero at all times.

FEEDING. A well-quarantined Oriole Angel will eat almost anything, but shows a special preference for chopped, gamma-ray irradiated Mysis Shrimps, fish eggs, Artemia, cockle, whole shrimps and a high-quality flakefood.

TROPICAL

SURFACE FILMS AND FUNGUS

A thin film has developed on the surface of my tropical freshwater aquarium. There's also a jelly-like fungus on the surface of the filter airlift tubes. What's causing these problems?

Fungus growth and oil on the water as you describe are sure signs of surplus biological material within the aquarium. This can be caused by overcrowding, overfeeding, insufficient filtration or too few water changes. Correct all these parameters and the problem will be cured.

Make sure the power filter has a spray bar return system fitted and arrange it to jet along the water surface. This maximises oxygenation and prevents oil or scum forming.

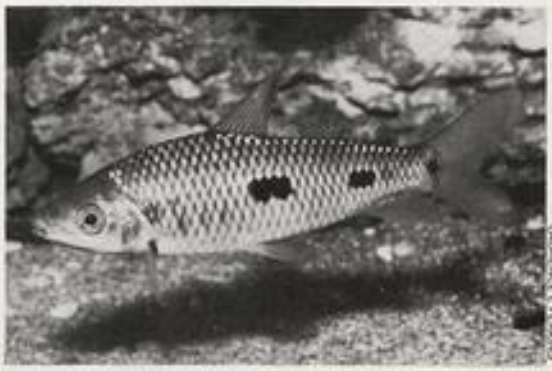
COMPATIBLE SELECTION?

Would you please tell me if the following selection of species is a compatible one: two Leporinus, *four Clown Loaches* (Botia macracantha) *and two Uarus* (Uaru amphiacanthoides). *Please advise me on a suitable diet for these fish.*

The *Leporinus* will present no problems; they are vegetarian fish (from American waters).

The Clown Loaches are good community fish but are unhappy without a cave, so install plant pots or polypipe sections silicone-sealed to a piece of slate.

Uarus are peaceful (even delicate) fish, often found swimming with Discus in Amazonian waters. Therefore, similar water conditions are best (soft and acid). It, too, is a vegetable eater, but will take other foods.



LAURENCE E. PERKINS

***Leporinus* (this is *L. friderici*) are predominantly peaceful vegetarians which will co-exist with other non-aggressive species.**

Clown Loaches and *Leporinus* will also accept soft, acid waters, so if the tank is designed for Uaru (boiled tapwater, plus a little peat in the filter) the fish should be compatible.

Feed a tropical flake diet, including a vegetable flake with the odd lettuce leaf, or the Uaru may eat any soft-leaved plants.

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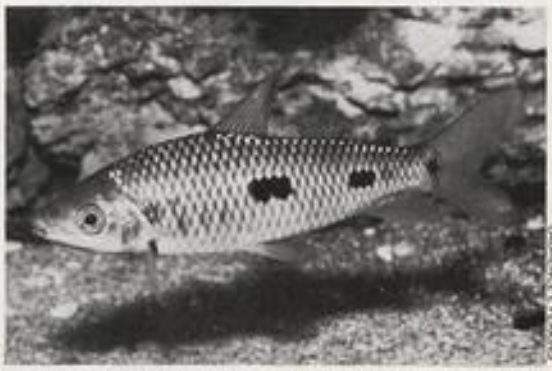

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HERPETOLOGY

TEMPTING TORTOISES

Is there anything I can do to tempt my 25-year old tortoise to start feeding after hibernation?

On warm March days, put your tortoise out of doors to bask. Spring sunshine is an excellent stimulant to promote feeding after winter inactivity.

Lettuce leaves, slices of cucumber (which are very aromatic), dandelion flowers and slices of sweet apple are all particularly tempting to a tortoise which is otherwise reluctant to feed.

JULIAN SIMS

Two 'newly-awakened' tortoises basking in spring sunshine.

The smell of a freshly mown lawn can also act as a stimulus to encourage feeding.

On cold or damp days, keep your tortoise indoors. Arrange an indoor basking area, illuminated with a 60 Watt silvered spot lamp. In this way, a tortoise can usually be tempted to feed, even when outside conditions are cool and dull. Indoor feeding will give the reptile a good start for the summer. Use newspaper on the floor of the basking area. This can be regularly changed to keep the indoor enclosure clean and hygienic.

Give your tortoise regular baths in shallow luke-warm water. This not only gets fluid into the body — especially important when a tortoise resumes regular feeding, but also stimulates the release of uric acid and faeces.

PLANTS

ASIAN ADVICE

I would be grateful if you would advise me on which Asian plants to buy for my Clown Loach aquarium.

For dwarf plants, any of the *Cryptocoryne* species would be suitable. For the medium ground, *Blyxa echinosperma*, *Vallisneria torta* and any *Cryptocoryne* species would be fine. For centrepeice plants, you could use *Barclaya longifolia* or a few plants of *Cryptocoryne blassii*.

For background plants, some *Hygrophila* species, *Rotala* species, milfoils, *Vallisneria spiralis*, Water Wisteria, etc would be useful (although not all are Asian in origin). For decorating logs or rocks, you could use *Microsorium pteropus* or *Vesicularia dubyana*.

PETER ZUKAL

***Barclaya longifolia* — a suitable centrepiece for a Clown Loach aquarium.**

Alternatively, you could simply buy an Asian plant collection. I used an illustration of one such collection in my book *An Interpet Guide to Aquarium Plants* (published by **Salamander**).

'PLANTS' ON PLANTS

I recently added some new plants to my aquarium. Within a week or two I noticed what look like tiny plants or small filter-feeding worms growing on the plants.

None of the fish are affected, but what are these 'plants' or 'worms'? Will they do any harm?

What you have on your plants is an infestation of *Hydra*. These are tiny invertebrates related to anemones and corals. They do feed on small organisms, including fish fry. However, they will do no harm to adult fish.

If you wish to destroy them, a copper-based treatment, such as Cuprazin, will do the trick. Alternatively, some species of fish (eg) some Gouramis, will attack *Hydra*.

KOI

NATURAL PONDS

Although shapes and sizes of Koi pools are well documented, I cannot find any information on the depth or shape of a natural pond. I would like to know what the recommended depth for a natural pond measuring 33ft x 13ft (c 10m x 4 m) would be. I would also welcome your suggestion regarding a suitable book that would include details of natural ponds.

I'm not sure what you mean by 'natural pond'. Ideally, a natural pond is a complete ecosystem where all the dying and dead plants, organic matter etc are absorbed back into the floor of the pond each season, thereby nourishing new growth. In a concrete or liner pool, this cycle is obviously not possible; the afore-mentioned matter merely rots down and, if not removed regularly, simply causes a stinking polluted puddle of water.

Having said all that, there's no reason why you should not have this type of pond, provided you are prepared to empty and clean it annually. It would be preferable to have a few fish, if only to keep down the population of mosquito and other larvae which will quickly colonise any area of still water. Perhaps a couple of tench, goldfish, and/or Koi would suffice.

As to the shape and depth, I would sugest roughly spoon-shaped as being ideal, with a depth of 3 to 4 feet (90-120 cm) minimum at the centre. The edges should be quite shallow, with either turf or peat down to, and a little below, water level to enable any wildlife easy access. A reasonable depth of water ensures relative stability for the water and any life therein.

I'm afraid I do not know of a book aimed specifically at constructors of this type of pond, but any of the popular water gardening books should contain most of what you need to know. In my opinion, *John Darwes's Book of Water Gardens* would be as good a choice as any, as it is fairly wide-ranging and includes discussion of all types of ponds, including wildlife ones.

Letters

The Great Import Debate (Final Thoughts)

Your reader's comments as to castrating the editor for printing the original letter must have been echoed by many traders in this industry.

What can I say in reply? I am totally disgusted with Mr Sands' comments as to the survival rate of fish that he has imported in the past. I wonder how he ever managed to stay in business with his customers losing 75% of all fish bought from him within three months. He is in a responsible position making statements that are ammunition for the factions that are working to kill this hobby in 1992. He should consider what he says very carefully. There are enough problems for the retailer in this country without the misinformation that he is writing. I also read the article in Pet Business World and was astounded that he could make such contradictory statements.

I would suggest that, in future, he thinks berfore he puts pen to paper realising the potential effect that his words would almost certainly convey to the younger generation of aquarists and potential aquarists of the future.

This is my opinion for what it is worth. It is also that of my customers, so I do hope that our thoughts and opinions are acknowledged for what they are.

As for your reader who wanted to castrate you, he is also a customer of mine who I know to be a caring individual with a heart of gold and who, with one exception, would not wish that on anybody.

D. Goodwin,
Tropifish,
Deal, Kent.

[2] Having read December's editorial, I am concerned about the attitudes of some readers. That someone has threatened to remove the editor's credentials is amusing up to a point, but it reflects intolerance towards another person's opinion.

David Sands painted a sorry picture in his article and I can understand a lot of people disagreeing with his views. These people are right to say as much, as some have already done. What cannot be justified is personal abuse.

I am sure there are many people, with interesting ideas, who keep them to themselves for fear of personal attack. Not everyone wishes to cope with the fame or infamy which can result from putting pen to paper. Please, ladies and gentlemen, let your voices be heard without insults and intimidation.

Alex Stephenson,
Dereham,
Norfolk.

[3] I have been keeping and breeding exotic fish for over 40 years, and importing them since the early '60's.

Since at least 80% of my imports come from Singapore, I don't think I would have many customers left by now if David Sands' wild statements were true!

If 75% of his imported fish do die, he must be doing something very wrong indeed.

George F Yallop,
Bergeo Aquatics,
Launceton,

[4] Dr J A Collins' "hypocrisy" paragraph on David Sands (see January letters) weakened an otherwise reasonable argument with personal invective, and ought to have been beneath his dignity.

I'd much rather read a lively discussion on issues without "ad hominem" remarks and sour grapes about people's "financial backing": a matter which is surely private to the gentleman and his sponsors, and not for public comment.

I'm sure that whatever "financial backing" Dr Collins received to do his doctorate was deserved, purely by virtue of his hard work and native ability, and that many others have benefitted from this investment in human capital. The same is true of David Dean Sands and any sponsorship he gets.

My own position is that I doubt that zoos will become a thing of the past this side of eternity. I also oppose the idea of positive lists which can only be based on ignorance and which, if applied, would do the world more harm than good, but at the same time I would welcome increased and recognisable self regulation in the industry and hobby (ie something akin to ABTA or LAUTRO as a mark of ethics and quality to the aquarist).

For example, hands up all those dealers who:

(i) make themselves aware of those species reckoned to be particularly vulnerable when collected for the hobby and refrain from dealing in them;

(ii) avoid supporting such practices as painting fishes, etc;

(iii) do not sell fish to children without being aware of parental approval;

(iv) provide an amount of free or low cost literature for the beginner;

(v) support local and specialist societies by publicising them and taking part in them.

The individual hobbyist has equally high ethical considerations, and these increase in proportion with his or her collection. German hobbyists in the "Patenschaft" species guardianship schemes co-ordinated by Hans-Georg Evers in Hamburg, are pushing forward the bounds of morally responsible fishkeeping.

In November 1990's "New Scientist" Colin Tudge encourages professional ichthyologists to enlist the help of amateurs to establish stable breeding colonies of endangered fishes. I hope that all who are able to, will respond positively if this is taken up.

The future of aquatics lies in mutual respect and the blending of the interests of all parties by means of objective, imaginative discussion. It lies in goodwill, not in rancour.

David James,
Hemel Hempstead,
Hertfordshire.

Editor's Note

*David Sands' **Reflections** (Nov '90), as the December '90 – March '91 issues have shown, have generated a great deal of 'vigorous' reaction among our readers. Many interesting points have been raised in the past few months, most of the publishable(!) ones being aired on these pages. However, it is now time to bring the subject to a close.*

We thank you for all your letters and telephone calls, and hope that the discussion has proved both informative and constructive.

John Dawes

Supreme compliment

May I, through your magazine, thank everybody concerned with the organisation of the Supreme Festival of Fishkeeping (10-11 November '90) for making it such an excellent weekend?

I would like to thank the lecturers — who were excellent in their subjects, the trade stands — for their help and advice (didn't John Dawes look well after his operation?), the FBAS and sponsors, Interpet, the holiday camp — for staging such an event, the specialist societies — for their effort in setting up their stands, including Pat and Derek Lambert and others of Viviparous, for a truly fantastic array of rare livebearers.

I, being part of the management team, did my turn at the Viviparous desk, and was surprised at the number of people asking about guppies, not knowing that, within Viviparous itself, I am organising a Fancy Guppy section.

Finally, I would like to thank all the friendly aquarists who I met and who made it such a great weekend. I hope that the huge success of the weekend will help make it an annual event.

Graham Seddon,
Viviparous,
(Fancy Guppy Section Manager).

UK-bred Fish Proposals

I would like to form a new society, to be known as The British Aquarist Breeders' Society or BABS.

BABS will, like many other societies, carry a basic membership fee to provide for newsletters, meetings and shows, but it will also have some very different objectives:

(a) to bring together fish breeders throughout the UK, so as to pool practical experience from every aspect of fish breeding. We intend to deal with every type of fish-marine, tropical and coldwater. This experience will be used to improve breeding success and breed previously unbred species;

(b) to preserve the natural environments which supply our hobby by reducing the numbers of wild-caught fish;

(c) to ensure the longterm future of fishkeeping as a hobby after 1992, avoiding the threats which exist in Germany and various States of America;

(d) to see, with the sponsorship of large companies who are interested in green issues, that a separate organisation is formed to run as a business to provide facilities for BABS and its objectives.

This separate organisation could possibly be known as British Bred Fish Supplies or BBFS. It will also have its objectives which are as follows:

(a) to set up and maintain a warehouse facility solely for the purpose of BABS to
— breed fish,
— store fish,
— wholesale fish;

(b) to ensure that this is done by purchasing bred fish from BABS members;

(c) to ensure continual breeding programmes;

(d) to offer aquatic retailers a competitive wholesale service;

(e) to provide excellent 'point-of-sale' material to emphasise the advantages of BBFS and 'green awareness';

(f) to promote itself and BABS in a very environmentally friendly manner;

(g) to return profits both to BABS members, by offering competitive pricing for bred fish, and to itself for the continuation of breeding programmes and conservation.

I am sure readers will understand the reasons for some of these objectives.

Obviously, with 1992 on its way, who can be sure of exactly which fish are to continue being imported; this applies especially to marines. In view of this, breeding programmes are needed now.

Another reason is that I believe we should be thankful that our hobby exists and endeavour to repay for the pleasure we reap and therefore protect and conserve the natural environments from which our fish originate.

It is because of this that I found a letter from the OFI published in the November '90 issue of *AGrP* somewhat disturbing. They can be quoted as calling conservationists their enemies. Surely, they should work with these people. I do not believe that the Australian government would impose a thousand dollar fine or a month in prison for collecting corals at the Barrier Reef, either. Obviously, the problems are there and are not just a misunderstanding, as the OFI have quoted in their defence for importation.

I would rather purchase a fish bred in the UK than one poisoned by cyanide or blasted from the water which would not be likely to last a week once you got it home. I believe we, fish breeders, should work together and, if after 1992, we cannot import wild-caught fish, maybe we can import fish from other similar organisations yet to be set up in Europe.

Peter Muchamore,
North Watford,
Hertfordshire.

Questionable practice

I recently paid a visit to a garden centre near where my son is attending Polytechnic. We went with the intention of buying a few additions for our four aquaria and pond.

We were both upset and horrified to see live fish being fed to Piranha. Other people who were watching were, obviously, also upset by this practice. The fish in question may possibly not have been up to standard for selling, but they were alive . . . and frightened.

I always understood that if fish were incurably ill, they should be disposed of humanely. As far as we could see, these were not sick fish.

Lorna Staveley,
Bridlington,
Yorkshire.

LAURENCE E PERKINS

Should Piranha be fed on live fish, whether at home or in a shop? (See — Questionable Practice).

Mag for U-16's

I am a twelve (coming up thirteen)-year-old fishkeeper and am interested in starting up a small factsheet/magazine for fishkeepers under the age of sixteen.

The magazine would contain approximately four pages/eight sides (A4) of competitions, letters, spotlights on certain species, product guide etc. Kids would pay a small fee to cover p&p, and the magazine would be sent to them every six(?) weeks for a year.

What I need is for anyone who would be interested in helping me run the magazine to drop me a line. They must be under sixteen years of age, and preferably have access to a computer and printer or a typewriter. When writing would those who are interested please say what fish they have, what computer/printer if any, and of course, supply their address and telephone number?

I'd also like to hear from anyone who thinks they might consider subscribing to the magazine. Please send no money as the project may not get off the ground. Please also note that all money received will be used to cover expenses; any excess may go to a charity. Please contact me via the editor.

Scott Furssedonn,
Pinner.

OUT AND ABOUT

ROLF C HAGEN OPEN EVENING

By Dick Mills

Monday evening, 26 November 1990, was an evening a few fortunate aquarists will not forget in a hurry. Some 20 or so had gathered, at the invitation of **Andrew Bartyla,** Managing Director of **Rolf C Hagen (UK) Ltd,** to pay a visit to the company's headquarters at Castleford, West Yorkshire.

None of us had any firm idea of what it was all about, nor had we expected to be treated so generously. Members of **Halton AS, Lancaster & Morecambe AS, Macclesfield AS, CAST 88, Sandgrounders AS, Wrexham AS** and I were welcomed with a warming buffet before being shown around the Hagen complex.

Of particular interest was a conducted tour of the Development, Testing and Quality Control sections by **Dennis Sibson** and **Tim Vincent.** Here could be seen the whole spectrum of the product development and aftercare, from future products under long-term testing, to well-established products which had been returned for servicing. In most of the latter cases, the faults lay in the abuse, misuse or sheer neglect on the part of the user, not in the product design!

Wherever possible, much of 'consumer-criticism' is objectively studied and incorporated in the updated versions. For instance, double-intakes and outlets on external power filters proved to be a little confusing for some people so, to avoid any ambiguity, a reversion to single inlet and outlets has been made.

Visitors — and their trophies — at Hagen's Open Evening.

Another tip from the team — some internal filters appear to stop for no reason: the cure is to invert them, to remove any air trapped within the upper impeller bearing which caused it to run 'dry' and temporarily seize up. A commonly-agreed conclusion was that every newcomer to the hobby should be encouraged to find out, in advance of buying any equipment and livestock, exactly how the aquarium equipment functioned, and Hagen's were congratulated on their extremely clear, yet concise instruction manuals. A useful period was spent discussing the applications of some of the newer products with the development team, before Andrew took up the theme of Hagen-Society support.

In the coming months, the company intends to examine ways of closer co-operation with societies in order that a fuller understanding of market awareness and market demands can be made. Much was made of the Hagen after-sales service and the unexpected 'personal touch', a fact borne out by one of the visiting party who had recently received a set of commemorative coins, from the parent company in Canada — and this, several years since winning a major award! The parting impression was that if Hagen could supply the goods, then the hobbyists could put them to excellent use, as was demonstrated by the amount of trophies displayed by the visitors on behalf of their very happy Hagen-Nutrafin-consumers!

After such a pleasant and cheerful evening, no-one minded turning out into the cold dark night for the long journey home, probably to be made shorter by lively discussions on what they had discovered at Castleford.

SWALLOW AQUATICS

By Dick Mills

They say that one swallow doesn't make a summer, but you can rest assured that a visit to **Swallow Aquatics** in Rayleigh, may well make your day. It's almost a case of a familiar story in reverse — with the aquatics section of an existing garden centre eventually taking over the whole site, instead of being the usual inverse proportion of space.

To give you some idea how impressive the two-acre site is, it houses no less than 120 tropical tanks, 60 marines and 80 coldwater vats and/or ponds. All too often the criterion of shops is thought to be proportional to the exact number of stocked tanks, but Proprietor/Director **Michael Seaby** doubts that premises with more tanks could boast more livestock.

Backing up the selection of livestock, there is an extremely large dry goods area and, of course, the expertise of the 15 full-time staff, all suitably well-versed, having qualifications including no less than a B.Sc in Zoology, National Certificates in Aquatic and Ornamental Fish Management from Sparsholt College and City & Guilds in Fish Husbandry.

Since 1985, many changes have occurred, but the centre is still being developed under its policy of continuing improvement. Once brighter weather and longer days come around again, we hope to make Swallow Aquatics the subject of a more detailed *A & P* **Out and About** article. Who knows what extra changes we will find then?

There's a large selection of healthy plants available in the comprehensive coldwater area.

You can find Swallow Aquatics at **London Road, Rayleigh, Essex SS6 9ES (Tel: 0268 781265).**

News from the societies

Portsmouth Aquarist Society

When Portsmouth A.S. first started their Inter-Club Shows 25 years ago, there were numerous clubs around in the south of England, many of whose members regularly travelled to the P.A.S. events. Over the years, 35 clubs have, in fact, attended.

However, as a result of the demise of some of these, plus a combination of other factors, only four clubs attended last year's show: Kingston A.S. (who won the shield, with 57 points), Mid-Sussex A.S., Isle of Wight A.S. and Eastleigh A.S.

Reigate & Redhill already had other arrangements for the same day, while Hounslow A.S. and Salisbury A.S. were planning to attend but had to cancel on the day, owing to circumstances beyond their control.

P.A.S. now have a new Show Secretary and may also need to find a new hall in 1991. Should this happen, clubs will be notified by post (assuming that secretaries' addresses can be traced).

To ensure that the P.A.S. secretary has up-to-date details, other secretaries are requested to contact the Portsmouth Aquarist Society, c/o 202 Kirby Road, Portsmouth PO2 0QB.

Rothwell & Wakefield Aquarist Society

The new venue for the Rothwell and Wakefield Open Show to be held on **Sunday 10 March** is Silver Royd High School, Swallow Crescent, Wortley, Leeds 12. Further details: Kevin Swinson (Secretary) on 0977 511464.

Diary dates

Catfish Association of Great Britain (Northern Area Group)

The Northern Area Group 1991 Convention will be held at the 'Mill at the Pier', Wigan Pier, on **Sunday 24 March.** Doors open: 10.30 a.m. Guest speakers: **Heiko Bleher** and **Adrian Exell** (from Interpet).

There will also be a catfish competition, a raffle, a photography competition, an information stand, trade stands and a Bring-and-Buy fish stand. Enquiries: 0942 42386; 0253 28090.

B.C.A./C.A.G.B.

The Catfish Association of Great Britain, and the British Cichlid Association, are organising a joint catfish and cichlid show and auction, to be held on **Sunday 7 April** at Amersham-on-the-Hill, Buckinghamshire.

SHOW

Venue: Amersham Village Common Hall, White Lion Road, Amersham-on-the-Hill.

Benching: 0900-1130 hrs. Entry forms and further details are available from: Mrs Gina Sandford, 5 Sparrows Mead, Redhill, Surrey RH1 2EJ. (Tel: 0737 769339).

Please enclose a stamped, self-addressed envelope for reply.

AUCTION

Venue: Amersham District Community Centre, Chiltern Avenue, Amersham-on-the-Hill.

Booking in of lots: 1000-1200 hrs.

Auction: 1300 hrs.

Lot booking forms if required, and further details are available from: Mrs Lynn Fern, 5 Winding Shot, Hemel Hempstead, Hertfordshire HP1 3QQ. (Tel: 0442 61858).

Please enclose a stamped, self-addressed envelope for reply.

Members of the two Associations, **and** non-members, are equally welcome to attend and take part in both these events.

Malvern & District Aquarist Society

The Malvern and District Aquarist Society, 18th Annual Open Show will be held at The Malvern Youth Centre on **Easter Sunday, 31 March 1991.** FBAS Standards. Details and schedules from R. J. Dovey, 0684 573787.

Halton Aquarist Society

The annual Open Show of the Halton Aquarist Society will take place on 7 **April.** Venue: Appleton Social Club, Appleton, Widnes, Cheshire. Benching: 11.00 a.m. - 12.30 p.m. Judging: 12.45 p.m. Further details are available from Eric Dunn on 051 423 4802.

Birtley Aquarist Society

The 8th Birtley A.S. Open Show will be held on **17 March** at the Birtley Community Centre, Ravensworth Road, Birtley, Co. Durham. Schedules and further details from R. Flinn, Show Secretary, 29 Birch Terrace, Birtley, Co. Durham DH3 1JL.

Merseyside Aquarist Society

The Annual Open Show of Merseyside A.S. will be held on **Sunday 28 April** at Rainhill Village Hall, Dane Court, Rainhill, Prescot, Merseyside. Further information from J. Bailey, 11 Auburn Road, Liverpool L13 8BJ. Tel. 051 228 8199.

STOP PRESS

It has just been announced that two major shows: AQUARIUM '91 (Sandown Park) and AQUARIA AND WATERGARDENS '91 (NEC Birmingham) will **not** now take place. The two organising bodies will combine to present one large National event at Olympia on **1-2 June 1991.** Further details next month.

TROPICAL SEA SLUGS

(SEE OVERLEAF)

Spotlight

TROPICAL SEA SLUGS

Max Gibbs of the Goldfish Bowl, Oxford, introduces some of the spectacular, though somewhat demanding, species of nudibranchs which are occasionally seen in tropical marine invertebrate aquaria.

(Photographs — including main one of a Spanish Dancer 'dancing' — by the author)

The Nudibranchs available to the tropical marine aquarist from time to time are generally so exquisite, in both colour and form, that the compulsive temptation to buy can be irresistible. However, these beautiful creatures are not for the unadventurous, and where they are to be kept, their special food requirements need to be studied before going ahead with making a purchase. The relatively short natural life-span of many species, along with their feeding habits, render nudibranchs difficult subjects to maintain satisfactorily in captivity.

They are patently invertebrate aquarium specimens, and to consider keeping them in what is essentially a marine fish tank is pointless. The best chance of success undoubtedly lies in having them as part of a community within a reef-style invertebrate tank which houses all manner of animals and plants, among which they may find suitable sources of food. For the enthusiast with a lush reef aquarium, well stocked with a wide variety of potential food-providing inhabitants, the chance of success is there to be enjoyed, but much still remains to be learned about keeping these very beautiful creatures in capacity.

SEA SLUGS OR NUDIBRANCHS?

Both names describe the creatures in question quite accurately, but neither name could be considered aesthetically suitable when applied to these beautiful animals of the sea. As they are shell-less molluscs, they might be considered as 'slugs', and, as they mostly have exposed gill clusters, the literal meaning of 'Nudibranch' — naked gills — is equally relevant.

However, without due regard for the vibrant colouring and fascinating forms they so often take, these are the names with which these remarkable animals have been tagged. Unlike the ugly (to me, at least!) terrestrial slugs, which mostly befit their name, these marine molluscs surely deserve something more elegantly suitable. But what?

Nudibranchs form a very large part of the vast group of sea animals commonly and generally known as Sea Slugs. They are widely distributed throughout the world's seas; tropical, temperate, and polar. The number of species is thought to be some 3000 to, possibly, 5000, with about 2500 of these at present recorded. Some are so small as to be almost invisible, while others are large enough to weigh in excess of 3lbs (c1.4kg).

Phyllidia varicosa **lacks the conspicuous external gills of some other types but it is still a very attractive species.**

The species likely to be encountered in the marine aquarium hobby are more often about 1in (2.5cms) in length, or thereabouts, and are almost invariably gaudily coloured.

VARIED DEFENCES

The brilliant coloration is thought to be a warning to potential predators that the nudibranch is distinctly unpalatable. Some species are also armed with stinging cells which have been acquired by ingesting the nematocysts from anemones and hydroids and re-used in the gills of the nudibranch. Other defence methods include the ability to expel a repellent toxic slime. Not all nudibranchs are flamboyantly colourful, and those with more sombre coats may be equally offensive.

It is difficult to imagine how those species with brilliant colours can be effectively camouflaged in their natural environment, but, in the kaleidoscope of colour which the coral reef truly is, and allowing for the distortion of colours as the water deepens away from the sun-bathed surface, they may effectively blend in with their surroundings. Further, most are nocturnal and will not readily be found on the reef in daylight.

DIETS

It is thought that many species have just one food preference selected from sponges, anemones, corals etc. Nudibranchs are mostly carnivores, and their presence in an established invertebrate aquarium might be considered too potentially destructive, but regeneration of the host creatures providing the nudibranch's food requirement is likely to accommodate this feature in a sufficiently expansive and intensively populated reef aquarium. Sponges, corals, anemones, squirts, sea fans, and coelenterates would provide the most likely food source for a range of nudibranchs.

SELECTED SPECIES

Chromodoris

The Chromodorid nudibranchs are the most commonly imported species, and many of these sport colours of orchid-like vividness and the adornment of the feathery, dorsally-mounted gill cluster. The pair of 'horns' (rhinophores) on the crown of the head completes the extraordinary form. Both the gills and the rhinophores are retractable.

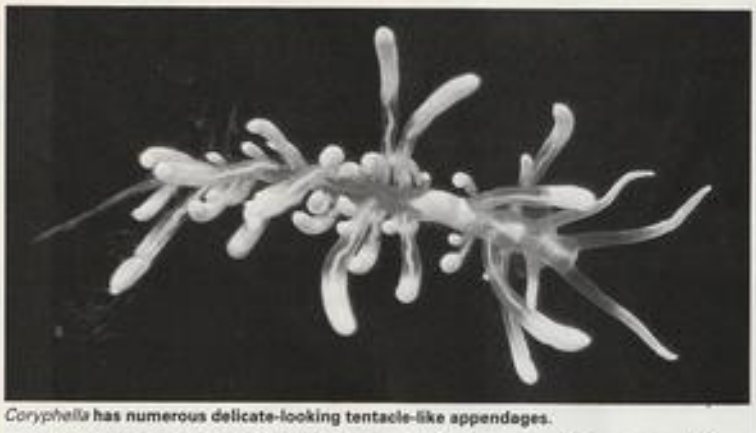
The colours might be a vibrant cerise and the mantle may be edged with a pure white band, as in the case of *Chromodoris luboski*, or it might be an azure sky-blue lined with black and edged with a rich orange to the mantle, and with fiery orange 'horns' and gill cluster, as in the case of *Chromodoris elizabethina*.

Others may be yellow/orange, banded concentrically with black, or strikingly striped with yellow, white, black, and red, as with *Chromodoris quadricolor*. Still more will have prominent spotting.

These Chromodorids produce a delicate egg ribbon which is usually coiled, spring-like, and resembles a fine lace. This is attached by one edge to the chosen spot.

Phyllidia

Other commonly imported types are the tougher-skinned 'knobbed' species, typified by *Phyllidia varicosa* which lacks the feathery gill cluster and probably absorbs its oxygen



Coryphella **has numerous delicate-looking tentacle-like appendages.**

requirement from the water through the skin. The body is basically black with irregular powder-blue areas, topped by a rich yellow. These areas are glands which harbour the toxic elements to give the creature an effective defence against potential predators. The presence of this toxicity is adequately advertised by the bright coloration.

Other species of *Phyllidia* are equally colourful and have the typical warty skin, but all of them are without the plumose gills seen in the Chromodorids, and while the skin of the Chromodorids is very soft and satin-smooth in most instances, that of the various *Phyllidia* species is tough and rough.

Coryphella

Other nudibranchs have tentacle-like appendages flowing from the body, as is typified by *Coryphella pedata*. I once discovered a very tiny specimen thought to be a *Coryphella* species attached to some rockwork in an aquarium set up for photographing fish. In trying to dislodge it in the hope of taking its picture, I managed only to damage it, and I assumed that it would rapidly die off after the onslaught on such a seemingly delicate and minute creature. However, it recovered and was left alone to grow within the aquarium.

During that time the aquarium was continually changed around to accommodate different specimens to be photographed, and it is difficult to see how the *Coryphella* could be feeding exclusively on one food, other than on the micro-organisms on the glass and rocks, or possibly on hydrozoas, as the invertebrate life would be brought into the aquarium only for the duration of a 'shoot' and then removed.

But grow it did, until I considered it large enough to photograph, after which it was consigned to a stock tank of invertebrate life in the shop. I never saw it again, but hoped that it went to a good home hidden away in some item sold from that aquarium.

Tridachia

Another example of a chance introduction of a sea slug came about when I installed a reef tank for a customer and stocked it initially with a collection of living rocks. As is usual, all manner of invertebrate life was on, and within, this rock, and it was not too long before a small, ruffled nudibranch appeared and stayed on prominent display most of the day.

The rate of growth was quite rapid and it appreciably increased in size within a few weeks. It was obviously obtaining all its food requirements from the rock, although it was never evident just what this was. The nudibranch was quite gregarious and appeared to be browsing wherever it was found within the aquarium, apparently on algae.

Although it has not been positively identified, it is a *Tridachia* species. An interesting factor is that the living rock is stored and shipped without water. This means that for some time — probably at least a few days — the *Tridachia* lived safely within the damp hiding place it had secured within the rockwork, absorbing its oxygen requirements from the surrounding atmosphere.

OTHER SPECIES

There are many more species within the scope of the 'label' Nudibranch and only the more commonly seen types have been briefly mentioned in this article. The fabulous Spanish Dancers *(eg. Hexabranchus sanguineus)*, which are best-known for their unique swimming action, and the *Casella* species with ruffle-edged mantles, or the various *Glossodoris* species, and so many others, go to make up further intensely interesting subjects, while some others, like *Nembrotha* sp, will constitute rare, unexpected and exciting finds.

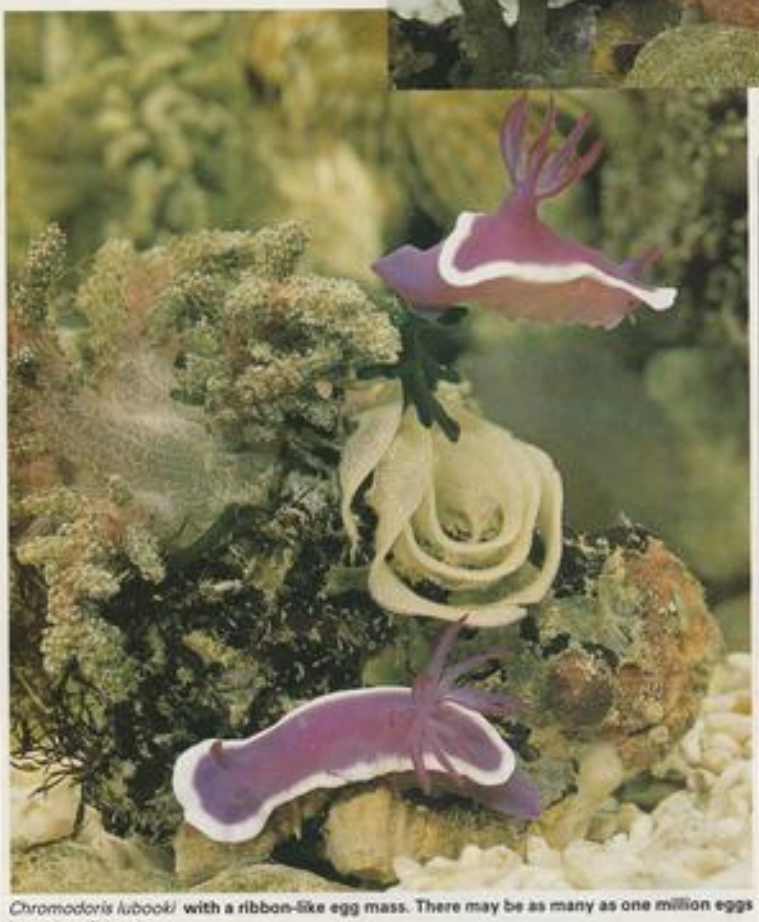
REPRODUCTION

The lack of a hard shell, and the resulting pliability of nudibranchs, enable them to crawl into obscure crevices, adding yet another dimension to their overall survival ability. Having both male and female organs,

Tridachia **— a ruffled, gregarious Sea Slug.**

A selection of spectacularly coloured *Chromodoris* **species.**

The Spanish Dancer *(Hexabranchus imperialis)* **at rest.**



Chromodoris lubbocki **with a ribbon-like egg mass. There may be as many as one million eggs in such a ribbon!**

nudibranchs do not even have to be kept as a matched pair in order for reproduction to occur.

However, although the fascinating lacey egg-ribbons are often produced in captivity, I have yet to hear of any successful rearing of nudibranchs in aquaria.

Some years ago I placed an egg-ribbon from a large *Glossodoris* species in a reef tank and numerous slug-like creatures appeared some time after, but although they were around for a few weeks, they never seemed to grow and gradually disappeared from the aquarium. If they were the babies of the *Glossodoris*, then it seems that the essential food source was not available to them and, whatever they were surviving on, was not sufficient for their longterm requirements.

Egg ribbons may contain up to a million eggs. After hatching, the larvae are free-swimming for a short time before they discover a suitable habitat on which to settle. Up to this point, the larvae have a minute hard shell, but this is quickly lost, this allowing the gills to develop during the stages to adulthood.

One of the rare finds — *Nembrotha* **sp.**

A well-observed and accurately documented aquarium breeding success would provide us with valuable data which, to date, seem to be wanting. Should any reader know of such instances — or, better still, have achieved breeding success with nudibranchs, we would dearly love to know.

News

Are your marines worth their salt?

Graham Cox has been manufacturing high-quality sea salts since 1960 when he found himself in a Central African senior secondary school teaching 'A' level chemistry and biology to teenage Bantu students preparing for University entrance. Graham wanted to include marine biology as part of the students' course but unfortunately, the nearest coastline was Mozambique — some 2000 miles to the east of his school, over very primitive roads. After making this appalling journey several times to collect seawater and live specimens, he set about the research work necessary to produce the seawater himself, using chemicals imported from England.

Later, back in England, the sea salts blend which was first to be marketed as 'SYNTHETICA' and 'NATURA' in the '60's and then as the improved 'ULTRAMARINE' in the late '70's, was manufactured in bulk and supplied to marine aquarists, universities, colleges, schools and marine fishfarms all over the world. This process of research and development continues unabated, even today.

Waterlife Research Industries Ltd, the manufacturers of 'ULTRAMARINE', believe that their sea salts are not only the only salts in the world deliberately to contain added trace elements in the correct amounts to match those present in natural seawater, but that the expensive, but vital, vitamins and growth substances found in natural seawater must also be added to the salts during blending in order to duplicate the formulation of oceanic seawater exactly.

'ULTRAMARINE' sea salts are entirely produced in Great Britain. This means that they are substantially less expensive than some other competing salts on the UK market. Pack sizes are 5/10/20/50/100/300 gallons, but owing to very generous packing, each pack produces considerably more seawater than the advertised amount.

Waterlife undertook an extensive and very successful coral fish breeding programme on a laboratory scale during the late '70's, only terminating this work when it became apparent that due to the relatively high costs of seawater, heat/light energy and the skilled labour necessary for the breeding of coral fishes, it was less expensive to import these creatures from Third World countries in the Tropics than to breed them in the UK. However, anyone wishing to learn how to breed coral fishes should send an SAE to **Graham Cox, Director, Waterlife Research Industries Ltd, Bath Road, Longford, West Drayton, Middlesex UB7 0ED. Tel: 0753-685696; Fax: 0753-685437.**

Aquatic evening at Hertfordshire Fisheries

The first open evening to be organised and held at Hertfordshire Fisheries in St Albans took place on Thursday 8 November 1990. The evening concentrated on pondkeeping with a talk by **Dr David Pool,** Head of the Tetra Information Centre, on 'The Secrets of Successful Pondkeeping'. This was followed by a lively discussion covering all aspects of pondkeeping which was only ended by the offer of free wine, which was provided by the staff at Hertfordshire Fisheries.

The 120 tickers for the evening were sold within four days of being advertised in the Hertfordshire Fisheries Newsletter. Each ticket cost £2.00 and all of the proceeds from the evening were donated to the Cancer Relief MacMillan Fund. This sum was swollen by the sale of fish donated by **Mrs Olga Day.** Mrs Day is the chief fundraiser for the Harpenden and District Branch of the MacMillan Fund and was at the evening to be presented with a cheque for £400 by Dr Pool, on behalf of the staff at Hertfordshire Fisheries.

Hertfordshire Fisheries is a rapidly expanding aquatic outlet in the St Albans area with recent projects including the opening of a large tropical section. To cater for their customers, the second open evening will cover the subject of Tropical Aquarium Fishkeeping. If the evening is as well organised and presented as the first, it will be very popular, so early booking will be essential if you are not to be disappointed.

Further details are available by contacting **Matthew Frost** of **Hertfordshire Fisheries, Burston Nurseries, North Orbital Road, St Albans, Hertfordshire.** Better still — go along and see for yourself.

New Diploma at Sparsholt

Seven students embarked on a new two-year BTEC National Diploma in Aquatics and Ornamental Fish Management which started in September, '90 at **Sparsholt College,** Hampshire.

This new course was developed by the College after wide-ranging consultation with active members of the aquatics industry, and it is designed to meet the needs of the professional manager of the future. To this end, it covers not only Fish and Plant Husbandry and Diseases in depth, but also Retailing, Business and Finance, Health and Safety at Work, Construction Techniques, Pond Installation, Equipment Technology and Animal Care.

Already, the students have visited a range of aquatic retail outlets, an ornamental fish farm, a waterworks and an analytical chemistry laboratory which specialises in water samples. They have also been taken behind the scenes to look at the 10,000 species of fish preserved at the British Museum (Natural History).

Several speakers from industry have also already paid visits to the College. In addition to these, Environmental Health and Trading Standards Officers have also spent time speaking to the students.

The original full-time aquatics course (National Certificate in Aquatic and Ornamental Fish Management) has now completed its second intake of students. In July 1990, seventeen students successfully completed this one-year National Certificate course and many have now found excellent positions within the industry.

Recruitment is already well underway for both the Certificate and Diploma courses for September 1991. Potential applicants are advised to apply as early as they can, as places are currently being offered for both courses.

Further information can be obtained from **Keith Davenport** or **Jane Lloyd, Sparsholt College Hampshire, Sparsholt, Winchester, Hampshire SO21 2NF. Tel: 096 272 441.**

One of Hertfordshire Fisheries' attractive pond layouts.

AAZPA membership for Aquarium Systems

Aquarium Systems of Mentor, Ohio, USA, has joined the American Association of Zoological Parks and Aquariums (AAZPA).

AAZPA strives to promote the welfare of zoological parks and aquariums and their advancement as institutions of learning, science, and recreation "for the purpose of human enrichment and enrichment of natural resources."

In 1964, Aquarium Systems

began as a supplier to aquatic researchers in educational and commercial institutions. During that time, they built two major public aquariums in the eastern United States. One of these was the first in America to rely on the use of a totally synthetic sea water developed by Aquarium Systems, called Instant Ocean® synthetic sea salt.

The reputation of Aquarium Systems in technical markets soon reached the hobby market, and its products were eagerly sought by retail customers. By the late 1970's, Aquarium Systems' efforts focused on meeting the needs of the retail market.

Today, Aquarium Systems continues to cultivate its educational and scientific roots through memberships and affiliations with organisations, hence its newly established membership of AAZPA.

Pet trade seminar

The first in a series of seminars arranged by the Pet Trade and Industry Association takes place at London Zoo on **Sunday 10 March 1991.**

At a time when the pet trade is increasingly under the spotlight, it is vital that all members of the retail trade widen their expertise and knowledge. With this in mind, the PTIA has brought together a team of experts who will give talks on a number of important aspects of livestock care and pet shop management. Aimed at both pet shop owners and staff, the topics covered will be varied and of interest to everyone.

From the veterinary profession, **Alan Jones** will discuss the Management of Cage Birds, while **Brain Sargeant's** subject is small mammals. **Simon Eagle,** from Omega, will talk on ways to expand the Pet Trade Market, and **Graham Cox** of Waterlife Research will give a presentation on Aquatics in the Pet Shop.

The Chairman will be **Ken Burgess,** PTIA's Retail Director, who will also talk on Staff Training and the City and Guilds Certificate.

The seminar, which will start at 10 am, is open to everyone in the trade (you don't have to be a member). Tickets are priced at £5, to include morning coffee and afternoon tea. Lunch is optional at £10 per head, to include wine. Visitors can also gain admission to the Zoo at the concessionary price of £2.00.

The seminar is scheduled to end at 4.30 pm.

Please apply for tickets to: **PTIA, 103 High Street, Bedford MK40 1NE. Tel: 0234 273933; Fax: 0234 273550.**

Talking Fish for a year

Tetra have been "Talking Fish" for a year! The Tetra Talking Fish Evenings started with an evening at London Zoo in February of last year. Since that date, a further five evenings have been arranged at venues ranging from Southampton on the south coast to Glasgow in the north.

Everyone who attends a Talking Fish evening receives a comprehensive set of advisory literature.

Each Talking Fish Evening has attracted audiences in excess of 140, with the best event of 1990 at Strathclyde University in Glasgow, having over 200 tropical fishkeepers in attendance. A gathering of this number of fishkeepers inevitably leads to much discussion, with useful hints and information being gained during the break, as well as from the lectures and films.

Each Talking Fish evening concentrates on a different area of fishkeeping. Previous sessions, for example, have covered Successful Tropical Fishkeeping, Maintaining a Perfect Pond, and Koi Keeping. The programme for each event is very similar, with two lectures, each lasting approximately one hour, separated by a short film on a related subject.

At each evening, a well-known guest speaker is invited to present one of the lectures. This includes well-known figures from the aquatic world, such as **Dr Chris Andrews,** the Curator of the London Zoo Aquarium, **Dr James Chubb,** one of the world's leading authorities on fish diseases and **Barry James,** author, regular *A & P* contributor and aquatic plant specialist.

Those attending each Talking Fish Evening receive a detailed summary of the lectures given, together with appropriate Tetra leaflets and a selection of Tetra Food samples. There is also a display of the entire Tetra range of products, with a member of the company in attendance to answer any questions.

Talking Fish evenings have already been arranged for 1991 with the venues spread throughout the UK. The next two are in Manchester on **20 March,** when well known cold-water specialist and *A & P* columnist, **Stephen Smith** will be the guest speaker and the evening will concentrate on Pondkeeping. Pondkeeping is also the subject for the Talking Fish Evening in Norwich on **23 May.** This time, **Nick Fletcher,** will be guest speaker.

Further details of the Tetra Talking Fish Evenings will be printed in the aquatic magazines as well as in the local press and aquatic stores. Aquatic societies in the areas will also be circulated sometime before the event to enable them to attend.

Letter from Nigeria

"When we entered this business we knew it would be an uphill struggle to establish a good reputation for fish from Nigeria. There hasn't been one single customer who hasn't actually 'groaned' when we telephoned to introduce our company. This attitude is understandable, considering that very few people here in Nigeria approach the export of fish professionally. We made our first shipments relatively late in last year's season and, although we have had our fair share of teething problems, we are dedicated to providing the very best possible quality of Nigerian aquarium fish to the world market.

A key difference between West Coast Tropicals and other Nigerian exporters is our huge conditioning centre. Over a period — at least two weeks — the fish are gradually introduced to a series of environmental and dietary changes. Every single fish that we sell leaves our premises strong, healthy and eating dried food. They are, indeed, 'preconditioned' to aquarium life. We haven't yet found a way of removing their high sensitivity, nor of increasing their tolerance to stress, but with a little extra care, Nigerian fish can be very profitable fish to handle.

We hope to be able to change your readers' minds about the quality of Nigerian aquarium fish and to prove the reliability of our service."

Ann Weir,
Managing Director,
West Coast Tropicals,
PO Box 72078,
Victoria Island,
Lagos, Nigeria,
West Africa.
Tel: 010-234-1- 686388;
Fax: 010-234-1-685754.

Gary's bet

Fans of ITV's **Your Bet,** hosted by Matthew Kelly, should make sure that they switch on on **9 March.**

One of our regular readers — and breeder of quality Fancy Goldfish — **Gary Lewis,** will be on the show. His bet? To pick out — in two minutes flat — five of his own-bred Kai Ranchu from a shoal of 50 fish selected by members of the exclusive Ranchu group featured in **A Quest for Excellence** elsewhere in this issue of *A & P.*

Will he succeed? Will he fail? Tune in on **9 March** when all will be revealed.

PRODUCT ROUND-UP

BY DICK MILLS

GTI Filters

Studying brochures from manufacturers, especially those offering a reasonable range of equipment, yet covering perhaps a single aspect of aquatic technology, can be very absorbing. Like a good detective story, you can see the connection of design between each model and, although you're never at a loss to know 'who did it,' you can also deduce the motive or, 'why they did it.'

GTI GARDEN POND FILTERS appear, from their leaflets, to be such a company; their products all have a clearly-defined pedigree, each relating to each other in a logical progression. This progression begins (again quite logically) in the pond itself, with PRE-PUMP FILTER BOXES.

Each box may be used in conjunction with standard pumps, and are designed to draw water from around 6-8in (15-20cm) above the settled sludge on the bottom of the pond and strain out suspended or floating solids, and so protect both the pump and any filter unit from mechanical damage or blockage. The usual filter medium is shingle, which can be washed and re-used. Size of units are Maxi (17.75 x 14.5 x 10in — 45·1 x 36·8 x 25·4cm — coloured black or green, for flowrates up to 1,250 gph — 5,625 litres/hr) and Mini (14 x 11·5 x 8·5in — 35·6 x 29·2 x 21·6cm — green only, up to 500 gph — 2,250 l/hr).

The four models in the ESCORT range of 'down-flow' biological filters are suited for ponds ranging from 250-1,200 gallons (1,125-5,400 litres) capacity, with flowrates between 80-400 gph (360-1,800 l/hr). Each gives adequate water oxygenation via a spraybar input (models ES15, ES25 and ES50 have optional air-induction units), biological performance, sediment collection, backwash facility and drain-off point. The perfoeated medium-support tray allows for either heavyweight or lightweight filter media. Covers may be of hard black plastic or coloured tarpaulin, as desired.

SINGLE-CHAMBER FILTERS follow similar medium support and sediment collection designs, but are 'up-flow' filters with dual-flow rates — fast flow, via a venturi, for oxygenation and mechanical filtration, and controlled slow flow for maximum efficiency in the biological purification section.

Two special features are the unique Black Witch non-blocking, self-cleaning, micro-mesh stainless-steel gauze, mechanical filter which then collects all suspended solids by enforced sedimentation into the 'flushaway' sump chamber. Water can be returned to the pond from either end of the filter. Models SC15, SC25 and SC50 have flowrates of 380, 500 and 800 gph (1,710, 2,250 and 3,600 l/hr) for ponds of 760, 1,000 and 1,600 gallons (3,420, 4,500 and 7,200 litres) respectively.

As expected, MULTI-CHAMBER FILTERS are the next extension to the design range. Each biochamber is supplied with venturi-oxygenated water at the correct rate for the filtration method used. The mechanical filtration section uses either brushes or the Black Witch system (described earlier). A drain-off tap is provided for each chamber. A soft-top tarpaulin cover is available.

GTI's versatile multi-chamber pond filter.

GTI point out that, as purification of water in Koi ponds is totally dependent on the efficiency of the filtration system (unlike planted ponds which have a certain amount of self-cleaning action), the use of multi-chambered filter units is almost essential.

The free-standing, highly-efficient TRICKLE CASCADE FILTER may not, at first glance, be easy to hide near to the pond, but its treated timber exterior (coupled with plant container top) should ensure it blends in with poolside shrubbery quite successfully. However, it's what's inside that we're interested in and, as the name suggests, pre-cleaned water from the pond is fed by a fixed sprayhead down in fine droplet form on to the filter medium.

This method has two immediate benefits over full-flood water flow: it sprays water over a wide surface area for maximum aerobic bacterial efficiency; and secondly, as the water cascades down to succeeding media, it becomes re-oxygenated on the way. The exterior finish can be of an Antique Pine, Redwood, or Teak stain or high-gloss, British Racing Green paint. Water drainage from the filter-top plant container is independent of the pond water system. Dimensions are 32in (81·3cm) high by 17in (43·2cm) square; flowrate is 300 gph (1,350 l/hr); suggested pond capacity is 1,250 gallons (5,625 litres).

Details of all GTI products from: **GTI GARDEN POND FILTERS, PO Box 274, Wheathampstead, Herts AL4 8NA. (Tel: 0582 833416).**

Tetra

The next time you pop into your local dealer, you shouldn't be surprised if: (a) he/she's on the 'phone, or (b) he/she's got a new wallclock with a trendy fish food motif on the face. Both will be the result of **TETRA'S** new sales drive initiative.

In the first instance, your dealer will probably be chatting to Jeanette, Tetra's Telesales representative, who will be giving out latest information of new products, offers, promotions etc. The Wall Clock is one of their first incentives to stock up (through their chosen wholesaler) with Tetra products. Designed to complement Sales service, not replace the travelling repeesentatives (sorry, chaps, it's still the open road for you), Tetra Telesales will enhance the company's support service to dealers, who are invited to ring the **Instant Retailer Service (0703 614601).**

Watch out, too, for Tetra's 1991 national advertising campaign in the aquatic press, gardening magazines and even TV Times. There will also be on-pack offers, promotions and competitions to create more off-shelf sales. The **Tetra Information Centre Consumer Service** and nationwide **Talking Fish Seminars** all help to keep the product name in the forefront.

Details of all Tetra products and free Information Pack from: **TETRA (UK) LTD., Lambert Court, Chestnut Avenue, Eastleigh, Hampshire SO5 3ZQ. (Tel: 0703 643339).**

B & R Electrical

Readers of December 1990's **Product Round-up** will hopefully have taken the hint and either obtained a **POWERBREAKER** Residual Current Device for themselves or arranged for Father Christmas to do so.

Following up from that, there comes news of another device which some may consider far more useful, in that it protects their fishes' lives, rather than their own. The PowerBreaker SECURITY ALARM PLUG warns instantly of any power loss, whether it be due to a powercut, blown fuse or even any unauthorised disconnection (unplugging by tiny hands).

The loud (70db) buzzing alarm will continue for up to 60 hours (long enough even for any neighbour to tell you of your bottom-of-the-garden fish-house's power loss!) The plug requires no special wiring and is obtainable at most D-I-Y outlets.

Finally, now that spring has sprung, don't forget to exercise real care over electrical safety in and around the garden, especially when small children may be nearby — fit RCDs and Waterproofed Cable Connectors, by PowerBreaker of course!

Details from: **B & R ELECTRICALS plc, Templefields, Harlow, Essex CM20 2BG. (Tel: 0279 34561).**

Interpet

There must have been many times when you've reached for a remedy off the fish-house shelf, dusted it off to read the instructions, used it — then wondered if it really worked. Shelf-life (or the lack of it) can be a very imprecise factor in this respect; after all, none of us really want to use such things that *regularly* do we?

INTERPET believe that TRIZYME, one of their newest products, will not suffer however long it's 'left on the shelf' — although there are so many good reasons for you to use it, that this is unlikely to occur anyway!

Trizyme is a stable biological product in powder form which is invaluable in improving water conditions, both marine and freshwater. It overcomes 'New Tank Syndrome', subsequently reduces sludge and nitrate levels, and rejuvenates biological filtration, especially after medication. Because the bacteria contained in Trizyme are held in an air-dried resting stage, there is no need for special storage conditions (ie refrigeration) — just keep it dry.

It does not become active until used, so long storage will not cause deterioration; a simple spoonful (measure included) sprinkled on the water surface of each 25 gallons (125 litres) is all that's needed. The real bonus is that the bacteria obtain their oxygen from the very wastes they break down, so the oxygen levels already existing in the aquarium are not depleted in any way and, while it goes without saying that Trizyme is quite harmless to fish, you cannot overdose with it either.

Tri-zyme, Interpet's latest water-enhancing product.

Why use Trizyme? In new tanks, it will allow stocking to occur at a faster rate than waiting for the filterbed to mature at its own leisurely pace; in established aquaria, weekly additions of Trizyme will ensure super-efficient waste breakdown, reducing filter cleaning and also depriving disease-carrying bacteria of nourishment.

Mention has already been made of its use to revitalise biological filtration systems after medication, but exhibitors and exporters / importers) might care to know that Trizyme can be safely used in fish transportation to control waste levels without oxygen depletion.

Available in separate marine or freshwater formulations, 8gm tubs (each sufficient to treat 500 gallons — 2,250 litres) cost £2.97. Trizyme? Try some!

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

Algarde

Two pieces of news from **ALGARDE** this month: the most important is that, as from January 1991, the company has moved to new premises; all correspondence should be directed to the new address.

Of more particular interest to the individual hobbyist, more used to obtaining Algarde products through the local retailer, is the introduction of the new Algarde aquarium HEATER/THERMOSTAT unit. Available in 5 wattages, the fully-submersible unit not only features a twelve-month guarantee, but also a visible temperature indicator. Its bright new packaging will quickly bring itself to shoppers' attention, whether it be displayed on counter, shelf or by Eurohook.

Details of Algarde products from: **ALGARDE, Enterprise House, Wharf Road Industrial Estate, Pinxton, Nottinghamshire, NG16 6LE (Tel: 0773 581481; Fax: 0773 581524).**

Aquastar lamps

If you can remember getting excited about Grolux lamps, then it's time you admitted to being your age — that was around *twenty years ago!*

Seriously, it was a bold attempt to transfer the use of a lamp primarily designed for horticultural use to aquarium use and, of course, it had its limitations. Since then, hobbyists have integrated Grolux lamps into various combinations with other 'coloured' tubes to provide just the light intensity and hue they want.

Now, thanks to the demands made by **JERRARD BROS** of Croydon, a further 'integration' has occurred, resulting in the AQUASTAR, a fluorescent lamp with all the beneficial plant-growing properties of Grolux, combined with a more realistic colour-balanced light output. Latest energy-saving technology has also produced a lamp of slimmer proportions, thus saving on necessary, although otherwise-expensive, mercury dosing (packaging costs less too!).

The 26mm diameter lamp is also long-lived, with efficiency eventually limiting its usefulness, rather than outright electrical failure. You can save electricity too, as two of these new lamps often prove as effective as three previous different types. The Blue/UV content makes the lamp suitable for freshwater and marine use.

To sum up, thanks to the combined forces of consumer demands (from us, the hobbyists) and technical research (the manufacturer), the market now has a product which suits everyone and, if you're wondering how deliveries are coming along, then don't worry — Sylvania's German factory is able to turn them out at around 6,000 per hour with full product reliability!

Details of Aquastar lamps from: **JERRARD BROS. plc, Cairo New Road, Croydon, CR0 1XP. Tel: 081 688 8222. Fax: 081 681 3119.**

Greenaway

In recent years there has been a tendency to clamp an ultra-violet lamp to almost any form of external filtration equipment in the hope that it will upgrade the filter's efficiency.

To most designers' credit, this ploy seems to work fairly well, but then there are companies, such as **GREENAWAY**, that are not content to leave things just working satisfactorily.

The key to Greenaway's ULTRA-VIOLET POND-WATER STERILISATION SYSTEM is its unique modular construction. The light source and electrics are mounted on either side of a single plate which can be lifted out from the filter in seconds for inspection, cleaning or maintenance. It is totally separated from the water which is treated as it flows past (through a quartz tube which can easily be cleaned without further dismantling).

The system eliminates the problems inherent in more conventional UV systems — the greening, or discoloration, of the tube and the slow build-up of silt within a chamber which cannot be seen without dismantling the unit. Other design objections sometimes found in UV filters are that they are bulky and usually come with a 'dedicated' filter. The Greenaway system scores on both these points, for its units are by far the most space-effective on the market; the 8 and 15 watt units (suitable for 1,700 and 3,000 gallon ponds — 7650 and 13,500 litres) measure only 13.5 x 3 x 5in (34.3 x 7.6 x 12.7 cm) while the largest (30 watt, 7,000 gallons — 31,500 litres), at 21in (53.3cm) long, is under half the length of comparable systems. So far so good, on the size front.

Units can be used as a stand-alone system, in conjunction with other existing filtration systems or, for complete protection against water-borne diseases, mould and unsightly algae, supplied as an integral part of the highly-successful Greenaway BIOLOGICAL FILTERS. Costs for the stand-alone unit — £105.80; integrated biological/UV units start at £180. All prices include VAT.

Greenaway, the first company to combine UV and biological filters in one unit, was formed in 1988. In its first year, over 4,000 of its biological filters were sold; now its product range covers over 40 different items and can accommodate virtually every pond filtration and sterilisation requirement.

For further information contact Dick Roper at: **GREENAWAY POND FILTERS, 6 Roman Way, Long Melford, Suffolk, CO10 9LN. (Tel: 0787 71351).**

Aquarian

There are some of us still around who remember the excitement when **'AQUARIAN'S'** Flaked Fish Foods were first launched. Now a whole new generation of hobbyists can re-live those heady days with the appearance of the company's newest — FLOATING POND FOOD — in their own words, "A big launch in new waters."

Produced to capture the attention of over 1 million pondkeepers, the new food looks set for instant success, bearing in mind its pedigree *(bearing in mind its Pedigree-geddit?)*, from the same team that developed the 'Aquarian' range of aquarium foods and remedies at the Waltham Animal Studies Centre, the pond food will be eagerly received by hobbyists already firmly 'Aquarian-minded' by virtue of the quality and success of the brand's existing products.

AQUARIAN

Aquarian's newest product — Floating Pond Food

Available in 100g and 500g tubs, the new food takes the now familiar pelleted form. Suitable for both Goldfish and Koi, it contains no preservatives, artificial colourants or oxidants. It is backed up by the 'Aquarian' reputation for all-round quality, so it is hard to see how it can fail to impress those that matter most — the fish! It will be equally hard to miss seeing it around, either in the press or at your dealer's, where its floor-display unit, full-colour posters and hanging display boards will command your instant attention.

Details of the new food, and all Aquarian products from: **'AQUARIAN' ADVISORY SERVICE, P.O. Box 67, Elland, West Yorkshire.**

New Technology

Thanks to the rest of the world catching up with the importance of water quality (even if *they* don't intend keeping fish in it), there is an ever-increasing supply of products on the market which will take all the nasties out of it — including the things we would not subject our fishes to.

NEW TECHNOLOGY have been busy on this front, and their ULTRAZORB is a blend of materials which will remove colour, odour, ammonia, nitrate and phosphate from aquarium water. It will also protect against sudden surges of ammonia and remove medication from the water after any course of treatment has finished.

Of course, to see if the resin is working, the hobbyist can use the appropriate testing kit, but NT point out that, as nitrate is being constantly produced in the aquarium, it is very unlikely that tests will ever show an absolute zero reading of nitrate. Any slight readings should therefore *not* be taken as indication that the materials in Ultrazorb are not doing their job!

When used regularly, Ultrazorb will keep aquariums sparkling clean. Replacement is recommended over four weeks. Ultrazorb is available in 420gm tubs with a nylon filter bag and costs £3.99.

ACTIZYME is a new concept in chemical/bacterial 'starter' treatment for aquariums and ponds. The dry pellets have an indefinite shelf-life and contain enzymes which 'feed' on ammonia and bacteria which colonise biological filters and convert ammonia to nitrite and nitrate. With a couple of fish to provide a supply of ammonia to the enzymes and bacteria, the aquarium/pond rapidly matures, initial nitrate levels fall and the aquarium/pond becomes habitable for your total fish population. When used to mature large water-recirculating systems in shops, fish losses (sometimes quite high initially) have fallen to virtually zero.

The accumulation of sludge is minimised with regular use of Actizyme, making filter-cleaning easier, and biological action of newly-cleaned filters is quickly restored, thus protecting fish against build-up of nitrates. If filtration systems in mature aquariums become 'stuck', leaving a high nitrite level, the addition of Actizyme will cause the nitrite level to fall away, allowing further fish stocks to be added.

Suitable for freshwater and marine use, Actizyme is available in two sizes: 25g (for 1,125 gallons — 5,062 litres) and 100gms (for 5,000 gallons — 22,500 litres), costing £2.99 and £9.49 respectively.

Details (and free leaflets on various aquarium techniques) from: **NEW TECHNOLOGY LABORATORIES LTD, Unit 13, Branbridges Industrial Estate, East Peckham, Tonbridge, Kent TN12 5HF. (Tel: 0622 871387).**

NEW TECHNOLOGY LABORATORIES

Ultrazorb will remove not just ammonia and nitrates, but phosphates, odours and 'colour' from aquarium water.