

The NEW

AQUARIST & PONDKEEPER

APRIL 1996

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INSIDE

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Features

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EDITOR

Dick Mills

ADVERTISING MANAGER

John Young
Tel: 0181 904 8886

PRODUCTION DIRECTOR

Jefery Swaffer

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COVER PICTURES

MAIN PICTURE: COURTESY OF TETRA
INSET PICTURE: LINDA LEWIS

Along with the strong visual pleasures enjoyed in Koi-keeping, who can deny the extra attraction of that special bond that develops between Koi and their owner, once hand-feeding becomes a mutual enjoyment?

Who said fish are colourless? As usual, Man cannot resist tinkering with Nature's own Grand Plan and many albino forms have been produced during captive spawnings.

FOOTNOTE: We are happy to point out that the credit to last month's cover picture should have read 'Keith Lambert, Wildwoods Water Gardens Ltd' and regret any embarrassment caused.

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Comment

We all have our own individual likes and dislikes in life — not just in fishkeeping — and this has become quite apparent in the production of A&P. However, it is probably the very differences that make it all so attractive but now and again something pops up to remind you of just how contradictory things can be.

It was obviously necessary that the emphasis of the Spring/Summer month's issues of A&P would tend to favour the outdoor fishkeeping scene, and this is continued this month with our Supplement PLANNING FOR XOI. What more colourful a subject could one wish for! Maybe a look at a Community Collection of tropicals for the newcomer to aquatics? However, and still keeping with colour, too much of a good thing can irritate, as one of our contributors reveals a light-hearted (I think!) aversion to gaudily-decorated aquariums.

So, we have a colour-packed issue for you this month right enough, and you will see that we have produced even more informative and entertaining pages for you to read. But tiring away in the background were the inevitable perverse gremlins too, within the very same issue, what does the fertile (I imagine of the Editor come up with — Albinism! The exact opposite to all this colourful extravaganza, a discussion on why fishes have no colour at all! It just goes to show, we do try to please all the people all of the time!

It never ceases to amaze the ingenuity of some products marketed for the aquarist. Take the very latest in the battle against pond predators. 'Herontop' is quite revolutionary, using no trip wires or loud alarms, no batteries or anything else in the least way technical. It comes in a handy bottle and it's so safe that you can't overdose with it, and it works with any size pond. The way it works is simplicity itself: you simply pour the dense green liquid into the pond and leave the rest to nature. As the colour spreads throughout the pond, a dense opacity proliferates causing an interruption in the visual location of the fish to any would-be predator. At the end of the predator threat season a brief exposure to a carbon filled filter will remove the colouration. Instructions supplied with the product indicate that it is essential to use the preparation between the end of March and the beginning of April, the latter date being preferable.

Jick Mills

EDITOR

E-MAIL ADDRESS:
101372.3451@compuserve.com



ABOVE *Papiliolewis reinitzi*.

RIGHT *Corydoras sterbai*.

FISH FOR

BEGINNERS



When you have just started tropical fishkeeping it can be quite daunting trying to choose fish for your setup. To start with, being sure which species will live peacefully together can be a problem. Most shops will help you out with this, but even so the final choice will be yours and will make all the difference to the final look of the aquarium.

Another important factor is which fish will do well in your setup. Some species commonly offered for sale require particular water conditions or a specialist setup with fancy rockwork etc. In this article I am concentrating on only

DEREK LAMBERT FILLS UP THE FIRST TIME AQUARIUM WITH COMPATIBLE, HARDY FISHES.

• PHOTOGRAPHS BY THE AUTHOR •

those fish which will do well in an average community aquarium with some plant cover.

Personally, I always start stocking a community aquarium from the bottom

up. What I mean by this is that each species of fish will live at a specific level in an aquarium so, to make the most of your tank, you need fish which will live in all the different levels. You may, for instance, be particularly taken with Hatchetfish but a tank full of Hatchets will look almost empty from a distance and any food uneaten whilst it is in the top couple of inches of water will fall to the bottom and rot. Some bottom-dwelling fish will soon search out this left over food and eat it up, keeping the gravel clean and the water pure. Hence my reason for thinking of the bottom dwellers first.

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TROPICAL Fish for Beginners

the aquatic world is of course *Corydoras* Catfish. These catfish scuttle about the bottom searching out pieces of food which have fallen into the gravel and range in size from 1in to 4in. There are over 120 species of *Corydoras* and all are suitable for beginners, although some of the new rarer species may set you back in excess of £20 for each fish and should be avoided until you have a little more experience — even if you did win the lottery last week!

Another very useful group of bottom-dwellers which make excellent additions to a community aquarium are Loaches. My personal favourite of these, and probably the best for a beginner, is the Chain Botia (*Botia striatissima*). This lovely little fish only grows to about 2in and fits in well with both small and large species, being peaceful enough not to harm smaller fish but tough enough to cope with bigger potential bullies. After several years absence from the aquarium trade it has recently started to be imported again and is well worth hunting out.

Moving on from the total bottom-dwellers there are many species which tend to hug the bottom but also move about in the lower third of the aquarium. Dwarf Cichlids fall into this category and out of the Cichlids as a whole, these are most suitable for general communities. There are several species of *Apistogramma* which are appropriate but

my favourite Dwarf Cichlid is the Ram (*Papilichromis ramirezi*). This grows to about 2in in the aquarium and comes in normal, gold and long-finned forms — a pretty, and peaceful fish, well suited to aquarium life.

Next come the mid-water fish. These make up the bulk of fish in an aquarium and ideally between them should reflect as great a diversity of form and movement as possible. For constant movement, and some of the most spectacular colours of all aquarium fish, livebearers are a must. Personally, I recommend Guppies and Platies for beginners. These come in a whole range of colours and fin shapes. They are peaceful, hardy and generally reach about 2in as adults. Check that the livebearers you are buying have their fins well spread and are swimming normally around the aquarium. Male Guppies which are swimming with their heads towards the surface, looking tail-heavy, are probably old fish which are on their last legs. Platies are prone to shimmying (a slow weaving motion which does not propel the fish through the water) when they are unhealthy or the water quality is poor. Avoid any fish which does this since it is a sign of trouble.

Characins, and in particular Tetras, are some of the most popular mid-water swimmers in the aquarium hobby. These tend to form shoals and are on the move much of the time. Most popular of all are

Neon Tetras (*Parachanna lewisi*) but my favourites are Black Neons (*Hypoclinemus herbertus*) and Emperor Tetras (*Nematobrycon palmeri*). Both form slow-moving shoals, although the Emperors tend to hang around head-down in a quiet corner of the tank. Black Neons reach about 1 1/2in whilst Emperors reach up to 2 1/2in in body length, and both are peaceful. There are lots of other species available and many are suitable for a community aquarium, but take care not to buy an unidentified fish. Remember Piranha are Characins — and some of the other members of this group have similar tendencies!

Another group of mid-water swimmers which are constantly on the move are Barbs. Once again there are lots of different species. Most commonly found in aquarium shops are Tiger Barbs (*Barbus tetrazona*) but these can be fin-nippers and are not one I would choose for a small fish community. Cherry Barbs (*Barbus litiga*) and Checker Barbs (*Barbus elaeops*) are much more suitable and if you want something a little different try the Two Spot Barb (*Barbus himacalatus*). Fish to avoid in this group include Tinfoil Barbs (*Barbus schwanefeldii*), these are so common in aquarium shops and many aquarists (even shop keepers) are unaware just how big they will grow. A body length of 20in is not unheard of and, even in a small tank, they will reach 6in in under four months if well fed.

Other shoaling mid-water swimmers include Danios which range in size from 2in to 4in. Rasboras like the ever popular Harlequin (*Rasbora heteromera*) and Rainbowfish such as the Madagascar Rainbow (*Bofelia gausi*) are all excellent. Harlequins only grow to about 2in so are ideally suited to the small fish community but there are plenty of other species of Rasbora which grow larger, and a few which are even smaller. All are peaceful community fish although some can be temperamental about water conditions. One to avoid, unless you live in a soft water area, is the Clown Rasbora (*Rasbora kalichirwa*). This



Guppy male, *Poecilia reticulata*

beautiful fish would make a lovely community fish but for the fact it is very sensitive to water conditions and only does well in soft, acidic water. One of the hardiest species of Rasbora is the ever popular Scissortail (*Rasbora trilineata*). This grows up to 6in in the wild but only reaches 4in in captivity and will not harm even quite small fish.

In recent times there has been an explosion of Rainbowfish species available to the aquarist. One of my favourites has always been the

feet long as well as small species only reaching 2in. Two excellent choices are Dwarf Gouramis (*Colisa lala*) and Honey Gouramis (*Colisa channa*, although it is sometimes wrongly called *Colisa sota*). Buy these in pairs, and make sure you have some plant cover in which they can make their base. Since males will spar I usually keep only one pair in an aquarium.

For the very top levels of your tank Hatchetfish make interesting additions. These deep-bodied fish with huge

YOU & YOUR AQUARIUM

by Dick Mills

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The 1996 revised edition of this book will give beginners comprehensive advice on all aspects of aquarium fishkeeping, including tropical and coldwater, freshwater and marine species. Dorling Kindersley books are renowned for their clarity of presentation with illustrations and line drawings leaving no subject unexplained.

THIS MONTH'S SUGGESTED FURTHER READING



ABOVE Male Emperor Tetra, *Nematobrycon palmeri*.

RIGHT Male Lyretail Platy.

Madagascar Rainbow (*Balaia nana*) and despite having the reputation of being a little delicate I would still recommend this to any beginner. It reaches 4in in body length and makes a good fish for the medium-sized fish community.

More sedate mid-water fish which have always graced my community tanks are the Gouramis. These include monsters which grow several



pectoral fins can jump right out of the water if they are frightened, so make sure the tank is properly covered at all times.

These are just some of the choices suitable for a new fish keeper but there are many more. Some aquatic shops colour code the labels to give you guidance, others don't, but if you ask the seller will be only too willing to help, having a good book with you is also useful.



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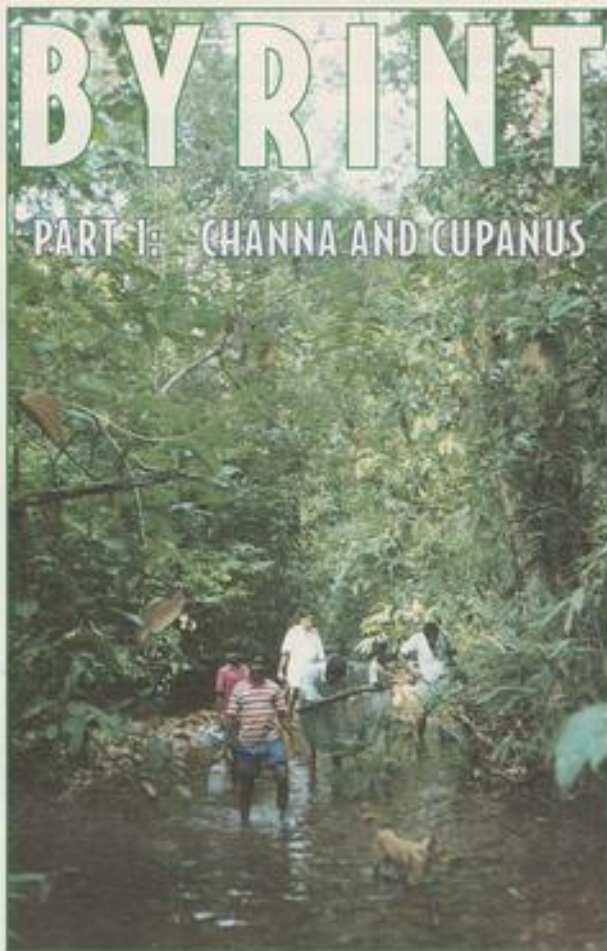
LANKA LABYRINTHS

PART I: CHANNA AND CUPANUS

Islands are particularly interesting for their endemic fish, that is, species that are found nowhere else. One that I had lazily turned over in my mind as a possibility to visit was Sri Lanka because of its easy access as a tourist destination and because of its two endemic labyrinths, *Malpulatta kretseri* and *Belontia signata*. An added bonus was the existence there of an endemic Snakehead, *Channa orientalis*, admittedly not a labyrinthfish but still an air-breather which has an accessory respiratory system.

Although Sri Lanka has been attached to southern India, most recently about seven million years ago, the only other *Belontia* species, *B. kassili* occurs in Sumatra, Malaysia and Borneo. Similarly, *Malpulatta* is more similar to the Indo-Malaysian Licquorice Gouramis, *Parepipterus* than the Indian *Pseudopipterus*. There are also species of reptile that are found only in Sumatra and Sri Lanka. This may point to an early zoogeographic connection or it may merely be that ancestral forms of these fish once occurred throughout India, but now have disappeared due to lack of suitable habitats.

Through the labyrinthine network of anabantoid enthusiasts, I wrote to Rohan Pethiyagoda, author of the definitive book on Sri-Lankan freshwater fish. Rohan's response was so positive



trip for me, based at Ratnapura. As it had proved difficult to hire a 4WD twin cab pick-up, he loaned me his, complete with Dhanapala Ratnagaka, his driver and one of his assistants, Kelum. This help was very necessary, firstly because sign posting off the main roads is almost non-existent and asking the way requires a knowledge of Sinhalese as English is not widely spoken away from tourist areas. Secondly, Lankan driving is somewhat eccentric and involves weaving between the crowds of pedestrians, sleeping cattle, sunbathing dogs and other motorists while sounding the horn continuously, to announce your passage.

From Colombo, we travelled first via Homagama and Avissawella, on Route 4, to Kuruwita where a narrow single-track dirt road led into the hills past tea-plantations and the former home of P.E.P. Deriniyagala, the describer of *Malpulatta kretseri*, the rarest of the labyrinthfish that I had travelled to find. By the time we had found the habitat and donned fishing gear, it had begun to rain and a small crowd of villagers soon found us out and came to watch us get wet. While Kelum sensibly fished in trunks, I insisted on wearing my waders and waterproofs and probably got wetter quicker and dried slower. Despite our best endeavours, we found no *Malpulatta* there, although normally Kelum expected to catch eight or so, but we did find three Combtails

**DAVID ARMITAGE,
TRAVELLING WITH KELUM
MANAMENDRA-ARACHCHI,
BEGINS A TWO-PART EXPLORATION OF
SOME SRI LANKAN SPECIES.**

• PHOTOGRAPHS BY THE AUTHOR •

that I soon found myself en-route for my first visit to the Indian sub-continent.

Rohan first organised a three day field

TROPICAL Lanka Labyrinths

Fact Box

PSEUDOSPHRONEMUS CUPANUS

The Spike-tailed Paradisefish comes from south India as well as Sri Lanka. Wild-caught fish can be very colourful with dorsal, caudal and anal fins delicately edged with blue and the lower caudal, anal and pelvic fins, often a deep red. Males have a very red eye. Males build a bubble nest under a leaf or in a cave such as an upturned flower pot. During courtship, the female becomes almost black and may end up head-down under the nest after the embrace, a perfect position to snap up the sinking white eggs before them placing them in the nest. Sometimes the male insists on doing this alone. 100-300 eggs may hatch after about two days and the transparent fry hang tail-down for a further two days before they swim free. It has been spawned with *Betta* to produce infertile offspring by the late Lankan biologist, Rodney Jonklaas which suggests a close relationship between the two genera.

and four *Pseudosphromenus cupanus* before the dusk finally drove us away to the Rest House at Ratnapura.

The next morning, we were up at 5am to visit the Sinharaja forest, a World Heritage site and pristine wilderness area. Pausing at the village that was its gateway, Kelum introduced me to 'Stringhoppers', which are sort of noodle-cakes making handling (literally) the dall and curry easier. Over the next few days on my subsequent field trip, we ate in a variety of rest-houses and wayside cafes, inaccurately known as 'hotels' and although my companions quickly found that I could and would eat everything, even I have to admit that curry and rice for breakfast, lunch and dinner does dim the enthusiasm for chilli!

Fortunately, there was no-one available to act as a guide at the park's

PREVIOUS PAGE The 'team' (with no lack of extra help) search a small upland stream through forest near Udagama.

RIGHT *Clarias orientalis* from woodland stream.

HABITAT 2 Kaluhpahana
pH 6.5/30°C

Lepidocephalus thermalis
Pseudosphromenus cupanus
Puntius titteya
P. cumingi
P. vittatus
Rasbora daniconius

HABITAT 3 Kaluhpahana
pH 6.5/26°C

Aplochelichthys dayi
A. paucus
Channa orientalis
Clarias brachysoma
Lepidocephalus thermalis
Mystus vittatus
Pseudosphromenus cupanus
Puntius titteya
Puntius vittatus
Rasbora daniconius

reception centre and Kelum's familiarity with the area was anyway equivalent. Before long, we were watching leaf-monkeys as they crashed away through the tree-tops and giant squirrels pattering along the branches. Kelum exhibited his encyclopaedic knowledge of Sri Lankan wild-life pointing out Layard's Parakeet, Yellow-Browed, Ashy-Headed and Rufous Bulbuls, Flower-Peckers and perhaps Sri Lanka's rarest bird, the Green-Billed Coucal. Wild Jungle Fowl pecked among the leaves in the gloom of the forest and I was delighted to have my first sight of *Nepenthes* pitcher plants (*N. distillaria*) dangling from their parent climber like beer mugs around a bar.

But we were here also to see some particularly nice *Balaia* habitats and in some of the upland streams we saw pools teaming with Combtails, their red bodies catching the dappled light filtering through the forest trees: I watched as large fish rushed out from

Fact Box

CHANNA ORIENTALIS

This attractive small species of Snakehead which grows to 11cm, is probably endemic to Sri Lanka although our knowledge is muddled due to confusion with the similar, but widespread, *C. gachua* which also occurs in Sri Lanka. Young fish are reddish-yellow, sometimes with a spot at the end of the dorsal. Older fish are olive-brown with a blue-green chest and throat. The main distinguishing feature is the lack of ventral (or pelvic) fins. Females often have an ocellus on the dorsal. Like *C. gachua*, *C. orientalis* is a paternal mouthbrooder which carries the eggs for 9-10 days and expels the young through the gill cover rather than the mouth. Females have been seen expelling sinking eggs for the young to eat. Snakeheads are quite sensitive to water quality and temperature changes.

territories under roots in the bank or among boulders to chase smaller fish in short dashes and thought how similar the scene was to the Baviaanskloof Wilderness area in the Cape where I had watched similar scenes featuring *Sandelia capensis*. Other pools were similarly densely stocked but with *Garra cylloensis* and *Clarias brachysoma*.

As the clouds gathered, we somewhat



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Insecticides and herbicides associated with agriculture and anti-malarial use of insecticides are potential pollutants.

The exotic, *Oncorhynchus mykiss* (Rainbow Trout) may have been responsible for species extinctions. Five species of Tilapines have been introduced. Largemouth Bass and Nile Perch have been suggested as introductions.

Compared with other threats, collection by aquarium exporters is negligible.

unwisely decided upon a climb to a nice vantage point. As Kelum strode ahead, occasionally scurrying into the undergrowth to collar a particularly interesting agamid lizard, I toiled behind. Inevitably, it wasn't long before the skies opened in a tropical downpour. We were chased, dripping, from the forest by a large velvet green scorpion and I found my first leech, securely fastened between my fingers. However, we were rewarded by a last glimpse of the Blue Magpie as the sun briefly illuminated it through a small gap in the clouds before the deluge resumed.

On Thursday, we travelled south on route 18 and then toward Maragoda on the boundary of the wet and dry zones, to see some limestone caves. These proved to be down a deeply rutted single-track dirt road which tested Dhanapahla's skills and the resilience of the truck. Even in this remoteness, as we walked to the caves, we came across plenty of people waiting by the side of the road for the tractor to pick up their produce. The caves themselves were full

of chirping mini-bats and a very nice cool refuge but the stream which ran through them produced no Belontiids. Just a few complaints from the lady washing her clothes upstream from me. As luck would have it, and as if the track wasn't testing enough, we met the tractor, with a flat tyre, coming down as we were on the way up.

We returned home to Colombo, through Ratnapura, and via Kaluhpahana on Route 8. Here we stopped twice, first to fish a stream bordered by paddy fields where Kelum, fishing on one side of the stream, caught 13 *P. capensis* while I, fishing on the other, with a whole host of help, caught none, although there were plenty of cherry barb. Kelum expressed a lack of confidence in the small size of my net and the diameter of the perforations. At the next habitat, a stream in a wood remnant,



ABOVE *Pseudorasbora capensis* from drain habitat.

RIGHT Agricultural drain running through paddy fields near Kaluhpahana.

it was therefore pleasing that while we caught only one *P. capensis*, I netted five nice little *Cianna orientalis* in shallow water under leaves, amongst roots and fallen branches. These tend to behave characteristically like large tadpoles in the net, wriggling from side to side as they try to climb out!

Closer to Colombo in the dusk, I was surprised to see a monkey burst out of a plantation and run across the road but even more so when we passed one of the few remaining working elephants walking nonchalantly in the stream of traffic.

CONTINUED NEXT MONTH

THIS MONTH'S SUGGESTED FURTHER READING

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by Horst Linke

Tetra Press

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SEE THE REVIEW OF THIS BOOK ELSEWHERE IN THIS ISSUE.

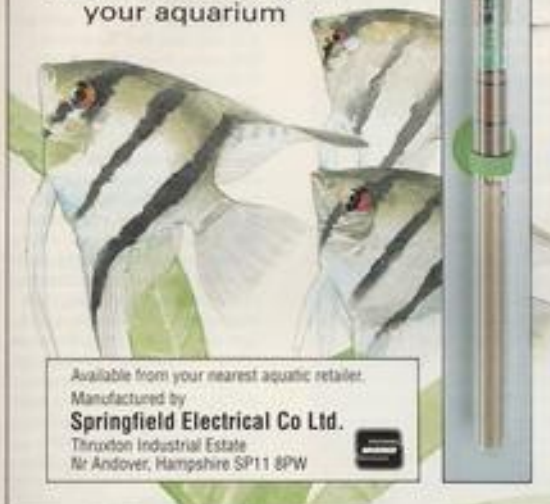


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TOMORROW'S AQUARIST

BY GINA SANDFORD



Sometimes I wonder just what is becoming of our hobby. Are we, in fact, losing touch with the basics. We only have to look through a magazine to see an abundance of products that are designed to make fish keeping easy and instant. There are products to test the water for, for example, pH, ammonia and hardness of various sorts. There are filtration units each of which the manufacturer believes to be the ultimate product and the same can be said for lighting units, heaters, thermostats and even the tanks and stands themselves. There are even units to feed your fish while you go away on holiday or, if you are a really lazy fishkeeper, to feed them while you are at home.

The last time I looked at all the gizmos and gadgets on a shop shelf I started thinking about what I believed the hobby is about ... fish and their well-being. Then I thought how I try

to achieve this.

What is the first thing I do when I go into my fish-house? Sniff and listen! Yes, the nose and ears are my first indication that everything is going along smoothly. There is a smell of damp earthiness on the warm air and a gentle hum of motors that says everything is fine. As I walk in my hand touches the tanks as I pass. Although I have a couple of thermometers in there — not in or on every tank you note — my hands have grown accustomed to what the temperature of the tanks should be. A glance round to see that nothing is behaving in an obviously distressed manner confirms that all is well.

While I am not advocating that the beginner throws away his or her thermometer I am encouraging them to begin to learn the "feel" of fishkeeping, to develop that sixth sense that helps you to avoid disaster. So,

when you look at your thermometer, touch the tank, it won't be long before you can just rely on touch.

Use your eyes to observe what the fish are doing. Are they hanging at the surface near the inlet from your filtration unit instead of swimming around? Touch the tank, it's probably too warm. Check the heater/stat and replace it if necessary. If it's not too warm then check the filtration system, may be the flow rate has decreased and the fish are short of oxygen in which case you can easily rectify the situation.

Conversely you may find your fish lying on the substrate barely moving, again a hand on the tank can quickly prove that it is too cold. Once again, check your heater/stat and replace if necessary.

Observation of your fishes' behaviour can also be an indication that you have failed in your regular tank maintenance.

For example, some of the catfish will show a slight degeneration of the barbels and of the fin membrane (soft part between the harder fin rays) just because I forgot to do something as basic as a water change. I wonder how many people have consulted a book and been convinced it was a bad case of fin rot and then been appalled because the proprietary medicines they purchased failed to cure the problem. I am not saying that I never need to resort to medicaments but I am saying that I rarely have to use them. If, 24-48 hours after my water change I see no signs of improvement then, and only then, do I suspect something a little more sinister. But I can only do this because I have learned to live with my fish.

Then there is the day that you discover you have a fish that has turned rogue in your aquarium and is bashing seven belts out of everything else in the tank. As you mutter something like, "That bloody Krib has gone too far this time — he's out!" just sit back and observe. Where's the female? She certainly isn't down the other end with the rest of them. He can't have killed her you've seen a body or at least bits of it. So what on earth is going on?

By this time you will have noticed that the other inmates do not cross an invisible demarcation line in the tank and it is only now that Mr and Mrs Krib usher their family of little Kribblings from the darkest and most secluded corner of the aquarium. Nothing is wrong with the tank, nothing is wrong with the fish, they were just doing what comes naturally. All you have to do is set yourself up another aquarium to house the brood as it grows.

I have to admit to having time switches for the lighting circuits in the fish house and the whole place has its own fuse box. The light switches are there because I have several banks of lights on the main tanks, coming on in sequence and going off the same way. On my tank in the kitchen, however, I have a single light plugged into the socket in the wall and I have to turn it on when I go in to make my early morning cup of tea and say "Morning fishes", to the fish and off when I put the washing machine on its timer and set the dishwasher off last thing at night. In between while I feed the fish, lean against the sink to watch them instead of getting the dinner ready, and lob in the odd pea, piece of potato or whatever to supplement their normal diet of flake and frozen foods.

Now I could have my fish house wired up so that everything is automatic: the fish would be fed automatically, water chemistry checked automatically, the lights go on and off automatically, the plants are fed CO₂ automatically, etc. The need for me to enter its portals would be only when an alarm bell sounded or a light flashed and then I'd be in such a panic I'd probably miss seeing what the problem was. Is this how you want your hobby to be like? I hope not.

Talking to people over the past few months from novice fishkeepers to expert aquarists it transpired that one of their favourite tasks is satisfying one of the basic needs of the fish — feeding them. It was the one time they could just stand back, relax for a while and observe some of the basic pleasures of fishkeeping ... you can guess what will never find its way into my fish house!

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(Photo — Polished wood veneer)



Seabray cube aquarium and stands

(Photo — Melamine board)



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(Photo — Melamine board)

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Reverse-Flow Filtration

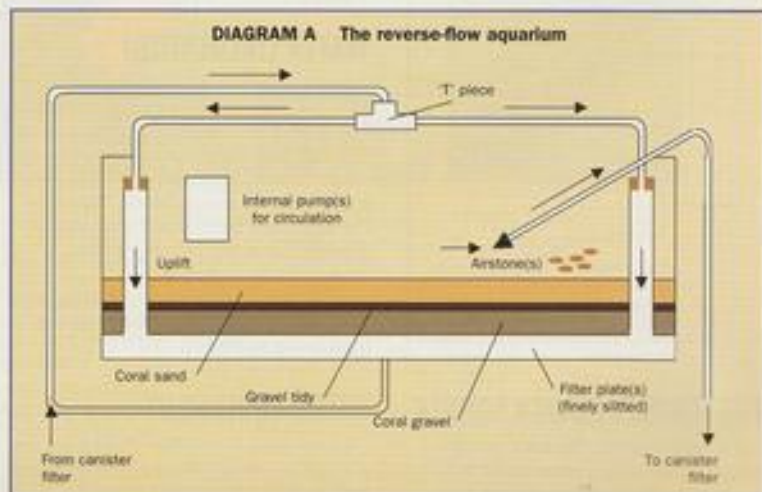


NICK DAKIN CHANGES INTO REVERSE GEAR FOR ANOTHER MARINE BIOLOGICAL FILTRATION SYSTEM.

● PHOTOGRAPH BY THE AUTHOR ●

The most logical advance and improvement on basic downflow filtration (see **Aquarist & Pondkeeper** February 1996) is widely acknowledged to be reverse-flow. It bears a great resemblance to the former as far as cosmetic appearance is concerned but instead of the aquarium water being pulled down through the filter bed and exhaled from the uplifts, water is forced down the uplift(s) and rises up through the substrate into the aquarium.

The significant advantage of the reverse-flow system is that the aquarium water is effectively intercepted at the power source by a mechanical filter i.e. a canister filter packed with filter floss. In this way, detritus, mulm and other suspended particles can be trapped and



ultimately removed from the aquarium, leaving the filter bed clean, unclogged and aerobic. Such a system remains more efficient for longer, unlike the downflow substrate which soon compacts with detritus and other debris thereby requiring constant 'hoovering' of the coral sand to maintain efficiency.

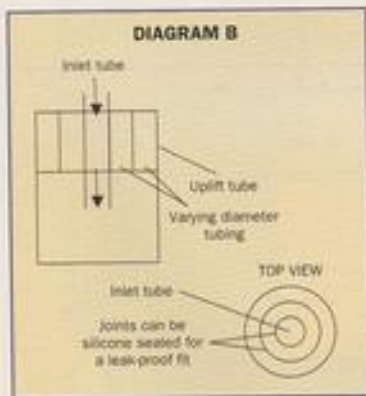
There are available on the market today powerheads with a reverse-flow action. Unfortunately, these do not possess the facility to remove solids from the water and in effect merely clog the filter bed from below, rather than from the top. Once the lower media is clogged, the whole bed will need to be removed and cleaned in order to restore it to full efficiency once more (quite a task!).

OPTION ARRANGEMENTS

Reverse-flow is achieved in one of two ways, either by setting the system up from scratch, or converting an existing downflow arrangement.

The filter bed remains fundamentally unchanged from that of the downflow system with two important exceptions:

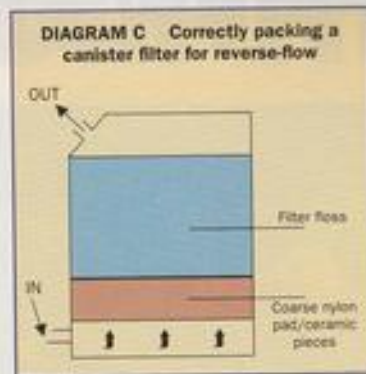
- (1) the filter plates need to be of the finely slitted variety, enabling even distribution of water throughout the substrate (if coarse, snap-together plates are used, the pressure will cause the majority of water to escape from an area just around the base of the uplift)
- (2) The uplifts need to be converted so that a tight fit is achieved with the adjoining 'feed' pipework, thus preventing any leakages. Conversion kits are available from manufacturers such as Eheim, or the aquarist can fashion his/her own fairly easily.



THE CORRECT POWER SOURCE

It is essential that the most suitable canister filter is chosen to power the system. Aim for a model that will

turnover the total volume of tankwater approximately two-three times each hour, being careful to take into account the operating 'head' which will affect the effective pressure and flow (the 'head' is the vertical distance from the pump to the surface of the aquarium water, the greater the distance, the lower the flow rate).



Pack the canister filter with mechanical media only as biological activity is not to be encouraged at this stage.

The canister will require weekly maintenance for heavily stocked tanks and fortnightly for lightly stocked ones. Failure to do so will result in a reduced flow rate and a steadily more inefficient filter. Replace the filter floss completely with fresh media and rinse out the coarse nylon pad or ceramic pieces under the tap.

TIP: The regular removal of the canister filter for media-change purposes can become a awkward chore unless twin-gang taps are installed on both the output and input hoses.

WATER CIRCULATION

Extra water circulation is essential as any movement provided by the reverse-flow system will be distinctly sluggish. In fact, the bacteria within the filter can strip the water of vital dissolved oxygen to possible dangerous levels. Therefore, the tank must be provided with several powerful airstones, internal power sponge filters, or better still a complement of powerheads (taking care to cover the inlets to prevent livestock from being sucked in).

OTHER EQUIPMENT

I have already considered the need for a suitable protein skimmer and activated carbon during my discussions on

THIS MONTH'S SUGGESTED FURTHER READING

THE SUCCESSFUL MINI-REEF AQUARIUM

by U. Erich Friese
T.F.H. Publications
ISBN: 0-7938-2093-6
Price: £29.95

Whilst a little bit further along the line than Nick Dakin's series has got so far, the very completeness of the coral reef scene really is a practicability in the aquarium, providing you know what you're doing. This book reveals all you should know. See a review elsewhere in this issue.

downflow filtration. However, how many aquarists would consider adding an ultra-violet steriliser at this point? The reality is not many, and that is regrettable: for as we shall see next month, the increasing sensitivity of fish require some sort of protection from common free-swimming parasitic diseases such as whitespot and Oodinium, especially if they are kept in conjunction with invertebrates and effectively impossible to treat with copper-based medications.

Whilst it is possible to simply insert the UV unit in-line with the feed to the undergravel, a much better arrangement would be to install it after another canister containing the activated carbon. Such water will have been cleared of yellowing dyes and make the steriliser that much more effective.

FINAL NOTES

Generally speaking, only one uplift will be required for a tank of less than 4ft in length. Thereafter, two, three or even four uplifts and possibly an extra canister will be needed. Having said that, there will come a point when undergravel is no longer viable and a cheaper, yet more efficient system will become a strong consideration... trickle filters. These I will be investigating in two month's time.

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ALBINO FISHES

IF YOUR FISHES ARE LITERALLY "BEYOND THE PALE"
DR R. J. GOLDSTEIN
CAN PROBABLY EXPLAIN THE REASON.



There are some who say, tongue-in-cheek, that Moby Dick was produced at a Florida fish farm. Herman Melville's albino Whale would never have fascinated us as simply another Whale. It needed to be different, for in being different it might be a messenger from the supernatural world.

Albino bears, deer, frogs, and even people have always captured our attention. Albino fishes have been a part of our hobby since the first albinistic Paradise fishes. They were followed by albino Barbs, Danios, Catfishes, Livebearers, Cichlids, and Tetras. Today, virtually no group of aquarium fishes propagated, with the possible exception of Marine Clown Anemonefishes, lacks an albino strain on the market.

DEFINING ALBINISM

What exactly is albinism? Some think it is a lack of pigment, but that is too broad a definition. Many chemicals function as green, red, yellow or brown pigments in fishes, and we won't discuss all of them here. However, we can outline the types of pigment and pigment carriers in fishes.

Most pigment is contained in special cells called chromatophores. There are light-reflecting and light-absorbing chromatophores.

Light-reflecting chromatophores are of two types, the leucophores and iridiophores, which reflect pigment either from scattered granules or from

stacked, iridescent plates of materials (*Comparative Biochemistry and Physiology*, 1986, vol. 83C, pp. 1-7).

Light-absorbing melanophores contain the better-known, non-iridescent brown, black, red and yellow pigments. Specifically, albinism is the lack of melanin pigment, which is the most widespread pigment in the animal kingdom.

Albinism might be generalized throughout the surface tissues, or localized in the skin only. It could be due to weak pigmentation rather than the absence of pigment. That's why breeders distinguish among albino, pink and "blushing" forms of fishes. There are also piebald fishes, with a mottled distribution of pigmented and non-pigmented areas.

Why do animals have melanin at all? There are many reasons. Melanin protects the skin from the damaging ultraviolet rays of the sun, absorbs the sun's infrared heat rays, and it provides camouflage. Internal parasites, such as Tapeworms and digenetic Trematodes, usually lack melanin (but may contain erythrophores with red pigment), while external parasites, like monogenetic trematodes and external crustaceans, usually have melanin. Cave animals (troglodytes) typically lack melanin. After all, why continue to use energy making something you don't need?

The same principle applies to having eyes. Internal parasites never have eyes, while external parasites frequently do. There are cave Salamanders and fishes

without dense pigment, those without pigment at all, those with weakly functional eyes, and those without pigment or eyes. A common hobby fish, and an excellent example of this principle, is the Blind Mexican Cave Tetra, a troglodytic form of *Astyanax mexicanus*.

In some animals, perhaps melanin is simply a waste product deposited in the skin or organs. How else can we explain the vast amounts of melanin in the internal organs of many animals? That is misleading. In many cases, that's not real melanin but another black material called "neuromelanin" a different chemical, arising from a different pathway (*Journal of Anatomy*, 1985, vol. 142, pp. 73-83). Although neuromelanin is technically a pigment, and probably has the same amino acid precursor, it is primarily used (but we don't know how) in nerve impulse transmission.

HOW ALBINISM HAPPENS

Albinism can arise when a single step in the normal biochemical pathway to the formation of melanin fails. What is this pathway? It all begins with phenylalanine, one of the twenty common amino acids. Structurally, it looks like a combination of the closed six-sided ring called a phenyl group and the simple chain amino acid called alanine.

Phenylalanine is important structurally and as a part of certain enzymes. It is also convertible to other amino acids,



Albino Tiger Barbs.
PHOTO: LINDA LEWIS

such as hydroxy-phenylalanine, or tyrosine for short. It takes the presence of an enzyme (phenylalanine hydroxylase) to make the change. There are people who don't have this enzyme, are deficient in tyrosine, and excrete excess phenylalanine in their urine; they have the genetic disorder, phenylketonuria or PKU. Having tyrosine in body tissues is vital, because it is used to make thyroid hormones, nerve impulse transmitters, and other substances.

In the melanin pathway, the normal animal converts some of its phenylalanine to tyrosine. The tyrosine then gets another -OH or hydroxy group and becomes Dihydroxy-Phenyl-Alanine or DOPA. Through sequential steps, this substance is converted to DOPA-quinone and then DOPA-chrome. Then the six-sided phenyl ring becomes a nine-sided indole ring. The indole step occurs when the nitrogen joins up

with the phenyl ring to create a supplementary five-sided ring on the six-sided one. (But since they share a side internally, there are nine sides altogether, not eleven.) Now we can convert the structure to a new substance called indole-quinone, and it is very interesting because it forms polymers. It is the polymers of indole-quinone that we call DOPA-melanin, or simply melanin. The accompanying diagram shows the steps.

Where the chemical reactions take place is important. The entire sequence occurs in special pigment cells called melanocytes. The conversions from tyrosine to DOPA quinone are mediated by the enzyme tyrosinase. If an animal lacks this enzyme, it cannot form melanin and its melanocytes remain colourless. If the deficiency in tyrosinase was more widespread, rather than restricted to melanocytes, there's a good chance that the animal would die from a failure to make nerve impulse transmitters.

This can apply to all its melanocytes, or to the melanocytes only of the skin, only of the hair, scales or feathers, only of the eyes, or only of some other organ. Therefore, we can have total albinos or partial albinos.

In man, the classical type of total albinism is called type IA human oculocutaneous albinism (OCA). There

is an absence of the enzyme tyrosinase and the person has white hair, blue eyes, and white skin. Recently, a new form of OCA in man has been discovered, one in which some tyrosinase activity develops later in life, so that partial pigmentation occurs as the person gets older (Clinical Genetics, 1986, vol. 29, pp. 42-50).

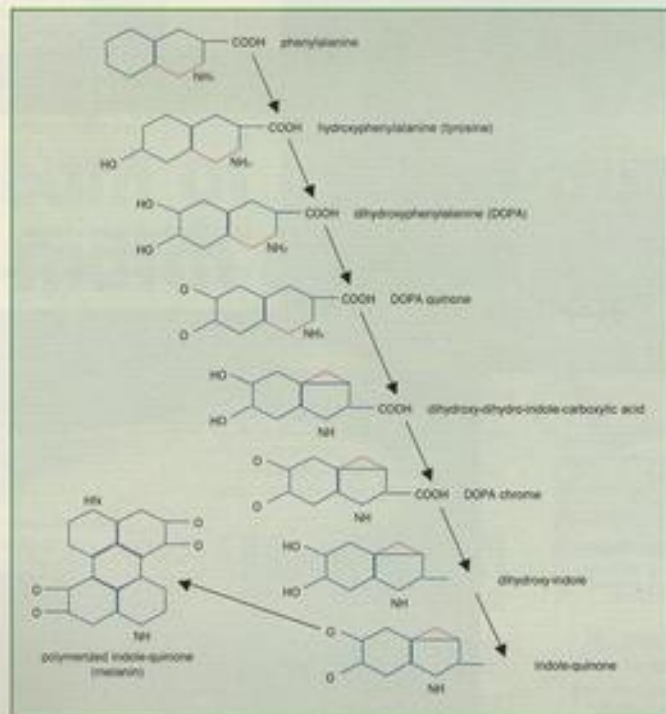
AQUATIC IMPLICATIONS

What does this mean to selective breeders of aquarium fishes? Some fish cannot mutate to lose the ability to form melanin without the enzyme deficiency being generalized throughout the body. Those animals either don't produce albinos at all, produce non-viable albinos that die early in development, or generate very rare albinos that can't be fixed by inbreeding. The difficulty in getting a good albino Beta is probably due to this problem. And it leads to another, related problem.

We have all experienced difficulties with viability of all-black Angels, all-black Mollies, and the near impossibility of obtaining a viable Solid Black Beta. In this case, I suspect the problem is that, by selectively breeding for excess melanin production, we are producing fish in which too much phenylalanine is shunted to melanin production, and not enough reserved for hormonal and nerve impulse transmission functions.

Looking at both problem all-black fish and problem albino fish, the difficulty may be that, by selecting toward or away from the normal melanin pathway, we simultaneously are selecting against normal nerve transmitter production and producing a lethal state in the offspring.

Albinism, in most cases, is easily produced by simple genetic manipulation using a large population of offspring and a mutagen, such as ultraviolet or X-ray radiation. Some mutations are minor and undetectable. Others are severe and lethal. In practice, we apply the mutagen and look for the mutation we want, discarding everything else. That mutation could be high



TROPICAL *Albino Fishes*

fins, rapid growth, gigantism, an excess of a specific colour, or the lack of any colour.

If these original albinos are bred to one another, several outcomes may ensue. In the desirable case, the albino character will be fixed and breed true. But other possibilities exist. The double albino gene may be lethal, in which case the young all die. Or the offspring may be normally pigmented, in which case albinism in the parents was probably due to a deficiency of different genes (and they complemented each other in the embryo).

There is a problem when only a single albino offspring is found. In order to fix the strain, that fish must be bred to a normal fish to produce offspring carrying the albino gene. Sometimes the amount of light necessary to trigger the normal fish into spawning behaviour will inhibit the albino by hurting its sensitive eyes. Generally, albino fishes must be bred in shade or under subdued light.

Can albinism be used to create new coloured fishes? Absolutely. By breeding for an excess of a different pigment cell,

that we are combining a lack of tyrosinase in the melanocytes in Fish A with enhanced erythrophores in Fish B, we might actually be dealing with two strains deficient in the melanin pathway, but at different points.

There are many success stories. The German Helleri is a Swordtail in which rich melanin deposition has been combined with heavy deposition of guanine in iridiophores. Those fish are black with iridescent blue-green scales. Unfortunately, the cross is often self-sterile and must be produced anew each time. Some of the newer Black Swordtails don't have this problem, but their guanine is not very impressive.

Much of what we know about pigmentation in fishes goes back to the early work of Dr. Myron Gordon at the American Museum of Natural History in New York. Gordon worked on skin cancers of the type called melanomas. He found that fish melanomas were similar to those in man, and pioneered the use of Mexican Platies and Swordtails as laboratory animals. One of Gordon's important findings was that

some cancers were not related to melanin production but to proliferation of the melanocyte or pigment cell; the resulting condition was called an amelanoma. Amelanomas typically produce a light-coloured fish, such as the new light Medaka (*Zoological Science*, 1985, vol. 2, pp. 317-322).

WHERE NEXT?

If you're interested in albino fishes, by all means pay attention to the publications of the international aquarium societies. All of them devote a portion of their energies to understanding and working with albinism and colour forms of their specialty fishes.

Understanding how colour variants are inherited is not easy; it is often different in different groups of fishes. And because fishes have several different sex-linkage systems (not the simple XX-XY system you learned in school), understanding inheritance of one character in fishes will give you a basic understanding of how those fishes must be manipulated to produce some other character.

Genetics cannot be studied to the exclusion of fish physiology, since survival is always a risk when mutations are generated. And, as many of you have already discovered, having a new mutation is one thing; anybody can be fortunate. Fixing that strain is quite another matter, and that's where fortune ends and skill begins.



LEFT Albino *Corydoras Aeneus*.

PHOTO: LINDA LEWIS

such as the erythrophore, the potential for red might be enhanced. Greens can be enhanced in those fishes with iridiophores and the deposition of guanine-based substances.

Can these traits be combined? While combining iridiophores and melanophores is technically feasible, combining different kinds of melanophores is not easy. The difficulty is that some of the intermediate quinones in the melanin pathway are red or yellow. Thus, while we might THINK



BELOW Kribia — *Pelvicachromis pulcher*. PHOTO: BOB GOLDSTEIN

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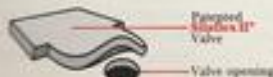


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COLDWATER JOTTINGS

BY
STEPHEN J. SMITH



Water torture

To many, the sound of running water — maybe a babbling brook or even a cascade or fountain into a pond — is a little slice of paradise. It is not surprising then that so many water features for the garden are sold every season. And, with new and interesting designs being introduced every year, there is no shortage of inspiration to brighten the sights and sounds of your own garden.

Did I say paradise? For me and for countless others, maybe so. But for the neighbours of Coldwater Jottings reader Robert Lee, of Hornchurch, Essex, the sound of his water feature is far from paradise, and not much of an inspiration either.

Now, I'm not one for neighbour disputes (there being far more weighty matters on one's mind than to squabble over the garden fence) but I was concerned to hear from Robert that his neighbour has complained about him running his water feature. I'll let Robert take up the story: "Last summer I installed a wooden half-barrel water feature with cascading water from a reproduction artificial pump run by an electrical pump. Having installed several Goldfish we gained a great deal of pleasure from the fish during the summer and we found that the sound of the cascading water very relaxing and soothing. However, shortly after installing the water feature we received complaints from a neighbour that the noise of falling water was disturbing them."

Despite Robert apparently cutting down the hours that the cascade was operated, Robert tells me that he has received visits from the Police, and he has subsequently been served with a Noise Abatement Order restricting the use of the pump and cascade to four hours a day!

Now, this is not an April Fool's joke. But it is a warning to all who have water features. Paradise it may be to you; but one person's paradise is another's hell, and it is evidently not safe to assume

PHOTO JOTTING

Colour change

We are embarking upon the coldwater season with gusto (aren't we?) so let's take a look forward at what we can expect this coming season.

Breeding fish is for many readers by far the highlight of the coldwater season. There are few more exciting moments than seeing hundreds of fry emerge and to see them grow, under our own tender loving care, into young healthy fish.

One of the characteristics of developing Goldfish is a gradual fading of the colouring from an olive-green, through black, and eventually to golden. This photograph of a Lemon Goldfish fry which I produced last season illustrates this perfectly.

The black stripe is quite attractive to some people and it is a source of disappointment, having purchased a 'black-striped' Goldfish, when the black disappears!



PHOTO: STEPHEN SMITH

that everyone else will share your enthusiasm for your aquatic interests.

However, with the thousands of water features sold and installed in gardens throughout the UK and in other countries, this is the first time I have ever heard of them causing any problems...

Electronic mail

The introduction of an e-mail facility to supplement the traditional means of the trusty Post Office has resulted in a multiplication of mail for the "Coldwater Jottings" desk. Thank you to all who write or e-mail with comments, suggestions, opinions, and so on. I cannot use them all on these pages of course, but I will try to answer them all personally, so please bear with me — and keep them coming.

Phil Reed e-mailed me from the Lake District to congratulate Coldwater Jottings on providing "a new dimension to those quiet winter periods in pondkeeping". Phil keeps

Discus in three indoor tanks, and has an 8,000 gallon main pond — with a 1,000 gallon quarantine tank in his fish-house. He asks whether **A&P** is on the Worldwide Web yet.

Richard Moore is another e-mail correspondent who is delighted with the e-mail connection for Coldwater Jottings. "It seems that e-mail is finally spreading out of the world of computer magazines and into the aquatic publications," says Richard. "as more people get 'hooked up' it can only increase the dialogue between readers and the magazine. I for one am too lazy to write to a magazine but it's no big deal to fire off an e-mail when someone puts forward a question."

Thanks for your communication, Richard, and your frankness. Good news for you all here: while **A&P** as such isn't yet 'online', Coldwater Jottings is! At least you can see what you missed last month (you have to buy the magazine to keep up to date, of course). So, if you have access to a personal computer with a modem and an Internet account, type in the following address:

<http://www.demon.co.uk/sjspr/aopm.html> — see you online!

(For other e-mailers, who might wish to communicate non-coldwater comments, why not try **A&P** Editor, Dick Mills on: 101372.3451@CompuServe.com?). Don't forget you can write, too (with real paper and pen), to the address below.

And finally ...

Do you have a coldwater fish with an unusual colouring? Or maybe you will be breeding fish, maybe for the first time this season. Have you had problems with your water feature? Let me know your questions, opinions, and information about your hobby by writing to me at Coldwater Jottings, **A&P**, Caxton House, Wellesley Road, Ashford, Kent TN24 8ET. And, if you have email, you can contact me direct at: jottings@sjspr.demon.uk — or, you can see last month's Jottings on the Worldwide Web at:

<http://www.demon.co.uk/sjspr/aopm.html> — looking forward to seeing you there!

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SHORE WATCH

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BY ANDY HORTON

PHOTOGRAPHS BY THE AUTHOR

Rockpooling

Observation is the key to the native marine hobby.

The aquarist is able to go down to the seashore and view the rock pool fish and invertebrates in their natural environment. By April the breeding is underway for Blennies and Gobies and the rockpooler has to be careful not to disturb their egg masses, which will be guarded by an aggressive male fish.

There are two books to look out for this month. The one likely to be in the shops is a completely revised 'Collins Pocket Guide to the Seashore' by Peter Hayward. This guide replaces the original that was first published in 1958 and was reprinted just about every year since then. At the time of writing I have not got exact details of the book, but it is sure to be an essential purchase. The other book is 'Oceanography' edited by C. P. Summerhayes and S. A. Thorpe, with numerous contributors by experts in their fields. The book is produced by Manson Publishing. The ISBN is 1-874545-37-5 for the soft-cover version.

food fish such as the Cod, Whiting, Haddock, Coley (or Saithe), Ling and Pollack. All these fish mentioned except for the Ling have three dorsal fins. Rockpoolers will be familiar with the Rockling which belongs to this family. Fish fry of the Cod family are found in rock pools. The most commonly encountered are Pouting, Coley and Pollack.

The **GARFISH**, *Belone belone*, is a streamlined open water fish distinguished by a slender silvery body and long toothy jaws. Sea anglers catch them when fishing for Mackerel. Only the larvae will be found inshore and they are one of the first larvae of the year, found in shallow water from May onwards. They swim on the surface and are very easy to

scoop up in a small net. They are particularly fascinating because the lower jaw is much longer than the upper jaw until the latter grows through the summer. They are only suitable as a temporary exhibit in home aquaria.

The **GASTROPODA** is a large class of molluscs known as snails because of their appearance. Of the three subclasses, the Prosobranchia are aquatic and contain the familiar marine snails like the Winkles, Topshells, Whelks, Dogwhelks and the conical Limpets. The Opisthobranchia contain the Sea-slugs that have lost their external shell; and the terrestrial air-breathing snails are classified as Pulmonata. Gastropoda means "stomach-footed" because the animal

moves along on a slug-like foot that contains part of its gut. This foot is twisted into the spiral shell.

GENETICS is the study of heredity, with the gene as the basic unit of inheritance. DNA is the primary genetic material of a cell.

The **GENUS** is an important and familiar category in biological classification because an animal is identified in scientific nomenclature by two Latin words (binomen) in which the **GENERIC NAME** is written with a capital letter and the subsequent species name with a small letter, normally in italics e.g. *Littorina littorea*, which is the Common Periwinkle. The plural is **GENERA**. Organisms grouped in the same genera should be genetically similar.

The rank above the genus is the Family.

The **GEOLOGICAL TIME SCALE** is a scale to divide the age of the Earth from 4,600 million years ago when the Solar System was formed into eons, eras and periods according to



Juvenile Pouting are one of the most likely Codfish, or Gadidae, to get stranded in rockpools in autumn.

ge

The **GADIDAE** are the family of bony fish known as the Cod Fishes and includes well known



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when life evolved. This relevant to the advanced rockpooter who is interested in when certain invertebrate life originated on this planet and how it has changed in form since then. Fossils are found between the tides.

GEOLOGY is the study of the Earth. This includes the structure and materials that make up this planet. Geology overlaps with other sciences, including biology and palaeontology (study of fossils) how life forms have shaped the development of Earth. The study of rocks (petrology) is important in deciding rockpooling visits and the fauna likely to be present. Sedimentary rocks like limestone often provide more niches and cracks for small fish and crabs to hide in.

GILLS are vitally important for marine life as it is this organ which is responsible for extracting dissolved oxygen from the sea to allow fish and invertebrate animals to breathe. The exchange of gases occurs as the water passes over the gills. In fishes these are of a delicate structure. In most fishes they are protected by a gill cover called an operculum. Invertebrates have gills on various appendages.

GLAUCUS is the quarterly journal of the British Marine Life Study Society. Its name derives from a Greek mythological character. Glaucus is the colour of the sea.

GOBIES are a family of small fishes called the **GOBIDAE**. Most of the members of this family are inhabitants of the intertidal zone. Their pelvic (underneath) fins are fused together to form a weak suction cup. There are about 18 British species, of which seven are regularly found on the shore in sandy pools, and some species will hide under rocks. Gobies can be distinguished from the Blennies (family: Blenniidae) by having two dorsal fins, and from their darting movements across the floor of the pools. However, many Gobies are very much alike and difficult to identify to species level. Many of the smaller Gobies that attain up to 8cm when adult live only for one year. They may breed up to five times laying their eggs under stones in the shallow seas and on the shore, and then they will die. Medium sized gobies, up to 12cm will live longer. The Rock Goby, *Gobius paganelius* is hardy in aquaria.

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A **GROYNE** is a name for a man-made sea defence constructed to stop the sea eroding the shore.

The **GULF STREAM** is the warm water current known as the North Atlantic Drift that originates in the tropical Atlantic and warms up the seas around Britain.

h

HERBIVORES are animals that feed on plants. Marine examples include Winkles that rasp away microalgae and the Sea Hare that takes chunks out of seaweeds.

HERMAPHRODITES are organisms that have both male and female reproductive organs. Sometimes these are alternate in operation as in the Oyster, the animal changing from male to female; and in other organisms like the acorn barnacle they are simultaneous, the animal is both male and female at the same time.

HERMIT CRABS are just about the most fascinating of all aquarium inmates. They are not a true crab as they belong to the infraorder called the Anomura, with the fifth pair of legs very much reduced. This

The Rock Goby is common on southern and western shores.

The Netted Dogwhelk is a marine snail that buries in the sand.

incoming tide.

HIPPOCAMPUS is the genus of the fish popularly known as the Sea-horses.

The **HOLDFAST** is the structure of a seaweed by which it attaches itself to a surface.

The **HOLOTHURIANS** are known as Sea-cucumbers because of their shape. They belong to the class of animals called the Holothuroidea which are related to The Starfishes and Urchins. Holothurians are only found in the sea and only rarely washed up between the tides.

HYDROIDS are an important animal group to the ecology of the seas surrounding the British Isles. They fill the niche that would be occupied by coral reefs in tropical seas. And they look even less like animals than the corals do. The order they belong to is called the **HYDROIDA** which is in the phyla Cnidaria. This gives a clue to their nature, as they all contain cnida which are stinging cells used to paralyse their prey of miniature items of plankton. A colony of hydroids contains a trunk and branch system called the colon on which the polyps grow looking like tiny sea anemones under the microscope. Most colonies are stationary and are called Sea-Firs because of their appearance to the naked eye.

On 4 May 1996 a group called 'Low Tide' will be holding events around the British Isles, Ireland and the English Channel coast of France celebrating marine life.

For further information contact: Clive Pepe, River Ocean Research & Education. Tel: 01273 779952. For information about the British Marine Life Study Society contact: Andy Horton. Tel: 01273 465433.



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Growing Tips

BY BARRY R JAMES

I was often amazed and somewhat amused by customers who staggered into the nursery in January (often in the teeth of a raging blizzard), shook the snow off of their coats, stamped their feet, and then asked if they could buy some pond plants. Few beginners seem to be aware that most hardy aquatic plants are herbaceous and die back during the colder months. Whilst it is true that submerged aquatics which live in fast flowing streams (such as Callitriche) will often grow during the colder months, plants which inhabit still waters would be crushed by ice and therefore become dormant during this time. Even when informed of this fact many customers would still insist that they must have some oxygenators so that the fish could breathe. Finally, when convinced that their freezing cold ponds had ample supplies of dissolved oxygen they would leave, obviously frustrated but grudgingly accepting the situation. Often they would then return periodically during February and early March to enquire if the time had come to buy the plants! Some would even come in with a bucket bringing over with water lilies which they had lifted from their pool and wanted to sell. This brings me to the obvious question as to when is the right time of year to add plants to a garden pool.

In general the pool season is the reverse of that for normal garden plants. Aquatics are best moved whilst they are actually growing and certainly not when they are dormant! Early May to at the latest early October is the correct time to divide plant rootstocks and to take cuttings. Plants moved at other times will often become infected by bacteria and fungi. These infect the unprotected tissue exposed when rootstocks and tubers are

severed when the plants are divided. When growing actively the plants can employ their defence mechanisms to see off the invaders and heal the wounds quickly. These processes are not active when the plant is dormant. Of course none of this applies to container grown plants which can be moved at any time provided that they are placed underwater quickly and the rootstocks not exposed to frost.

Certain marginals need to be planted the previous year to be of their best. Calthas, or Marsh Marigolds, flower as early as March so plants bought in May have normally finished their flowering cycle for that year. Beware of buying well developed plants in early April. They have probably been forced under glass and will succumb to late frosts. Whilst this shock may kill them the chances are they will struggle back as the year progresses but will be passengers for that season. Steer clear, too, of Water Lilies pre-packed in polythene bags and hung up on peg boards often in the sun. They will almost certainly have been shorn of their leaves and roots to save weight during transport and will almost certainly have been imported. These plants mostly perish within a few months after planting.

Faced with the bewildering array of Marginals, Deep Marginals, Submerged Aquatics, Water Lilies and Floating Plants many new pool owners go into a blue funk. When approached by a salesman they mutter that they really only want a couple of bunches of oxygenators and a few snails to get the pond going. If the assistant leaves it at that and doesn't offer any advice the customer pays and leaves, only to return a few weeks later with tales of green water, blanket weed and with complaints that the couple of bunches of

A to Z of plants

The family Cabombaceae is confined to the New World. Of the two genera only one, *Cabomba*, is in general use in the aquaria. Of the eight known species three are in regular cultivation.

Cabomba caroliniana

Common Name: Green Cabomba
Distribution: South-Eastern North America. Now naturalized in many parts of the sub-tropical and tropical world including Cuba.

Description: Herbaceous aquatic plants with long thin stems with opposite, decussate or three-partite whorls of light to dark-green leaves. This strongly rooted plant ascends to the surface reaching a length of several feet. At the surface, small lanceolate floating leaves and small white flowers (coloured yellow at the bases of the petals) are produced. This species has many growing forms of which several are now regarded as distinct varieties.

Cultivation: *Cabomba* in the native habitat grows in still or gently flowing streams; in aquaria it will not thrive in heavily-filtered tanks with vigorous water currents. It needs good illumination and a general temperature of around 25°C. Ideally it would prefer a winter resting period at 18-20°F but this is difficult to arrange in the aquarium, so this species will have to be replaced periodically. Propagation is by cuttings, although these root poorly when inserted directly into the substrate. I have found that allowing them to float on the surface for a few weeks will encourage them to produce roots after which they can be planted more successfully. This technique should be used for all *Cabomba* species.

Other species:

Cabomba aquatica: the Yellow Cabomba is large but finer in all its parts than *C. caroliniana* and is more difficult to cultivate needing stronger illumination. The common name refers to the colour of the flowers. The floating leaves are round.
Cabomba platyneura: The Red Cabomba has beautiful often wine-red foliage, round floating leaves and violet coloured flowers. Needs intense illumination.
Cabomba pulcherrima: very similar to the above with a need for at least 12 hours illumination per day.
Cabomba australis: from South-Eastern North America is very similar to *C. caroliniana*.
C. warmingii: with delicate transparent leaves from Central South America and *C. palaeiformis* from Central America have not yet been introduced into cultivation.
Brasenia schreberi is the only species of the other genus comprising the Cabombaceae. It is widely distributed throughout the tropical world and is a rooted plant with ascending stems and floating leaves. Although it has been tried, it would seem to have no future as an aquarium plant.



Cabomba caroliniana.
Photo: Barry James

oxygenators have perished. There is a planting formula that the new pool owners ignore at their peril.

Buy a collection of plants recommended for the size of pool.

It may be pricey but is still cheaper than replacing plants which have perished as a result of having been overwhelmed by the "weeds" of the pond, namely the algae. When first planted, the pool may look a bit sparse but with patience the plants will soon spread and start to look respectable. Let us take the parallel situation of planting a garden border. We put in our exquisite, but tiny, shrubs and stand back and admire our work with some satisfaction. However within a few weeks we

are engaged in a ferocious battle with the weeds which are hell-bent on smothering our treasures. Sensible and knowledgeable gardeners will have installed ground cover plants at the same time as the shrubs and will have placed a thick layer of pulverised bark on the ground between them. It is exactly the same with pools. By selecting the correct varieties and varieties to start with, the "weeds" of water, i.e. the Algae family are starved out of existence in the competitive struggle for space, nutrients and light.

So, Rule One — buy at the right time. Rule Two — buy a suitable collection right at the start.



frogs & friends



By BOB and VAL DAVIES



Part of a Christmas present which could not be gift-wrapped — baby Blue Spiny Lizard.
PHOTO: BOB & VAL DAVIES

presenter on Granada T.V. mentioned having seen frogs in his pond — then came the big freeze and heavy snow which of course delayed activity over practically the whole country. On 1st February, which was quite frosty, we discovered two young froglets hibernating under a small stone by the pondside. They were still there, apparently unscathed, when the thaw came, owing to drifting the snow was nearly three feet deep over their refuge which no doubt had an insulating effect. The stone was a mere one inch

(2.5cm) thick and would seem to be scant protection in a really hard frost — no doubt many hibernating creatures do perish if their cover is inadequate when temperatures drop. If they are tempted out of hibernation by mild spells or sunny weather they can be caught out by a sudden change in temperatures. Common Lizards (*Lacerta vivipara*) which used to live in our outdoor enclosure occasionally emerged in winter sunlight only to succumb as temperatures dipped when the sun disappeared. Whenever possible they were replaced in their hibernating chamber but even so some were lost.

Surprise Christmas present

In June 1994 we obtained a captive-bred baby Blue Spiny Lizard (*Sceloporus cyanogenys*) and were later given another from a different source. Fortunately they turned out to be a true pair and were placed in the garage for hibernation in the winter of 1995. We were still in the process of reducing their temperature when, on Christmas Eve whilst making a final check that everything was alright, seven babies were spotted. It was a pleasant surprise — the female had not looked gravid and had not previously been cooled down. This livebearing species is frequently imported and the mature males are quite attractive. The adults had been raised in high (90°F/33°C) daytime temperatures with full-spectrum lighting. They are insectivorous and if they can be obtained in good condition are worth trying.

Outdoors

Way back on 25th January the lunchtime weather



Panther Chameleon (*Chamaeleo pardalis*). The independently focussed eyes of Chameleons give all-round vision.
PHOTO: BOB & VAL DAVIES

Unusual eyes

The capture of prey by Chameleons using their extensible tongue is well known. To achieve accuracy both of the independently moving eyes must be focused on the insect in order to judge the distance accurately. The success rate is remarkably high — they even allow for movement of the insect. Recent research in Germany on accommodation (adjustment in the lens to permit retinal focus of images of objects at different distances) in Chameleons has shown it to be exceptionally precise. To focus accurately a large retinal image is necessary — image magnification in the chameleon eye has been found to be relatively higher than in any other vertebrate eye. This large retinal image is produced by the unique design of the Chameleon's lens which has negative refractive power i.e. lens power: corneal power is negative. This is the opposite of other vertebrate eyes in which the corneal power has tended to increase over the lens power.

Declining amphibians

As part of the worldwide study of declining amphibian populations the Southern African Frog Atlas Project (SAFAP) has been set up at Cape Town University. Southern Africa has just over 100 species of frogs — 47% are endemic to the region. The 1988 Red Data Book on threatened Reptiles and Amphibians listed one fifth of them. Four endangered species may well have disappeared by now. The project which is part of the Declining Amphibian Population Task Force (previously mentioned) is aimed at listing all species and examining their status with a view to possible protection. The information will go into the central databank as part of the worldwide study.

Useful hints

1. For arid desert-type creatures a coarse sandy substrate is needed. Horticultural sand, although coarse tends to go dusty. Bird sand, preferably without oystershell grit, is useful although more expensive but it has the advantage of being dust free which is better for the inhabitants and for the keeper at cleaning time. Some shops now stock it under the name 'reptile sand'. Coral sand, as sold for marine aquaria is also suitable, very attractive but expensive. However it can be sterilised and rinsed for re-use.

2. If you use fruitflies (*Drosophila*) for your frogs escapees can be a pest around the house. A small container of red wine placed in the room will attract them — they drown in the wine. If you wish to capture them alive use a piece of banana (or other fruit) instead of wine. When a number of flies are seen in the container clamp your hand over the top — the flies can then be shaken into the vivarium. Do not re-use them if the room has been sprayed with fly sprays, air fresheners etc.

3. Crickets will often drown in a water dish and soon contaminate the water. To avoid this place sufficient sterilised pebbles in the water to provide 'stepping stones' for the Crickets but still allowing spaces for the reptiles to drink. The pebbles must be sterilised regularly by boiling.

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Herp medicine

Veterinary treatment for exotic animals can sometimes be difficult to find. It is apparently a low priority in the syllabus at veterinary colleges. As far as can be ascertained exotic medicine is compulsory only at Edinburgh — 10 lectures in the fourth year. At certain other colleges students may be able to elect to do a short course. Due to increased interest in exotic animals some vets are now offering treatment for reptiles and amphibians and it is worth seeking out an address before your animals need treatment so that you know where to go if necessary. Check with other keepers/societies who may be able to help you. D.I.Y. treatment with left-over human

B.H.S. Frogwatch Survey

A&P reader Alex Ewing from Kent sent us news of the FROGWATCH 1996 Survey but for various reasons it was not possible to include details before commencement. British Home Stores have provided funds to support this project which started 18-24 February. FROGWATCH recording packs were available in many B.H.S. stores between the above dates. The packs contained recording sheets for gathering information on spawning, development etc. This information will be sent to University College, Cardiff — it is hoped that analysis will assist in monitoring environmental changes. Hopefully some readers will have seen the packs and are participating.

The same correspondent also sent us the newsletter of the Kent Reptile and Amphibian Group (KRAAG) which has a strong conservation content. It contains details of some interesting events planned for this year. Readers in the Kent area should contact: Betty Platenberg, The Mount, Stodmarsh Road, Canterbury, Kent CT3 4AQ.

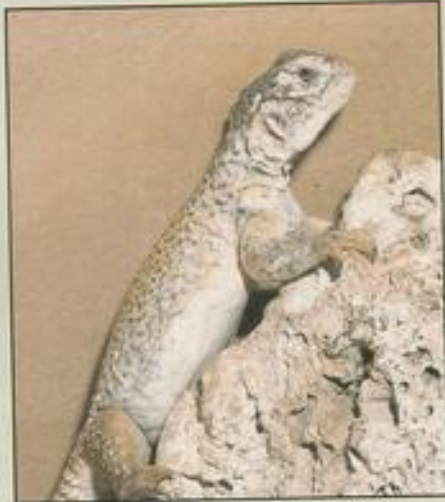
antibiotics is not advisable and proprietary medicines for cats and dogs are not suitable for herps. The actual treatment

which the layman can administer is closely restricted by law — a vet will advise what you can or cannot do.

A case for captive-breeding

Frogs and Friends (A&P, March) mentioned EC bans on three species of Spiny-tailed lizards (*Uromastyx*) and the Egyptian Sand Boa (*Eryx jaculus*), not an outright ban but one (as explained) which will probably reduce or stop the importation for the pet trade. It is worth mentioning that numbers of both species exist already in Britain. The latter has been bred on numerous occasions and successful breeding of the former was recently reported. For anyone trying *Uromastyx* they need really high daytime temperatures up to 126°F (52°C) under a hot spot, an ambient temperature of 82°F (28°C) with a drop to a minimum of 61°F (16°C) at night and full-spectrum lighting. Although mainly vegetarian insects are often accepted especially by young specimens. A winter cooling period is needed to stimulate breeding activity.

Controlling imports should give impetus to keepers' attempts to breed them (and other species). Captive breeding should be the aim of every keeper otherwise the animals are 'biologically dead'. Controls are increasing regularly and will continue to do so — common species may not always be so common! As lifelong enthusiasts we would hate to see the day when herps (or other animals) could not be kept. The sad fact is that although the controls are meant to protect the animals in the wild their natural habitats are being destroyed and many of them face an uncertain future.



Uromastyx acanthinurus — import now banned.

PHOTO: BOB & VAL DAVIES

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Books



Labyrinth Fish

Author:
Horst Linke
Publisher:
Tetra Press
ISBN:
3-89356-137-4
Price: **£8.95**

Who has not kept Paradisefish, Siamese Fighters or Gouramis at some stage? Yet, their requirements are often misunderstood and only a fraction of the known species are available to the hobby. New species are described, but even as they are discovered their rainforest habitats are destroyed by logging or industrial development.

Since 1963, the author has travelled widely in Asia and Africa, exploring the fast-disappearing habitats of these fish, and successfully breeding his captures in the aquarium.

Although published in 1992, this book is only now marketed in the UK. It is the third edition of a volume first published in 1980 in German by Tetra who are to be congratulated on their continuing commitment to this project. The advances that we have made in the intervening years can be deduced when you realise that a further dozen species have been described since this book was written.

The book is superbly produced, well bound so that the spine will not break if you open it flat, and with beautiful, accurately-produced colour reproductions. The author first explains the nature of Labyrinthfish and describes aquarium set-ups required to maintain them, before moving on to the species. Typically, each page or double spread pictures the species, shows its distribution, typical habitat and a table of parameters recorded there. In addition, he describes how they can be kept and bred in the aquarium.

The highlights of this book include many newly-discovered species from Borneo, including the Licuorice Gouramis, *Parosphromenus*, the miniature red Bettas, the *Betta coccina* group and the *Betta foerschii* group, some of which did not even have a scientific name at the time of writing. So we find, for instance, that *Betta brownorum* is *Betta* sp. aff. *coccina* (from Sarawak). Three of the species of Chocolate Gouramis are covered and here we learn from Horst Linke's

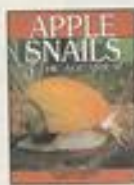
Reviews

experience, that *Sphaerichthys acrostoma* males mouthbrood the young while, in the other species, it is the female's job.

Notable omissions are the *Sandelia* species from South Africa and the Snakehead, *Luciocephalus*, which is now considered an anabantoid. Some inaccuracies include the use of the name *Ctenopoma* sp. aff. *ctenotis* for a member of the *C. nanum* group (*C. ctenotis* is a synonym for *C. nurel*).

I can recommend this book wholeheartedly. Buy it, and wonder at what you have been missing — and the world is losing!

DAVID ARMITAGE, AAGB



Apple Snails in the Aquarium
Authors: **Dr Gloria Perera and Jerry G. Walls**

Publisher:
T.F.H.

Publications
ISBN: **0-7938-2085-5**
Price: **£13.95**

This book breaks totally new ground for it is the very first to detail the extraordinary lifestyle of the 'Apple' Snail, the snail that everyone's heard of but about which so little (until now) has been known. Every facet of the 'Apple's' lifestyle is covered — from the possibility of it carrying disease, through its Water Lettuce clearing appetite to its role in the modern aquarium. Commonly found in both the Old and New Worlds, Apple Snails have long since richly deserved a volume to themselves and aquarists everywhere can now discover all there is to know about them (and other popular aquarium and pond-inhabiting snails) in this very special book.

DICK MILLS



The Successful Mini Reef Aquarium
Author:
U. Erich Friese
Publisher:
T.F.H.
Publications
ISBN: **0-7938-**

2093-6
Price: **£29.95**

Who can fail to be impressed with a fully-furnished, and fully

inhabited marine 'reef tank'? But, equally, how many feel that it is quite beyond their capabilities?

Setting down with this book makes for a good read for one thing but by the time you reach the end you will understand a whole lot more about the problems in keeping things happy on your aquarium's slice of the coral reef. One of the most important things is to understand how the fishes' behaviour changes when faced with co-habiting with other species in a closely-confined space, and then to choose only compatible fishes and invertebrates accordingly.

One of the most entralling chapters has to be that on Themed Tanks (species tanks might be another title). Here, the various families and genera of invertebrates are closely examined so that a compatible collection can be assembled, paving the way for success no matter which species you eventually choose.

For those wanting to keep fish another chapter deals with the further set of complications that this choice throws up. This well-researched section again will give you cause to ponder but the outcome again should be satisfactory — and save you much heartache (and money) in the process.

This deserves to become the standard work for would be 'reef tank' owners.

DICK MILLS

Tropical Aquarium Fish
Author: **John Dawes**
Publisher: **New Holland (Publishers) Ltd., 24 Nutford Place, London W1H 6DQ**
ISBN: **1-85368-578-X**
Price: **£12.99**

This book serves at least two purposes — it gets newcomers off to a good start but then also sets up more ambitious species to consider keeping once experience has been obtained. It is set out on the premise that you want to keep tropical fish (as opposed to coldwater species) but then takes you through the three main choices of collections available — freshwater, brackish and salt water. To appreciate why each aquarium is set up in its own individual way, the needs of fish from each of these three natural areas are first examined. Following the successful

furnishing of the aquarium, the book moves on to consider suitable inmates (including invertebrates too, in the case of marines); the tropical section includes a good cross-section of the more universally-popular (and available) species; extra, non-illustrated species suggestions are added as are 'coldwater' tropicals, those species not requiring so much heat as the preceding species. 'The second-level' species listings follow the same format and is followed by species for the experienced aquarist or, where conservation considerations or lack of captive culture experience occurs distinct warnings are given as to not keeping them! A final brief section gives details of popular plant species. For a book of modest proportions this packs in vital, basic information. Experienced fishkeepers will like it too.

DICK MILLS



Caring for your Pet — Goldfish
Author: **Dr David Sands**
Publisher: **Salamander Books Ltd., 129/137 York Way, London N7 9LQ**
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It Seems To Me ...

Andrew Werendel says: "A stitch in time ... is worth all the tea in China", or something like that ...

As an avid reader of **A&P**, I was intrigued by a small article entitled 'Brits care about their fish — Interpet' on the Newsdesk page (**A&P**, March 1996).

Whilst I don't wish to take quotes out of context, it seems to me that this title might be a wee bit ambiguous, because it goes on to say that over one million aquarium remedies were sold by Interpet last year and, whilst I do realise that this is a Sales 'hype', it strikes me that if you sell, as one supplier, over a million remedies we can't really care too much as a nation about our fish.

To think laterally about this, I remember the old adage 'An apple a day keeps the doctor away.'

In other words, prevention is better than cure — and this is where, as a nation, we fall down.



PHOTO: M.P. S.C. PETERSON

We will always need medicines for parasites and the like but many things like ulcers, for instance, would never occur if we were only to look after our aquariums in the proper way.

If we feed our fish correctly, then they get the correct nourishment, are strong and healthy and can ward off illness naturally, just we humans do. Hands up all

those who feed Platies, Mollies, Swordtails, Suckermouth Catfish on a meat diet instead of a vegetable diet — see what I mean? If we were more careful to match our fish with the many deliberately researched and prepared specialised foods designed especially for that particular species, many of our fish health problems would simply

not arise. Whilst my argument might seem to be highly simplistic, I think most hobbyists will appreciate the point I am trying to make.

A friend of mine in Germany found a badly-ulcerated fish and cured it using a product called Sera Fishtamin. How about that for a 'green' remedy! He simply put Fishtamin in the water and in three weeks the fish was completely healed — you see, no

chemicals needed, just vitamins — and the fish cured itself. (Fishtamin is purely a vitamin extract).

Hopefully, in the not so distant future, when I see an article headed by 'Brits care about their fish' which contains no mention of selling a million remedies, then I will really know that we do care for our fish, in the best possible way.



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Planning for Koi



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PLANNING

There is no denying the fact that Koi are stunningly-attractive fishes but, as in so many cases, you have to work hard at keeping them if they are to live up to your expectations of them. This means, above all else giving them the correct living conditions for them, not necessarily those which suit your whims and fancies in the pond design aspect.

Another fact to be considered is that Koi are a specialised subject; there are very few instances where all the criteria for keeping them correctly will be found in an existing pond set-up. Therefore Koi cannot, and should not, be regarded as an 'upgrade' or 'add-on' to your existing outdoor fishkeeping circumstances, along the same lines as you might upgrade a computer system or when buying a new car. Of course, the mere fact of getting into Koi will be



A Deutz Yamabuki Harfwake.
PHOTO: DAVID TWIGG

FOR KOI

seen as an upgrade in taste by those already enjoying the company of these magnificent fish who might query as to why you haven't done it earlier!

Planning for Koi involves many things (apart from the financial outlay); it goes without saying Koi will transform your garden — and probably your life — but help is available for the terminally Koi-struck. The real secret is to seek help before, and not after, you have made your acquaintance with Koi, and this is the real purpose behind this Supplement. We shall be giving you all the facts, figures and tips that you need to get going. Do study all the expert advice within these pages; we want you to get the best possible enjoyment from Koi, who are waiting to do their part too but only if you get it right — right from the start.

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PLANNING FOR KOI

THE GARDEN POND — THE KOI POND — The differences

ARE YOU THINKING OF KEEPING KOI?
DAVID TWIGG SUGGESTS YOU
GET TO KNOW WHAT'S IN STORE FOR YOU.

• PHOTOGRAPHS BY THE AUTHOR •



Have you been keeping a garden pond for many years with a collection of fish that maybe includes Koi? Are you considering the jump into the specialist field of Koi Keeping? Have you just come home from your local Water Garden Centre where you have seen some specimens of these lovely fish; or is it that you have friends in the Koi fraternity and are aware of the social aspects of the hobby that make it more appealing from the family point of view?

Whichever of these, or indeed any other reason you may have for building a Koi pond, you should be aware of the differences and what you may be letting yourself in for. Koi keeping is a



fascinating hobby that is breaking new ground almost daily.

So what are the differences between the Koi Pond and the ordinary garden pond? The three that most people are immediately aware of are depth of water, volume of water and sophisticated filtration systems. There are several other differences that I will try to cover in the remainder of the article but will

commence by looking at water depth.

Koi are quick to grow and one purchased at, say, four inches (100mm) in Spring may well be twice that size by Autumn given good food and water quality. As it grows it needs to exercise its body muscles and swim bladder in order to grow in proportion and water depth therefore becomes a necessity to achieve this. It is generally accepted that

redesigning it today (and had the available space), the overall dimensions I would opt for would be slightly longer and narrower, say 24x8ft. This may sound a lot but when the Koi grow to in excess of 24in long then this really is an important consideration.

So right away we see that size and volume of a pond is a major difference between the Koi pond and the 'average'



LEFT Excellent example of how a Koi pond and filter system is put together.

ABOVE The finished, newly established 16,000 gallon Koi pond that really is the centrepiece of this garden.

5ft (1.5m) is the minimum depth required to ensure proper exercise but this must of course be associated with a reasonable length of water for a 'swim'. Shallow ponds of 18in to 3ft with limited maximum swim length tend to produce 'pop' bellied Koi.

Given that depth is a major factor in the Koi pond then the length and breadth of the pond will determine its volume. These dimensions are down to the individual's taste and his/her garden. My own pond built in 1985 is 20x10ft internal measurement but if I were

garden pond but, even if you already have a pond that meets this specification can it become a Koi pond? Well, that depends on the existing filtration system used and how water is taken from the pond to that filter.

Koi have been developed over many years by extracting fish that exhibited some coloration and breeding from these. The colours we see today are far removed from the original parents and consequently the resultant stock is not as hardy as its Common Carp relative. The hardier varieties of Koi are those that are indeed closer to the original, such as Chagoi and Asagi, and basically any other single-coloured Koi. These are the fish that will survive reasonably well in a reduced quality environment. To keep the better quality Koi requires a higher quality of water and cleanliness and this comes from a properly designed



PLANNING FOR KOI *Pond Differences*

pond shape, its bottom contours and the filter system.

Most garden ponds, if they have one at all, pass the water through some form of 'box' filter that provides a home for the development of a colony of bacteria that will feed on the ammonia produced by the fish. The units are sold widely but they are generally insufficient to meet the needs of the Koi pond as it has developed to the present day.

So how does our Koi pond filter differ from the 'box' filters? In the Koi pond water is taken from one or more 'bottom drains' (another difference) to the filter system where it is processed in two or three ways. An early requirement that new Koi keepers become aware of is the need for clear water so that the Koi can be seen, even when swimming around the bottom. It is relatively easy to see a fish through 2ft of water even if it has fine particles floating in it. It is a different matter however to observe that same fish swimming at 5ft or more depth.

The removal of these free floating (suspended) solids is therefore a prime criteria. There are several ways of doing this. The one originally in vogue when I started in 1985 was the 'settlement chamber'. Water is taken from the bottom drain(s) to the settlement chamber where the flow is reduced (a number of ingenious ways have been devised) such that the solids drop to the floor of the chamber, from where they can be removed at a later time, thus allowing clear(er) water to proceed to the next stage of filtration.

A second, and now very popular way of



Get great pleasure from looking at a collection of fish in clean, clear water.

separating out these solids is by using a circular 'vortex' type bay. The water feeds the 'vortex' tangentially and low in the chamber and because the water is slowed at the side walls the solids settle to the bottom of the conical section from where they can be flushed away when convenient.

The water then passes through one or more chambers containing filter media on which bacteria grow and is finally returned to the pond ready to start the cycle again.

Turnover of water in the pond is a vital part of the quest for clarity. The faster the water is pumped through the system

the less is the chance of those suspended solids settling out onto the bottom of the pond, only to be re-released at a later time. It must be slowed however through the filter for proper biological cleaning to take place.

Another important difference then is the way and the place that the water is returned to the pond. Having the return in a position such that flow in the pond becomes 'broken' will encourage settlement inside the pond rather than the filter system. The location of this return, if it was to be, say, a waterfall, must be taken into account when designing the pond.

Aeration in the average garden pond is often non-existent other than in the summer months when the pump driving the waterfall is switched on. This sort of aeration is insufficient for Koi. A range of large air pumps are available for use in Koi ponds, or rather they are generally better placed in the filter system where they will be supplying extra oxygenation for the biological stages and minimising the likelihood of any anaerobic bacteria colonising there.

Many garden ponds have a collection of plants for the fish to swim around and under. Whilst there are Koi keepers who do manage to keep plants successfully, the majority will opt to remove them for any one or more of several reasons. The obvious one is that Koi are bred for their colour and need to be seen! Hiding under lily leaves does not help here; other reasons are however important. Koi are prone to ripping up plant life for food; the problem is that they don't



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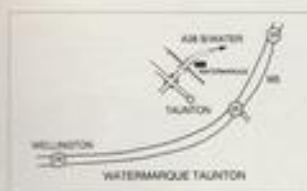


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consume it all and much of the debris ends up in the filter system, lying on the pond floor, or in the worst case blocking the pump. The strongest case probably against the water plants is that they can create almost stagnant areas of water that accumulate dead and rotting matter that, if allowed to build up, can create a dreadful water quality problem and subsequent Koi health problems.

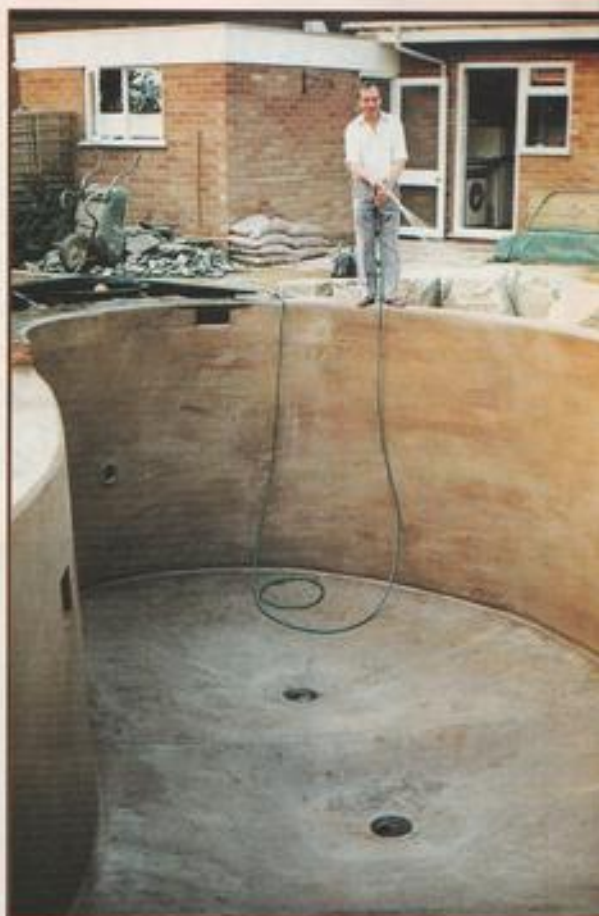
I recall that we used to clean out our first garden pond twice a year and we always remarked on the smell of the 'muck' that came out of the bottom. Koi keeping is as much the art of water keeping as anything and another of the differences is that it is necessary to keep the system (pond and filter) as clean as possible ALL of the time, even if this means a daily cleaning effort.

The subject of pond water quality is one that keeps Koi keepers in discussion for hours; and part of water quality is that bit that comes out of the tap and is used for 'top-up' purposes. It does differ from area to area and, because of this, many people are now purchasing domestic water purifiers through which they are filling and topping up their ponds so that the 'in-system' filtration has only to cope with fish pollution, and not the various additives that are currently found in the fresh tap-water supply.

Another difference that comes to mind as I write is that of heating the pond water. Generally this would not be considered for a garden pond other than

perhaps putting a floating heater in during the coldest part of the year to prevent a small area of the pond surface from freezing and thus facilitating gaseous exchange.

Koi ponds are not shut down for the winter months and water flow rates, although sometimes modified downwards at this time of year, are still quite high. This fact alone prevents (except in exceptional circumstances) the surface freezing. That aside, as mentioned earlier, Koi are more sensitive to water quality and temperature is one of the parameters within that definition. Many people are now designing gas or electrical heating systems into their ponds from the word 'go'. Others are adding them to existing systems to



ensure the health of their Koi all year round. The most dangerous time in a Koi keepers year is Spring and heaters are

ABOVE Koi ponds get bigger and bigger! Bottom drains, surface skimmer and midwater return can be clearly seen.

LEFT Get it done right first time round! My pond, built in 1985, did not incorporate an efficient surface skimmer. When I upgraded my pump the increased turbulence created by the waterfall produced this protein scum.

PLANNING FOR KOI *Pond Differences*

installed to minimise if not remove the potential for problems at this time.

An extra-ordinary amount of specialised equipment is used by the Koi keeper either for use in, or when maintaining, the pond. "Bottom drains", "swirl" chambers, settling bays, filter media, air pumps, UV filters and skimmers to mention just a few items. Special handling nets to suit size of fish, floating baskets for temporary viewing and sizing of Koi, bowls (large and small) for long term viewing and medication, etc. and medical boxes containing everything except the kitchen sink, to mention just a few more.

The keeping of a Koi pond then is relatively Hi-Tech and, unlike the ordinary garden pond with its Spring and Autumn maintenance, is an all year round task. Keeping fish is no longer a summer pastime, it is an all year round pleasure. In order to increase enjoyment levels many Koi keepers cover their ponds during the winter months; others heat the water with electric heaters or gas boilers. Use of heaters means that the health of ones Koi is improved and the risk of infection from opportunist sources is greatly reduced. Some winter covers, mine included, are designed so that the Koi can be easily attended to should the need arise. Covers vary in design from "home made" frames with greenhouse shading stretched across them, through polytunnels, to sophisticated

purpose built fish houses.

If a Koi pond is your desire then before putting spade to ground please read as much as you can about it first. Recent editions of **AGP** have contained several articles which go into the pro's and con's of pond design and construction and are recommended reading if you are intent upon building a specialist Koi pond. One of the most comprehensive books produced in recent times is 'The Interpret Encyclopaedia of Koi', published by Salamander with ISBN number 0 86101 405 7 which covers almost all aspects of Koi keeping that could concern the

newcomer to the hobby.

The most recent publication to come on the market is 'Koi Kichi', written by Peter Waddington. This is an excellent 'read' and contains a wealth of information on all aspects of the Koi hobby both here at home as well as in Japan. Peter's book, ISBN number 0 9526381 0 X, is available from him at Infiltration, Unit 13, Millingford Industrial Estate, Golborne, Warrington, Cheshire, WA3 3QE.

Clubs are a very useful source of information; most have extensive libraries from which you can borrow books and

many of them in the UK are to be found in my Koi Calendar published in **AGP** each month. Having joined a club you will find that members are eager to tell and show you how they designed and developed their pond, and some may even tell you of their mistakes! Koi keeping can have its disappointments as well as rewards.

The British Koi Keepers Society is the largest body of Koi keepers in the UK; it is comprised of "Sections" at varying locations around the country. You will find more details of the BKKS elsewhere in this Supplement. There are several other independent Koi "Clubs" in the UK and these operate along similar lines to the BKKS Sections. If you are not a member yet of any of these bodies then I would suggest that you at least get in touch with one or other of them because there is an awful lot of knowledge out there just waiting to be tapped.



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PLANNING FOR KOI

KOI CULTURE — A General Overview

The sight of fishes in close proximity almost never fails to stimulate in people of all ages a remarkable tranquillity that seems to concentrate the mind and lift the spirit. Ever noticed for instance how the darkened environment of a public aquarium can reduce carefree holidaymakers to silence or to communicating only in hushed whispers? Or how large groups will stand almost entranced as they gaze upon a shoal of dazzling Koi majestically cruising through the deep waters of a crystal clear pool.

That fishes can produce a calming effect is indisputable, so it is perhaps little wonder that in these days of evermore stressful lifestyles an increasing number of people are discovering the joys, and therapeutic benefits, of keeping them.

One aspect of the hobby that has enjoyed a surge of popularity in recent years is the ornamental garden pool or



Sanke Koi in a clear water pond.

PHOTO: DAVID THOMAS

pond, a pursuit that has kept pace with the corresponding increased interest in the garden generally. Without doubt a pool feature can provide a completely new and exciting dimension to any garden setting and will effectively satisfy and combine the interests and ambitions of both fish fancier and garden lover alike.

After a difficult day, what could be more relaxing than sitting beside a tastefully-designed pool in ones own environment listening to the gentle sounds of moving water and watching the graceful activities of the colourful inhabitants?

Although goldfish have always been, and remain, the most popular aquatic livestock for the outdoor fishkeeper, more and more people are now cultivating an interest in that undisputed king of

coldwater ornamental fishes, Koi. This is perfectly understandable for these magnificent creatures, with their huge diversity of dazzling colours and patterns, are quite unsurpassed in their

ROY OSMINT EXPLAINS ...

PLANNING FOR KOI

Koi Culture

beauty and elegance.

For most people, the initial spark of inspiration will probably emerge as a consequence of observing a large shoal in the ideal circumstances of a dealer's custom-built display pool where they will be seen as a veritable kaleidoscope of colour in gin-clear water.

This, then, is the picture that the prospective Koi keeper will generally have in mind to create in his or her own environment, albeit perhaps on a somewhat smaller scale! They are certainly the conditions that need to be aimed for if these lovely fishes are to be seen to best advantage, and their great beauty fully appreciated.

There are, however, quite obviously many things to consider (and much planning to undertake) before the mental concept can become reality. The following information is intended as a general overview to help those contemplating such a move to understand more fully what is likely to be involved. It is not a specific instructional guide on any particular aspect.

To gain a better appreciation of Koi it is desirable to know something about the nature of the fish and its origins. Nishikigoi, or Koi, are descended from Common Carp (*Cyprinus carpio*) which have a wide distribution in natural freshwater across many parts of the world. But it was in the 17th century in a remote rice growing region of Japan known as Niigata Prefecture, where the farmers bred and maintained carp as a food source, that the prospect of producing fish of great beauty first became apparent.

It was observed



ABOVE A three stage water purifier with used sediment filter on display.

BELOW The size of this Koi, under treatment, can be clearly seen.

PHOTOGRAPHS BY DAVID TWICK



that from time to time the carp would produce young which, instead of being the usual brownish/grey colour, would display patches of other pigments and pattern differences. By growing these mutants to sexual maturity and selectively breeding from them it was found that fish of bright colouration could be produced, and an opportunity was realized.

As an ever-increasing number of these humble farmers became interested in breeding Nishikigoi (brocaded, or coloured, carp) a greater quantity of colour mutations were produced and by careful selection over many generations certain recognized Koi varieties became established.

Throughout the 19th century many new colour lines were generated but even by the turn of the 20th century Koi were not really known outside Japan. It was not until after World War 2 that countries in the West started to show interest and the whole business commenced to accelerate.

Koi are now bred commercially in many parts of the world including Israel, USA, Germany and the UK. But although all of these produce fine fish they are still in the

main unable to match the top Japanese breeders who reign supreme when it comes to absolute finest quality.

Careful planning for the Koi pool is of paramount importance and this cannot be over emphasized will later prove extremely costly in every respect. The first things to consider are the size of the intended pool in relation to the overall dimensions of your garden and how much you can afford to spend on

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Koi Culture

the total project.

In purely practical terms the larger the pool the better, this will allow for both the fish and your interest to grow, a minimum size of 10x5ft is often recommended. A pool in this respect is similar to that other garden feature, the greenhouse, in that it is always better to go for one somewhat larger than you initially feel you require — later on, you will be glad you did.

The depth of the pool is also of vital importance, most standard fish ponds are not deep enough for Koi and 3ft 6in should be considered the very minimum, although the deeper the better. This will help ensure that the lower regions remain above freezing during winter and stay at a relatively constant cool in summer.

Other considerations regarding the pool itself are the shape, whether formal or informal, its location, the material from which it is to be constructed and whether it will be totally or partially above ground level or completely sunk.

The choice of formal or informal pool design is clearly a personal one based upon preference and the overall effect that it is desired to create. Many modern Koi enthusiasts seem to favour those that follow geometric lines but there are no hard and fast rules.

Siting of the pool will again depend largely on circumstances but it should

ideally be as close to the house as possible for practical reasons. Keep away from overhanging trees or shrubs and preferably select a position that enjoys shade for some part of the day. Do not overlook the need to incorporate room in the site area for a filter unit, this can later be camouflaged by general landscaping.

The material probably best suited for constructing a Koi pool is Butyl rubber as it is the most durable of the synthetic liners, can be fashioned to virtually any shape and has a long life expectancy. Some precast or moulded pools are also satisfactory although the majority are not deep enough for Koi. They are also clearly restrictive regarding shapes.

In many respects a pool constructed at least in part above ground level makes for easier servicing and viewing of the fish. But, equally, a fully sunken one integrated into a tasteful landscape has much to commend it. At the end of the day the whole project is likely to be a compromise of many factors, not the least of which will be budget.

To ensure that optimal water quality and clarity are always maintained in the Koi pool, an effective filtration system is required. This must achieve two basic functions — removal of suspended particles in the water and, more importantly, to assist the natural breakdown of ammonia-based waste

created by the fish.

In the natural habitats of rivers, lakes and pools fish are not constantly living in the same water, it is continually on the move by flowing, soaking through the earth and by evaporation, it is then replenished by rainfall. The fish are also relatively few in number in relation to the size of the body of water in which they exist and so nature takes good care of water quality. In the confines of an ornamental Koi pool where stocking levels will be artificially high, and these other natural processes cannot function in the same way, the filter system helps redress the balance.

The action by which water is cleaned and purified can be classified in three ways — biological, mechanical and chemical — and all of these can be used in filter systems.

Biological filtration is the most important process in any pond as it is this that removes toxic ammonia from the water and converts it to less harmful nitrites and nitrates. This is achieved by vast colonies of bacteria maintained in the filter bed and is accomplished through the nitrogen cycle.

The removal of suspended particulate debris from the Koi pool by mechanical filtration is also extremely important, this includes uneaten food, fish waste and dead organisms etc. If left to build up this will promote the development of



The ideal place to relax on a spring afternoon.

PHOTO: DAVID TAYLOR

various single cell microscopic protozoans which are the disease agents that most affect Koi.

In chemical filtration, substances like activated carbon and zeolites are used to convert organic and inorganic compounds into inert elements. Due to the porous nature of these filter media they are able to effectively act both mechanically and chemically.

The choice and size of filtration system required will ultimately be determined by the dimensions of the pool and thus the quantity of water to be cleaned, anticipated stocking levels should also be taken into account. Many varieties of multi-chambered units capable of incorporating the filter methods described are readily available. It must, however, all be carefully considered and calculated and it is here that the experience and guidance of an expert is indispensable. Any reputable dealer specializing in this branch of fishkeeping will be happy to discuss and advise on this, or any other aspect of the project.

Eventually after much planning and hard work the pool will be constructed and thoughts can at last turn to the long awaited prospect of selecting and introducing the fish. This is the exciting part but it must be approached in a

disciplined fashion.

At this stage the most important thing is to get the biological filter operating but it takes time for the bacteria colonies to become established. Some dealers can provide mature filter media ready colonized to enable the whole thing to be speeded up. Until waste is produced in the pool the filter will have nothing to work on so a few fish can now be introduced to start this process. Again some dealers will offer help in this respect by operating a scheme where cheaper fish can be purchased to get the system up and running and then part exchanged for superior ones once it is established. During this phase frequent checks should be made using an ammonia testing kit to ensure that things are progressing satisfactorily. The ammonia content must build to a certain level before the bacteria in the filter can start to break it down into nitrite. When subsequent readings indicate that ammonia is at a constant safe level, thoughts can turn to acquiring permanent stock.

Do not, however, suddenly overburden the system by introducing large numbers of fish all at once; progress very gradually.

The cost of Koi varies greatly but

between the extremes of very cheap and extraordinarily high can be found a range of fish at every possible price. Three principal factors influence what you will pay — size, origin and colour. The larger the fish, the longer it has been maintained and the more apparent will be its quality. In the main Koi of Japanese origin are more expensive than those bred in other parts of the world due predominantly to the breeding line. The better the colour and pattern distribution of the fish the greater its cost, the number of colours it carries is also a significant factor.

Always purchase Koi from a reputable source bearing in mind that the essential care needed at every stage of the fish's development, together with its transportation and proper quarantine requirements, all have to be reflected in the price. If it is too cheap for its quality the probability is that some of these elements may have been neglected and serious problems could later result.

Constructing, stocking and running a custom built Koi pool is a costly undertaking requiring much thought and planning, but the long term interest and pleasure that can be derived from keeping these 'living jewels' in ideal circumstances is quite beyond measure.

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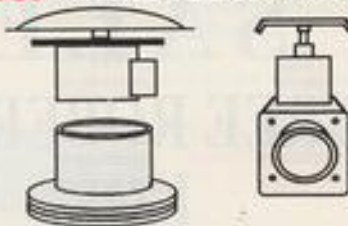
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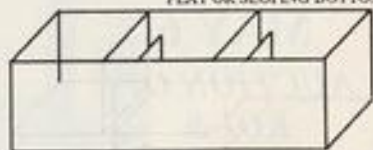
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PLANNING FOR KOI

FILTRATION SYSTEMS FOR KOI

If there is one aspect of Koi-keeping guaranteed to cause discussion, argument (or even outright war) it is filtration! Ask 10 seasoned Koi-keepers "What's the best system?" and you'll more than likely get 10 different answers! So what system should someone about to embark on this addictive area of the hobby choose? At this stage, I will have to assume that the building of your new pond and filter system is a progression from keeping the humble, much-maligned but very hardy Goldfish. BE WARNED, the Goldfish is a very forgiving creature: it will live (or should I say 'exist') in conditions very short of 'good' and will survive many forms of abuse — untreated tap water, poor water quality, neglect — and many, many more. Koi, however, are much less tolerant of these shortcomings and should never be subjected to them.

The 'methods' of filtering Koi ponds basically fall into three categories:

1. In-pond undergravel.
2. Remote (box) type external.
3. Modular multi-chamber external.

All of these systems, in their many varied shapes and sizes, have been used for many years. You will often find that certain areas of the country will favour one system over any of the others: the reasons for this is simple — whoever the

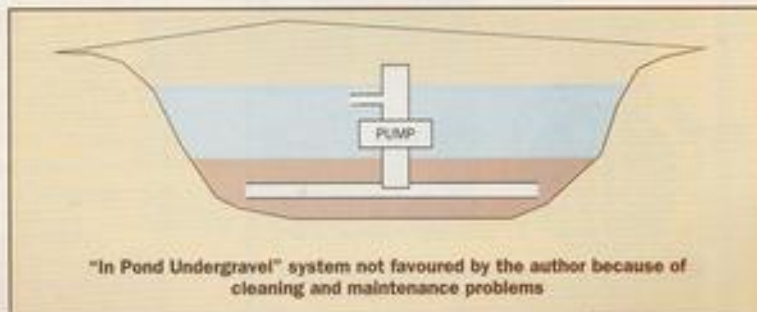
RUSS BAKER, OF PARK GARDEN KOI, BITES THE BULLET AND EXPOUNDS THE VARIOUS ASPECTS OF THIS VERY DEBATABLE SUBJECT.

• ILLUSTRATIONS BY THE AUTHOR •

'pioneer' in any given area is, the rest will follow. Call it evolution if you like, the word gets round through local Societies and soon become the

'standard.'

Like most things in life, it's a 'horses for courses' dilemma; before the spade touches the ground much thought and planning (hopefully) will have been done in order to maximise the benefits and minimise the shortfalls. Eminent writers are often heard to say (with years of hindsight behind them) "You must have one of these, four of those etc etc" which is great if you've just won the lottery but not so appealing if you haven't! Telling this to 100 people about to upgrade to a Koi system may well result in 95 taking up train-spotting or golf instead! Any planning must obviously revolve round the available garden space (and the available cash) when trying to achieve the right system for your circumstances.



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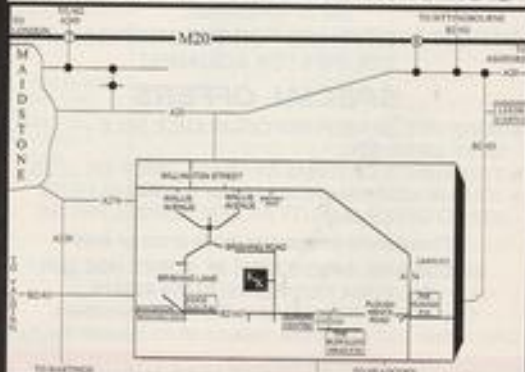
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pond water — what the bacteria are used to, dechlorinated before use during toppings up, and at the same temperature. All these things help to minimise damage to the 'bio-mass' within the filter media. Use a gentle flow of pond water from the pond's pump (how about fitting a 'T' piece with tap in the supply line just for this purpose?) to rinse off the worst of the accumulated 'crud' from the removed sponges and rinse out the now empty box as well. Do this fairly quickly to avoid the media drying out — if the phone rings, let it ring, your filter media is more important!

Most of the previously-mentioned criticism relating to box type external filters is directed at their physical size, or rather lack of it. Taking a dubious analogy, it's not the size, it's what it can do that's important. Filling it with pea-gravel won't be as efficient as filling it with top quality media such as Spring-Flow, Floror, 'hair-rollers', open-celled foam (NOT FURNITURE FOAM) or Japanese matting. To clarify things once and for all, the actual purpose of a biological filter is to provide a home for beneficial nitrifying bacteria (*Nitrosomonas*, *Nitrobacter*) to nullify the toxic effect of ammonia-based compounds released by the fish by converting them firstly into nitrite and then to nitrate. This is all you should be asking of the filter. "But what about crystal-clear water?" you will be saying. One by-product from the filter, as we have seen, is nitrate; this is a nutrient and, together with natural light, makes excellent food for algae, recognised by

us all as green water. However, if the balance in the pond is correct then any clear water should be regarded as a bonus and not a filtration right!

How do we get rid of green water safely? I am not a fan of algicides (weedkillers by another name) so, if you have room, build a vegetable filter (at least one-third the size of the pond and 12in deep) linked to it by a small water-flow. Plant it with aquatic plants (Watercress is good) so thickly you could walk across it without getting your feet wet and this will consume all filter-generated nitrate and starve green water and blanketweed out of existence. Or, as is more usual, fit a correctly-sized Ultra-violet Clarifier to your system but do remember that UVCs are clarifiers, not filters, and must only be used to complement a filter system not used instead!

SYSTEM 3

For ponds above 1,000 gallons, where space is not a problem, and for those of 5,000 gallons and above, it might be surmised that these larger ponds are probably Mark 2 or 3 for fishkeepers already well-experienced, needing bigger and better things.

There is no substitute for the many variants on the modular, 'up and over' multi-chamber systems: usually gravity fed, the cleaned water will be pumped back into the pond via a re-oxygenating device (necessary because the bacteria will have used oxygen during nitrification) such as a venturi, waterfall or cascade. If ground conditions prevent

excavation, these multi-chambered filters can be pump-fed with a gravity return to the pond if necessary.

Assuming a 5,000 gallon pond, a gravity-fed filter should be connected by a 4in (minimum) diameter pipe from a bottom drain, or drains (4in each) or from a mid-water feed. The trend these days is to feed the first chamber from a bottom drain which, although preferable, is also more likely than a mid-water feed to clog with blanketweed and consequently be more difficult to unblock — of course, you could always have both with slide-valves so that variations of supply can be used.

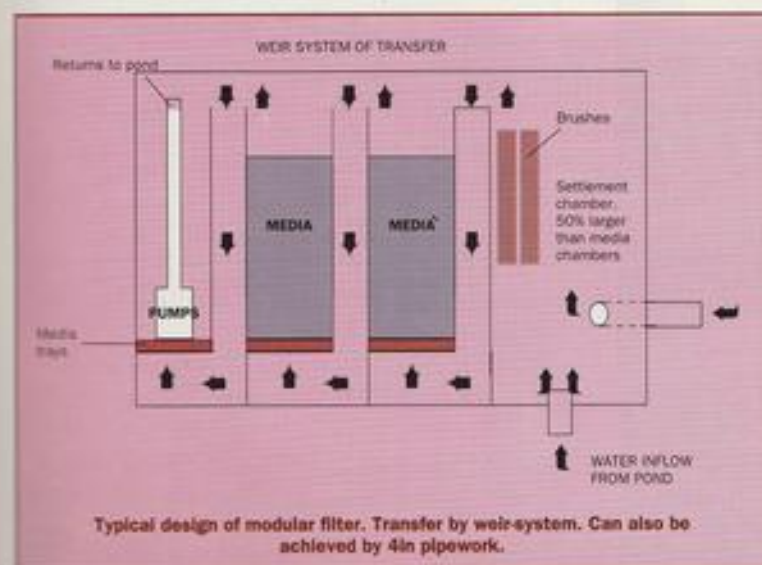
If finances permit, I would suggest that the first chamber be of the 'vortex' design: the incoming water enters at a tangent with the result that the spinning action separates the solid material down the middle to a 2in drain-to-waste fitting from where it can be flushed away to the sewer or soakaway. The remaining liquid is then passed on to the biological section for further purification, so there is much less 'mechanical' maintenance required on the rest of the system. My own preference for multi-chambers, especially for larger ponds, is for an 'up-flow' design where water rises up through the filter media to overflow via a weir system, or more 4in pipework, to the bottom of the next chamber (see diagram).

If a vortex chamber cannot be accommodated then the mechanical 'settling' chamber should be used and fed from the pump in the same way; the only difference here is that this settling chamber should be at least 50% larger than the subsequent chamber to allow the inflowing water to 'slow down', 'expand' and therefore let the solids sink down to the bottom for future drain-off or vacuuming out.

How many chambers, and how big should they be? If you are buying 'off the shelf', study the manufacturer's recommendations, ask your dealer's advice and then buy then next size up! It is impossible to over-filter a Koi pond but very easy to under filter it! We are talking about serious Koi-keeping here so don't stint on filtration.

If you want to build your own filter, do cost everything out before you start — parts, materials and your time — maybe that ready-made one wasn't so expensive after all. As a guide, allow 10 square feet of biological area of your filter for every 1,000 gallons of water: some will say that is over the top but I don't think so, and big is beautiful isn't it?

In the mechanical settling chamber



PLANNING FOR KOI *Filtration Systems*

(usually the first chamber) guard the transfer of 'settled' water by rows of brushes but mount these well clear of the bottom so that hoovering out the gunge is made easy. My brushes are 12in long, in six rows, in a 30in deep chamber; by having them sticking above the water a little way there is usually 18in of clearance beneath them. At least two (depending on size), preferably three or four biological chambers should follow: the choice of filter media is wide but I go for the 'lighter' materials as this makes them easier to clean, they don't need extra strong media trays to support them and they provide much more bacteria-colonising surface area than any of the 'gravel' types.

Biological chambers benefit greatly from a supply of diffused air, especially during the summer months. Three or four 4in airstones placed under the media so as to percolate up through it will greatly improve performance and bacterial stocking levels. A substantial airpump will be required, such as a Highblow 40 or similar.

Pumping the installed system is another subject open to debate and argument. My own particular conclusions (arrived at after doing things the wrong way at least once), are twofold: firstly, use more than one pump at all times. Secondly, arrange the water flow to turn the system over every two hours. Now for the reasons.

You can bet that the pump will break down (they all do eventually) at the most inconvenient time — 2am on a hot thundery summer night is usually favourite. By breakfast time the Koi will have given up looking for oxygen in the water and may well be seeking it on the lawn in their panic. Using two pumps means that at least one will struggle on in the meantime offering some kind of relief.

The relative slowness of the water flow will allow your filter to work at its best. If you have a UVC (you might as well fit it at the outset, you'll end up doing it eventually) divert half of your water flow through it to ensure water clarity — again the slow rate will give best results.

CONCLUSION

Please do check water quality parameters regularly — weekly on established systems, more often with new installations — as this monster that you have created will stab you in the back during the early weeks if you're not watchful.

With even slight shows of ammonia and nitrite, stop feeding and change water as necessary (little and often is preferable) until these killers are tamed by your maturing filter. There is no substitute for attention to detail and constant vigilance is required.

Koi filtration is a massive subject and we have only skimmed the surface (no pun intended) in this article.

I hope you will have gleaned something to you and your fishes advantage from it. Still more sophisticated forms of filtration, such as trickle filters, are in use together with even more variants — who knows maybe one day I'll write a book about it? In the meantime, happy Koi-keeping.

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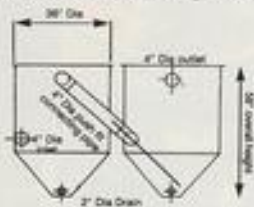
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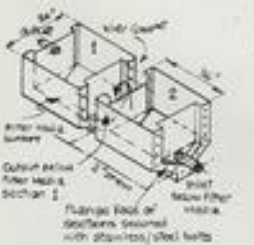
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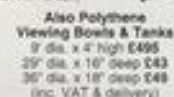
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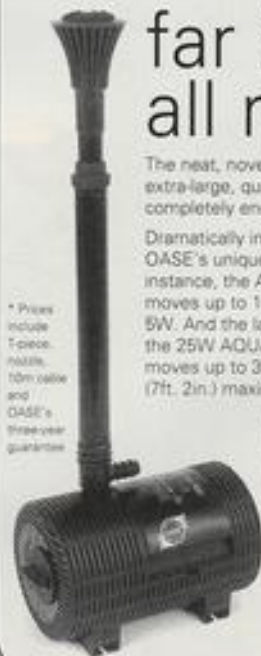
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PLANNING FOR KOI

SPRING IS HERE



This is the average quality of Koi from your own Koi's spawning.

Some Koi keepers talk about "breeding their Koi" as if allowing the fish to do what comes most naturally to them is a major accomplishment, that not everybody can manage without some miraculous feat of prowess in their own Koi keeping skills? Of course, nothing could be further from the truth, and without any interference on the behalf of the Koi keeper, provided that they are healthy, and are kept in good water, the Koi will breed by themselves—that's the easy bit. What the Koi keeper should have said was "My Koi bred, and I managed to raise the fry from them." In truth also, everyone with a bit of knowledge and enthusiasm, is capable of raising fry, and it is time that the mystique and shrouds of mystery

BARRY GOODWIN DETECTS A TWINKLE IN THE YOUNG KOI'S EYE AND PLAYS A WATCHFUL CHAPERONE.

● PHOTOGRAPHS BY THE AUTHOR ●

which always seem to be associated with this very natural process were wafted away.

BREEDING TIME

Late springtime is when your Koi will breed, although some do it earlier and

some do it later, and this is always a very violent process. If you do not have a pond that is correctly designed to be free of internal and peripheral protuberances, spawning can cause serious damage to females that are normally pursued by several of the males in the pond. This is therefore a time when you must brush up on your topical treatment skills, otherwise you could lose the odd Koi to subsequent infection from any wounds.

THE CHASE BEGINS

You will know when the spawning process is about to begin, as the females, who will now be fat and heavy with spawn, will be half-heartedly chased by a bunch of males for a few

PLANNING FOR KOI

Spring is Here

minutes, and then they will seem to lose interest. This procedure is repeated more and more often until it becomes a constant and spirited chase about the pond. Koi can actually be induced into spawning at this time of year after a partial water change in the pond, and also after a strong period of rain. If you buy any new Koi at this time of year, and they happen to be females, the introduction into new water can also trigger the spawning sequence, so you must be wary of this as it will not bode well for the survival of that Koi.

You see in many books that ponds have spawning "nets" on the bottom where the eggs are deposited, but in my own experience, the eggs are normally deposited in blanket weed or spawning ropes at the edges of the pond. The males will drive a female against a hard surface, literally squashing her to expel the eggs which are then fertilised by a number of the males. The excitement during spawning is so intense, that if you have larger fish, water is literally thrown out of the pond, soaking patios and surrounds etc, and I have had eggs deposited on my windows at the rear of the house, which are six feet away from the pond! Books will also tell you that your Koi spawning will be over in a couple of hours, but I had a spawning one year that went on all day and throughout the night, and it lasted a little over 24 hours in total. Of the five females that were involved, all were totally exhausted, and I went on to lose one of them.

PROTECT THE EGGS

That is the easy bit... your fish have spawned, now it is up to you to see that the eggs are afforded some sort of protection, as your Koi, being of course very caring parents, will then commence to eat the lot! At this point it is better if you have planned to keep the spawn in advance, and if you have a quarantine system that is unemployed at this time (you can plan it so,) this can be adapted to take the eggs, to nurture them and to grow on the eventual fry. If you have a bottom drain in the quarantine tank, then you must fit some sort of sponge cover to this to prevent the minute fry from getting through into the filter. Any water pipes out of the tank must also be so treated.

Better than allowing your fish to simply spawn in the blanket weed, it will

be easier if you can provide some sort of spawning rope for them to use, and there are any number of these on the market. It is even possible to make a very good spawning rope out of a nylon car towrope, and one manufacturer produces a sort of "grass skirt" design that is simply turned inside out once the Koi have spawned on the outer fronds.

Fibre options such as these are more satisfactory than using blanket weed, as this tends to rot down in time, polluting the water, and it is much easier to simply lift a spawning rope out of the pond for transfer. The same pollution problem happens with *legum* branches, and these can be worse as when they rot down they release turpentine into the water, which wipes out any fry you have managed to hatch.

At the point of transferring the eggs on the spawning rope from the pond to the quarantine tank, you will have to make a decision as to how many you really want to hatch and rear, as "culling" at a later date is not always easy if it is just to reduce numbers, and if you have got a wife like mine, she won't let you cull any! Taking a very reasonable view of it, I would say that you should keep no more than 500 or so eggs, and leave the rest for your Koi to eat, this is far easier than attempting to surmount the logistical problems of trying to raise 250,000+ baby Koi in your quarantine tank! Don't worry about missing out on a Grand Champion or two by doing it this way, the Koi you produce just won't be in this class at all, but you can of course dream. You can also give some eggs to your friends for them to try their hands at hatching and rearing, by which gesture you could rise to the elevated status of "Koi breeder" in their eyes! You will read that you should sterilise the eggs in a very weak solution of methylene blue at this point, but I never have, and have never suffered any problems. Not all of the eggs will be viable however, as some will be unfertilised and develop fungus after a couple of days, and then you should spend a bit of time going round with a pair of tweezers, or a teaspoon removing these as the fungus could damage the good eggs, and you don't want this to happen.

WATCH THEM DEVELOP

Provided that you took the precaution of making sure that pond and vat temperatures were the same at the time

of the transfer of the eggs from one to the other, the young fry should hatch in a few days, but until then you will have an interesting time watching the eggs grow. You will be able to see the tiny Koi forming inside the transparent shell, from the time when you first see the tiny black dots of the eyes right through to when you can see (with a magnifying glass) the whole form of the hatching Koi inside the shell.

One day you will come out to look, and all the viable eggs will have disappeared... they have of course hatched and you have had success. Hard as you may look however, you may not yet see them yet as they are masters of subterfuge, and will be expertly hiding, living off their egg sacs, and finishing off their development. Soon you will see minute darting forms though, as within days they consume the egg sacs, and begin to hunt avidly further afield for food.

FEEDING THE FRY

It is best if the fry are fed live food at this point, and infusoria in abundance is very useful for this, but not always readily available in the quantities needed to feed 500 or so hungry fry, (aren't you glad that you didn't keep the whole 250,000 now!) and in this case you will have to improvise. *Daphnia* could prove to be too large at this point, and



once again there is the availability problem.

You can do several things here, you can take blanket weed out of the pond and place it in the vat near your fry. This will be rich in micro-organisms of the right sort to feed your baby Koi, but the weed will have to be changed over at regular intervals. Once it has been in with the baby Koi, they will inhabit it of course, and then I defy you to wheedle them out! The best option is to put your spawning rope into the pond a couple of weeks before you expect your fish to spawn, and then it will grow its own population of food for your fry to consume after they have hatched.

After a few more days the fry should be about 1/16" long, and then you can go on to an easier method of feeding, and that is with hard-boiled egg yolk. Just hard boil an egg in the usual manner, peel it, and separate the yolk, then break it into about six pieces and store these in the refrigerator. Take one piece of egg yolk and wrap it in a piece of an old pair of ladies tights, (at least tell your wife that they were old ones) where it can be waved about gently in the water to break up

into a fine powder amongst the fry for them to feed on. You will need to do this several times a day. You can also use the "Liquifry" type of food instead with some good results.

PREDATION

The young Koi will quickly get bigger, and as is usual, some will grow much faster than the others. If you do not take care, these will predate on the smaller fry, and soon you could be down to a couple of dozen in total and be wondering where all the others went to!

It will be best to separate these larger fry into another tank if you have one, or even to cull them, as the ones that grow too fast usually have some form of genetic disorder that will show in later weeks. It is important that the vat is well lit, preferably by daylight, or a good selection of tubes that will simulate daylight like a Trulite, a Northlite/Grolux combination, or a Triton. They fry will

without water of course, and whip them to a light powder, when they can be fed to the fry.

When they are even bigger, you can feed them on "Zooplankton" or "Aquadaphnia" when they should really start to grow for you. If you have the facilities, then live *Daphnia* is even better, and it is every breeder's secret ambition to keep his young fry swimming in a sea of such food.

Correct feeding at such an early stage is very important, as if you get it wrong at this point, the problems may not show up until later life, and minor deformities such as curled gill plates, not noticeable on a 1/16" Koi will manifest themselves.

CULLING

When they reach the size of about 1in, then you really should have a good look at them, for you will then be able to easily pick out the malformed fish, which

unfortunately will have to be disposed of, if you can't face culling them yourself, just put them in the pond where your larger Koi will do the job for you!

You must also take care at this point that the water does not become polluted, as you will always be overfeeding in such a situation, and

ABOVE This method of hatching and rearing was unsuccessful as the Koi in the pond could suck the fry through the fine mesh of the net, and one Koi jumped into it and finished off the rest!

LEFT Feeding the fry with egg yolk as described in the text.

not develop correctly, and could even die without light.

As they get even bigger, say 1/2in upwards, then you can feed them on commercial Fry Food, or put some of your normal pellets in a liquidiser,

may well get a film of uneaten food on the bottom of the tank, or it may clog your filter sponges. The vat must therefore be carefully hoovered out at intervals, and you must be diligent about water changing, but remember ... no chlorinated water, purify it or treat it with a dechlorinator, and temperature equalisation of the incoming water at all times.

You will read all sorts of advice about culling "techniques", but unless you are some kind of expert Japanese guru, you will not have the "eye" for what to keep and what to throw away. All I can tell you is that I kept them all and what I initially thought were "good" turned out



PLANNING FOR KOI

Spring is Here

to be rubbish, and what I thought were "rubbish" turned out to be reasonably fine Koi. In other words, of all the light coloured fish, I got one reasonable

Kohaku, and from all the black, uninspiring fish, I got Showas, Sankes, a Shibusu, an Asagi, a Kujaku, and many more. None of them were what you

might call "show stoppers," but I still have some in my pond today, and one of them (the Kujaku) has won an award for 2nd best Hikarimono, size 1, in a club competition. It is when this happens that you feel that you have been really successful and can rightly be proud that you have finally "bred your Koi".



Every breeder's dream! Baby Koi swimming in a sea of daphnia.

IF YOU HAVE NO SUCCESS

You may not always be successful in what you do, caring for your small Koi, as if (or when) you really get into it you will find that there are so many things that can go wrong that are just not your fault. For instance there are certain combinations of scalation on Koi which when mated together will produce 100% fatalities amongst the fry, and unless you knew this you would think it was your own fault and possibly feel mortified. There are other combinations that will produce 50% mortality, and so on. The moral is, as with most other things that you may not be successful with at the first attempt ... try, try, and try again!

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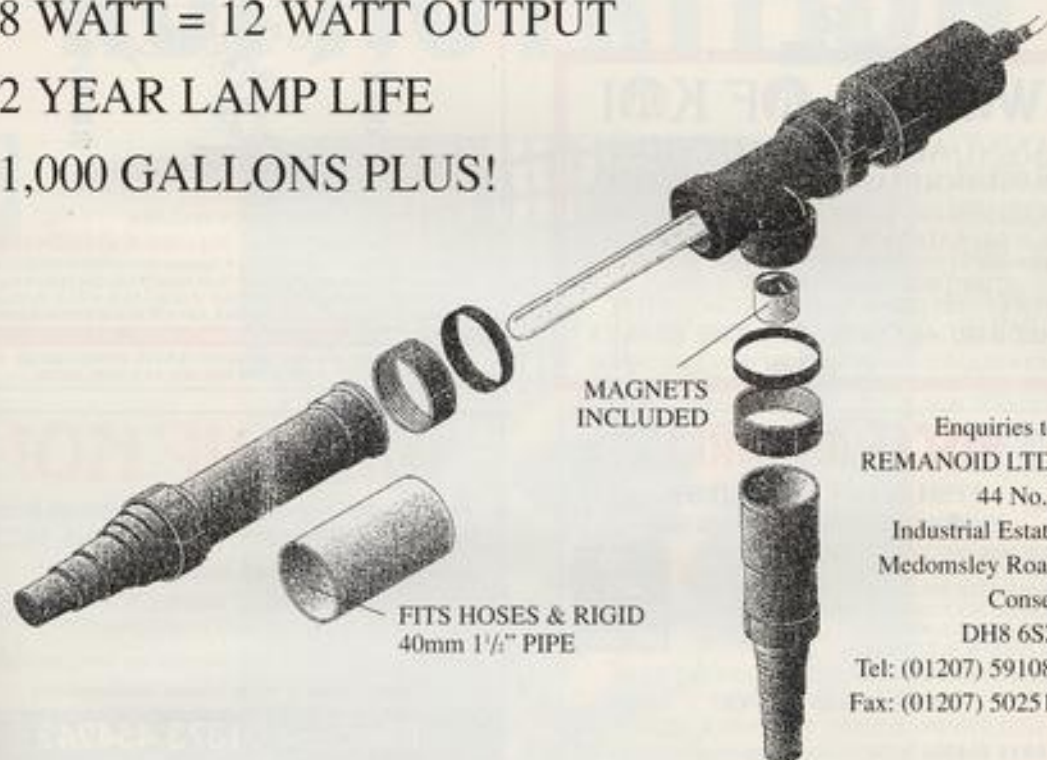
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PLANNING FOR KOI

KOI NUTRITION

For most Koi keepers, exactly what is in the food that they feed to their fish is of little interest. Instead they rely on advertising claims, trial and error or perhaps fellow Koi keepers' recommendations in order to select a suitable diet. The choice of food is important. A good quality diet will not only provide the fish with all of the nutrients it requires, but will also be readily consumed — and easily digested — resulting in less fish waste and less pond maintenance.

A NUTRITIONALLY- BALANCED DIET

Koi, like most animals, require a nutritionally-balanced diet in order to grow and be in their best possible condition. By this we mean that they require the correct amounts (and quality) of proteins, carbohydrates, fats, minerals and vitamins. The relative amounts of each of these nutrients required in the diet varies depending on water temperature, Koi size, maturity, etc. Before considering how the requirements change it will be useful to examine Table



DAVID POOL,
TETRA INFORMATION
CENTRE, PROVIDES
FOOD FOR THOUGHT
ON KOI FEEDING.

● PHOTOGRAPHS BY THE
AUTHOR ●

Handfeeding Koi
allows you to check
them over for
problems.

1 which shows how these nutrients are used in the body of a Koi.

All of these nutrients are required throughout the life of the Koi, but in greatly differing proportions. The protein

requirements are perhaps the best example. Fry and young fish grow very rapidly in their first few years, in some instances increasing in length by 10-20cm each year.

PLANNING FOR KOI

Koi Nutrition

Proteins (or more correctly, amino acids), are used for tissue formation and, because they cannot be stored in the body, the Koi fry and young need to obtain large quantities on a regular basis. In the wild, young carp feed largely on zooplankton (eg Daphnia and Copepods) followed by benthic invertebrates (eg Bloodworms and

complicated by seasonal variations and the reproductive cycle. In the winter, when water temperatures in the Koi pond fall below 15°C, the Koi will only grow very slowly (if at all) and should be given a relatively low protein food. Above 15°C the Koi will grow rapidly and should be given a higher protein diet. At these higher temperatures even mature

Koi, which are not growing rapidly will require a high protein diet to form reproductive tissues or to repair damaged tissues.

WHAT TO FEED

There are a number of commercially available foods which have been specially formulated for Koi. These foods vary considerably in terms of their quality and the nutrients contained in them. It is important to

choose a proven make of food to ensure that your fish



LEFT In the wild, snails are eagerly devoured by Koi.

BELOW "Feed me!"



Freshwater Shrimps) which are both rich in protein. In captivity we should reproduce this by feeding a diet which has a relatively high protein content. Research has shown that Koi fry require a diet containing 45% protein and young fish require a lower protein concentration in the food of approximately 30%. This general reduction in the amount of protein required by the Koi as they grow is

receive all of the nutrients that they require. This is

particularly so with Koi, which are often kept in a relatively bare pond, with few other sources of food available.

Commercial foods are available in powder, flake and stick forms and the choice depends largely on what the fish can fit in their mouths. As a guide, fry up to 2cm in length should be given a powdered food, those between 2cm and 6cm should be fed on flaked foods, whilst larger individuals should be given a stick food. Larger fish will still feed on flaked foods, but tend to ignore small particles which will remain uneaten and can pollute the water.

TABLE 1 Nutrients required in a balanced diet

Nutrient	Composition	Use in Body	Examples
Protein	Various combinations of 23 amino acids, 13 of which are essential for the Koi	Form of repair body tissue and for inefficient energy production Cannot be stored	Meat and fish
Carbohydrate	Generally formed by plants from carbon hydrogen and oxygen	Energy production Excess stored in muscle and liver	Sugars Starch
Fat	Formed from fatty acids	Energy production (+ tissue formation) Excess stored in fatty deposits and liver	Oils, fats
Minerals	Chemical ions	Regulate body processes	Iron — used in blood. Calcium — used in bone
Vitamins	Complex compounds formed by plants	Regulate physiological processes, eg by forming enzymes	Vitamins A, B, C, D, etc.

WINTER FEEDING

Commercial foods come in a range of formulations to provide your Koi with



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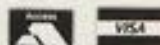
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PLANNING FOR KOI

Koi Nutrition

their exact nutritional requirements throughout the year. Anyone who keeps Koi will be aware that they consume less food as the temperature decreases. They will, however, continue to feed even at temperatures as low as 4°C. At such temperatures, the amount of food consumed is very small, but does prevent the fish from using up their energy reserves.

Great care has to be taken when feeding the fish during the winter, as any food that remains uneaten can decompose and pollute the water. Additionally, if the temperature falls still further after feeding, some of the food may remain in the intestine for a long period of time and lead to intestinal disorders such as ulceration (caused by the acidic digestive secretions remaining in contact with the intestine for a prolonged period of time).

On occasions throughout the winter there are times when the water temperature rises slightly and the fish begin to actively search for food. At these times small quantities of Wheat Germ foods may be given. These foods are rapidly digested even at low temperatures, and the high fibre content prevents any intestinal disorders.

SUMMER FEEDING

As the water temperature rises during the spring and early summer, Koi become more active and consume more food. At temperatures above 12°C a slightly higher protein food should be given along with, or combined with, colour enhancing diets.

Throughout this period the Koi should be fed two-four times each day on as much food as they will consume within five minutes. By following this rule, you will automatically alter the feeding in accordance with the changing water temperature throughout the summer. When fish are feeding actively the time of feeding is unimportant. There is no truth in the idea that Koi should not be fed in the early morning or evening — after all that is precisely when wild carp are feeding most actively!

In mid summer, at water temperatures above 15°C Koi will be feeding ravenously and growing quickly; at these times a high protein diet (around 42%) is required as a supplement to the other

TABLE 2 Quantity of dried food required each day to encourage rapid growth

Fish Size	Amount of food required per day (as a percentage of body weight)
Newly hatched fry (less than 2cm long)	15-20%
Older fry (3g in weight, 2-4cm long)	10-15%
10g in weight (approximately 5cm long)	5%
100g in weight (approximately 12cm long)	2%

foods. The protein in this food can be utilised by the fish to rapidly produce tissue, allowing the fish to grow. Feeding this diet mimics what is happening in the wild, where a rich protein diet is available in the large numbers of insect larvae, fish fry and snails.

FOODS

Although commercial Koi foods will provide your fish with all of their nutritional needs, every Koi keeper likes to give their fish an occasional treat. Earthworms, silkworm pupae and small quantities of brown bread can all be used. In addition Koi are particularly fond of fresh plant material which is rich in vitamin C.

In most ponds there will be some plants (or blanketweed) and any new growth will be eagerly eaten. Alternatively, whole Lettuces, Watercress or even Orange segments will be appreciated. Whole Lettuces are particularly liked by large Koi and, if added in the evening, will often be shredded or have disappeared completely by the following morning.

COLOUR ENHANCING FOODS

The colouration of all Koi is determined by the relative amounts of three colour pigments (red, black and yellow) within the skin of the fish. So, for example, the orange colouration of some varieties is a result of red and yellow pigmentation, whereas brown is due to black and yellow. In addition, there are reflective cells called irridocytes which produce the metallic sheen of some fish and can interfere with the colour

produced by the above pigments. Blue, for example, is due to black pigment covered by irridocytes.

Colour pigments are contained within the chromatophores, the density and distribution of which is determined genetically. The fish themselves cannot manufacture colour pigments and need to consume them as part of their diet. In the wild naturally occurring colour enhancers are found in certain algae (eg Spirulina), plants and invertebrates (eg Shrimps). In the pond or aquarium it is very unlikely that there will be sufficient naturally occurring colour enhancers to satisfy the

needs of all of the fish. Therefore commercially-available foods, such as those containing Spirulina, should be given on a regular basis. In this way the full colour potential of the fish will be realised.

WHAT NOT TO FEED

Many Koi keepers give their Koi a range of foods which are unsuitable, particularly if given in large quantities. White bread, trout pellets, sweetcorn and potatoes are examples of feeds which should not be given in large quantities as they will result in the fish becoming very overweight.

POND ADDITIVES

Not all of a Koi's nutritional requirements are obtained from its food. In fact many vitamins and minerals can be absorbed across the gill membrane. The algae which form "green water" provide one example of this. They release a number of vitamins into the water which improve the colouration and overall health of Koi. Anyone catching Koi or goldfish from a pond which has been "green" throughout the summer will certainly notice this. These vitamins are present in Tetra Koi Vital, a pond additive which allows you to have the benefits of "green water" with none of the disadvantages!

The importance of fish nutrition and providing a balanced diet cannot be overstated. A good quality food in the correct quantities will help to ensure your fish remain in good condition and grow rapidly.

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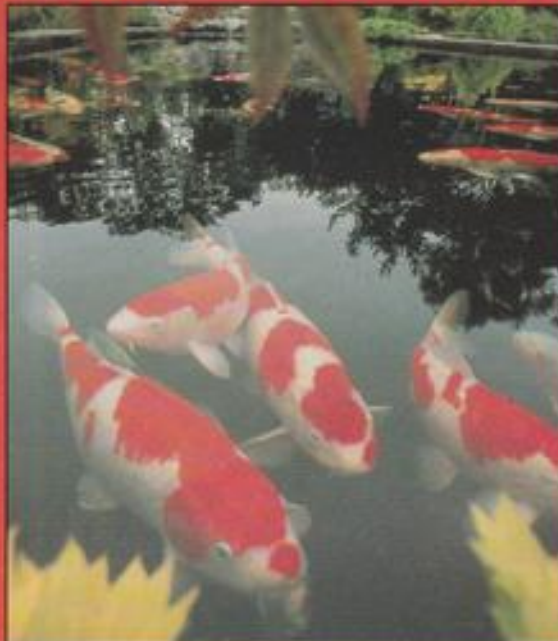
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PLANNING FOR KOI

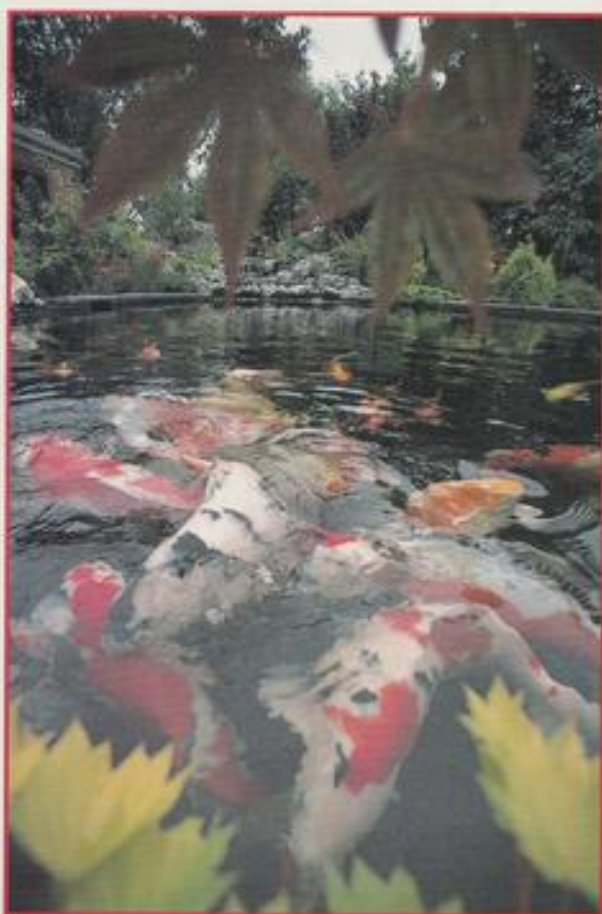
CHOOSING KOI

There are of course many factors you can consider when choosing Koi but there is only one that you must always apply and that it — choose what you like!!

The purpose of this feature is not to presume to tell you what you should be choosing, instead we hope to provide you with more information to enable the selection you make to be a little more informed.

Before choosing Koi, there is one factor you should consider perhaps above all others: by reading the other Koi features in this supplement it should be clear that Koi are not just another type of fish. They have specific requirements in terms of acceptable water quality and environment and before you buy any Koi you should make sure your system is up to it. Check out the other features in this issue of **A&P** and make sure your system is — if it's not, don't choose any Koi and save your money, because the chances are that the Koi will die. Koi are not goldfish and Koi do best in Koi ponds.

There are 13 Show Classifications of Koi and more than a hundred



**NIGEL M. W. CADDOCK, NISHIKIGOI INTERNATIONAL, SAYS
THERE IS MORE THAN ONE APPROACH.**

● PHOTOGRAPHS BY THE AUTHOR ●

individual varieties. While you may think a detailed understanding of these is just for real Koi enthusiasts, achieving a basic working knowledge is easy with a little effort, it can be a great help and is an excellent first step for newcomers — at least you will know what you are considering choosing. You would not buy a CD without knowing who was singing on the disc, so don't buy a Koi without knowing what variety it is! Learning about Koi varieties can be very interesting and as it certainly is not as difficult some 'experts' make it sound: it can also be great fun and early success will inevitably encourage you to want to learn more. Don't go to an 'expert', instead go to one of the country's great local Koi clubs, or to one of the UK's proper Koi dealers. Magazines like **A&P**, and some books are also great sources of good information (the best by miles is *Koi Kichi* by Peter Waddington Tel: 01942 724896 for more information).

WHAT TO LOOK FOR

Before embarking on the actual selection process, you really need to decide what you are buying the

PLANNING FOR KOI

Choosing Koi

Koi for. This may sound obvious but in reality it is not. For example if you are selecting a Koi with potential to grow on and improve (this sort of Koi is called tategoi pronounced tat-ey-goy) look for a Koi with potential to improve not just a Koi that looks great now. If, on the other hand, your priority is to show your Koi then the main focus of your selection criteria needs to be given to the Koi as it appears now, as the judges will assess it as it is now — not how it might be in the future. Accomplished shape, pattern and colour are all vital for show Koi, whereas for tategoi accomplishment is hoped for in the future. If your primary requirement to select a pet, all these factors are completely irrelevant and our Prime Directive — pick what you like best — applies totally!

GROWING PAINS

One thing most Koi have in common is a propensity to grow, and grow they do and, in the right conditions, very quickly! Given the correct environment and appropriate feeding, Koi will grow at an phenomenal rate. This, of course, is part of their attraction but it is vital that Koi Keepers fully appreciate that the size of our ponds is a limiting factor and directly linked to the number and size of Koi that can be successfully kept in them. Overstocking is a major problem. An even more common problem is accidental overstocking. Consider this scenario: In June 1995 a 2,000 gallon pond with efficient filtration system contains twenty 5in Koi — no problem. In August 1996 the well-fed Koi are now between 8in and 12in — sounds great until you consider that the total Koi loading on the pond and filter has increased from 100 Koi inches to 160+ Koi inches. This 160% increase in loading is the equivalent of putting another 12 Koi into the pond and unless the pond filter was oversized in the first place the chances are by early summer in 1997 our Koi enthusiast will be in trouble via accidental overstocking.

The key factors in our scenario are:

1. Build a pond you will grow into — not out of.
2. Make sure your filtration system is up to the job.
3. When you buy Koi remember they grow — and often very quickly.

All this is good news as long as you plan for it, and make sure your Koi pond and filter system is sensitive to these realities of Koi keeping life.

WHERE TO BUY FROM

The UK has some of the best Koi dealers in the world. The best place to buy Koi from is a Koi professional. There is absolutely no substitute for specialist advice from people who spend each day (every day) working with Koi. Not only are these specialist Koi shops the best places to buy from but they are an invaluable source of information and often a gathering point for fellow Koi nuts who just hang out for a Koi chat — no better place to learn about Koi.

While non-specialist Koi outlets are okay the overall depth and quality of information and advice is generally not available. The exceptions are some of the larger garden centres with specialist Koi sections — Stapley Water Gardens in Nantwich, Cheshire and Hollybush in Walsall, West Midlands are just two good examples.

While it is of course advisable to check out what all the dealers in your region have to offer, developing a relationship, based on mutual trust, with your local, preferred, specialist Koi dealer is a priceless investment. In addition to good initial advice this sort of relationship often affords enthusiasts excellent learning opportunities and of course a reliable informed source of advice if problems do occur.

CLUBS AND SOCIETIES

Just like their fish, Koi enthusiasts are natural shoaling creatures — we all love to talk Koi, show off our ponds and Koi and to swap ideas, problems and solutions with like-minded fellow Koi Keepers. The UK has the biggest number of Koi clubs anywhere in the world outside Japan and these are another invaluable source of information and friendship. The biggest is the British Koi Keepers Society with local sections all over the country; in addition the Midlands Koi Club, Northern Koi Club, Yorkshire Koi Society and, more recently a Southern Chapter of the Japanese Koi Society ZNA offer ample choice for keen Koi enthusiasts.

FROM THE RIDICULOUS TO THE SUBLIME

Koi Keeping is truly a hobby with an infinite learning curve. In addition to being one of the main frustrations which renders our hobby at best confusing to the uninitiated (as there is often more than one right way of doing anything) this specific attribute is the stimulus that inspires many Koi nuts to create some of the most beautiful garden features imaginable. The British are indeed a nation of gardeners and of animal lovers and proud of it too, and I for one would take some convincing that the side of a Koi pond on an early Summer evening is not the best place in the universe to be.



LEFT
Champion Koi.



BELOW
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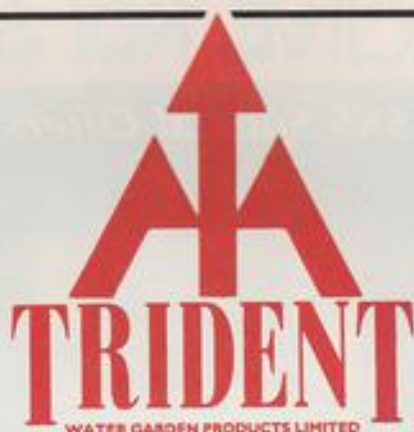
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PLANNING FOR KOI

KOI HEALTH



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We live on a world totally dominated by micro-organisms and the latest findings (announced this year) by bacteriologists has

DR. DAVID FORD, AQUARIAN ADVISORY SERVICE, UNRAVELS THE MILLIONS OF FACTORS AFFECTING KOI HEALTH — AND WARNS AGAINST JUMPING TO THE WRONG CONCLUSIONS.

● PHOTOGRAPHS BY THE AUTHOR ●

added thousands (if not millions) of new species to these life-forms.

The science of bacteriology began 100 years ago and in that time 5,000 species of bacteria have been

PLANNING FOR KOI

Koi Health

identified and named. This was done by the standard technique of isolating a sample and growing a culture on Agar plates, with microscopic examination after staining with selective dyes. The new method involves DNA studies which positively identifies each bacteria at source, rather than laboratory-grown. Using this method, just one gram of soil was found to contain 10,000 different bacteria — double the number identified in 100 years of world-wide study! The consequences of these findings are mind-boggling — just how many bacteria (and viruses) inhabit the pond where your Koi live? We have identified but a handful — the *Aeromonas* and *Pseudomonas* spp that cause problems and the *Nitrosomonas*, *Nitrospira* and *Nitrospirillum* spp that do good things. It looks as if we have barely scratched the surface of the myriad of microorganisms that the Koi intimately live with all their lives.

HEALTH FROM HAPPINESS

How can Koi live in a bacterial soup where dozens (if not hundreds) of

species cause disease? By constantly battling against them! The immune system of a Koi is very sophisticated, it allows the bacteria and viruses to swarm all over the skin and throughout the gut, but excludes them from the internal organs and blood stream.

To do this, the fish needs to be in tip-top condition. It has to be uncrowded, no aggression (Koi are just big softies), no toxins in the water, the right temperature range, plenty of dissolved oxygen and well fed. In other words Koi need to be contented. Contented fish are happy fish, and happy fish are healthy fish.

WHY DOES DISEASE STRIKE?

Do you get one, perhaps two colds a year? Wrong, you get dozens! Only one or two develop because you are below par for some reason or other. Most of the viruses and bacteria that you inhale are removed by your immune system. It is the same with Koi. Viruses (e.g. Spring Viraemia of Carp), spores (e.g. Dermocystidia), micro-parasites (e.g. *Cyathostoma* and *Cestis*), fungus (e.g.

Saprolegniasis), etc., plus all those microorganisms waiting to be identified, are attacking the Koi and being resisted — most of the time.

A CASE HISTORY

You own a prize Kin Gin Rin among a collection of Koi. With its sparkling gold (Kin) and silver (Gin) it is very attractive to a passing Heron (if only they would!) When the bird strikes however, the Koi manages to struggle free and dives to the bottom of the pond. The fish is traumatised and produces chemicals such as adrenaline, ACTH (adrenocorticotrophic hormone) and corticosteroid into the bloodstream. These are collectively called 'stress hormones' and prepare the fish for a fight or flight, which it cannot do in the confines of the average garden pond. These hormones actually suppress the activity of lymphocytes in the blood

Health matters apply to owners and their families, as well as the fish — keep children away from the Koi pond unless supervised.



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stream. Lymphocytes are White Blood cells that mop-up the invading bacteria.

In the Kin Rin Gin's gut are *Aeromonas salmonicida* bacteria feeding off the passing faeces, but the stressed fish now has diarrhoea and sheds colonies of the bacteria around its hideaway. As time passes the fish starts to recover and begins its feeding response, grubbing around the bottom, smearing its mouth parts with the colonies of *Aeromonas*. With reduced immuno-response, the bacteria attack the fish and get a hold on the skin causing tiny erosions.

Another bacteria is in the water called *Aeromonas hydrophila* that prefers to grow on flesh, which is now revealed on the fish's snout. Colonies grow rapidly and the fish starts to develop an ulcer.

Meanwhile the owner is puzzled by the fish's disappearance but is pleased to see it rise for food a day or so later. However, this allows inspection and with

immunity. The *Aeromonas* enters the blood stream because they are immune to the antibiotic (most are nowadays) and the fish now gets septicaemia (blood poisoning). The fish lies on the bottom and the fins clamp, the eyes glaze and the owner calls the Vet. The Kin Gin Rin is a large fish (Vets will not inject fish under 6in/15cm) so the last resort injection of more powerful antibiotic (such as Oxytetracycline) is given. This is effective, because the *Aeromonas* is not resistant and dies out, the fish showing remarkable recovery only a day later. However, the fish has now had a double dose of antibiotic and it is now known that these chemicals damage the fish's kidney and liver (often long after the disease has gone) and a week or so later the Kin Gin Rin's osmoregulatory system goes haywire.

Like all freshwater fish, Koi are absorbing water via osmosis and the

kidney constantly extracts and excretes it in large amounts. The damaged kidney cannot cope now and the water input slowly exceeds the water output. The fish begins to swell. "Oh, no, its got Dropsy now," says the caring owner and isolates the fish in a floating bowl, in case the 'disease' spreads to the other fish.

The Kin Gin Rin's stress factor goes through the roof when it finds itself imprisoned in a white box, but this does not kill it. It actually dies of heart failure, due to water build-up in the internal organs and then the circulatory system. The postmortem examination reveals no obvious disease, our sad owner claims it is just another mysterious fish death, but at least s/he did everything possible to save it...

TLC IS BEST

A sad tale, but too common. The original stressor can be many things other than a heron, cat attacks (only occurs in shallow waters, by the way), overcrowding (never forget that fish have to swim in their own loo), presence of aggressive fish (Channel Catfish that become giants or shoals of 'playful' Orfe are not good companions), chemicals from the garden (sprays used far from the pond can drift into it eventually), even noise (I usually get a letter about stricken pond fish after bonfire night!).

The answer is to think carefully about the fish's environment. It has to be ideal or you will never succeed with Koi. Healthy Koi really means having a



horror the owner sees his/her prize fish has a mouth tumour! ("It must have banged its nose on the pond side.") The fish is caught and anaesthetized, the 'tumour' is scraped and antibiotic cream smeared in the wound plus Orobace to keep it *in situ*.

The fish is returned to the pond, where it promptly goes back into stress again, with consequent reduced

ABOVE A Koi covered in White Spot, but note the clamped fins and hollow belly — this fish had earlier problems and the opportunistic White Spot is not the primary disease.

RIGHT A Koi with a body ulcer being painted with Mercurochrome while under anaesthesia, such traumatic treatment should only be done as the last resort.



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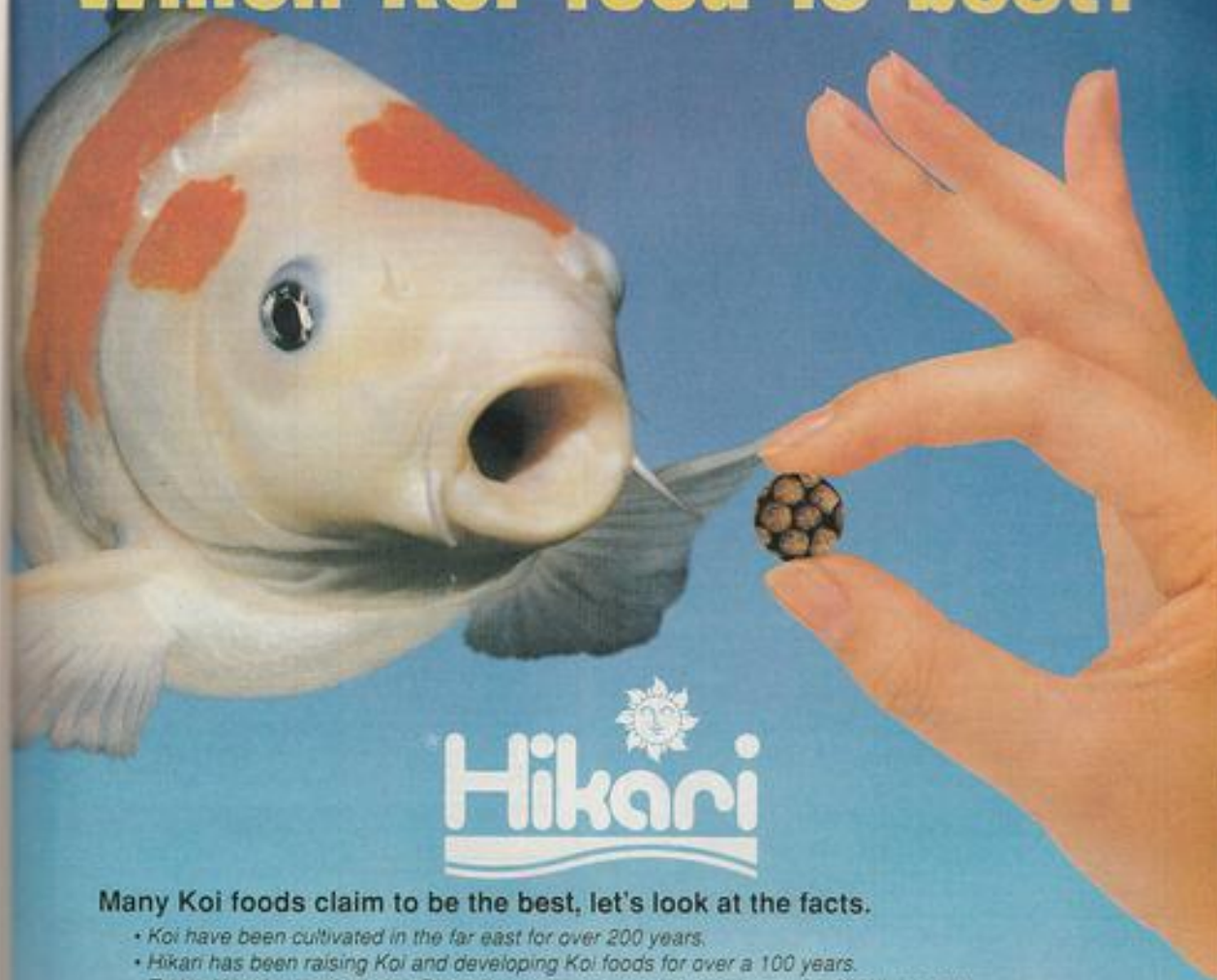
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PLANNING FOR KOI



THE BRITISH KOI-KEEPERS' SOCIETY

According to some people, to keep Koi successfully you need to be both a millionaire and a scientist all rolled into one. It would be nice to be in that position but it's not essential, as the growing number of existing Koi keepers without these qualifications prove. No doubt the rumour was started by someone unfortunate enough to get off to a bad start with their Koi, probably through ignorance of the Society's existence.

The British Koi-keepers' Society was formed originally for one reason only — to help keep Koi alive! Now there is no need to go down the lonely route of slowly learning through mistakes (and probably losing fish in the process); join the BK-KS and you will be able to tap into the enormous fund of knowledge and practical experience built up by its founders and continuing members over the past 26 years. The Society is not trying to sell you anything except a warm welcome and for £21.00 a year you will

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● PHOTOGRAPH BY THE AUTHOR ●

the main way of raising funds to support the Section is by holding Shows; these may be the 'Closed' type in which only Section members participate or it may be an 'Open' Show which, as its name suggests, is open to all comers whether they belong to any Section or not.

Of course, the national body also sets an example by having its own National Show. This year, KOI '96 is the 21st annual Show and will be held, as usual, in August at Billing Aquadrome, Northamptonshire. This is the Koi Show not to be missed by anyone interested in these magnificent fishes. You will see

Koi keeping. To give an up to date example, the KOI HEALTH FORUM was formed two years ago: born out of the original HOT LINE, this now has trainee and established Health Liaison Officers throughout the U.K., whose advice is available to you as a BK-KS member whatever your Koi problem. But even the 'experts' need advice sometime and it is a measure of the Society's esteem that, in 1994, London Zoo approached the BK-KS for advice before building a Koi pond — and they've been keeping fish for 70 years!

If you're reading this Supplement then obviously you are thinking about, or already keeping Koi. Whichever category you come into, however large or small your Koi pond, then joining the BK-KS should be your next move. Don't forget, your membership entitles you to:

- Help from a Health Liaison Officer.
 - 12 Magazines a year.
 - Access to the Society's Sections.
 - Friendship with Koi-minded people.
- Now comes the bit I've been dreading

receive a monthly magazine that will keep you up to date with all manner of Koi information — dealers, Shows, articles, hints and tips, book reviews, members ponds, lively correspondence and so on — the list is endless.

Being a national body, the BK-KS has 44 Sections throughout the U.K., with each Section being an independent 'Club' with its own committee and funds on its own financial policies. However,

simply stunning examples there together with all the latest technology and equipment available who looking them in perfect health.

But, the most important thing circulating in any BK-KS is the information on one hand and the willingness to impart it on the other. There are always people on hand to welcome for no other reason than wanting you to get the very best out of

our Annual General Meeting is looming, and as there is likely to be a change of Membership Secretary, I have volunteered myself as the contact for the BK-KS at this moment in time.

Please don't be afraid to call me for any information about the Society, or even to come and see.

Phone me after 8pm, or at weekends, on 01462 294352.
Happy Koi-keeping.



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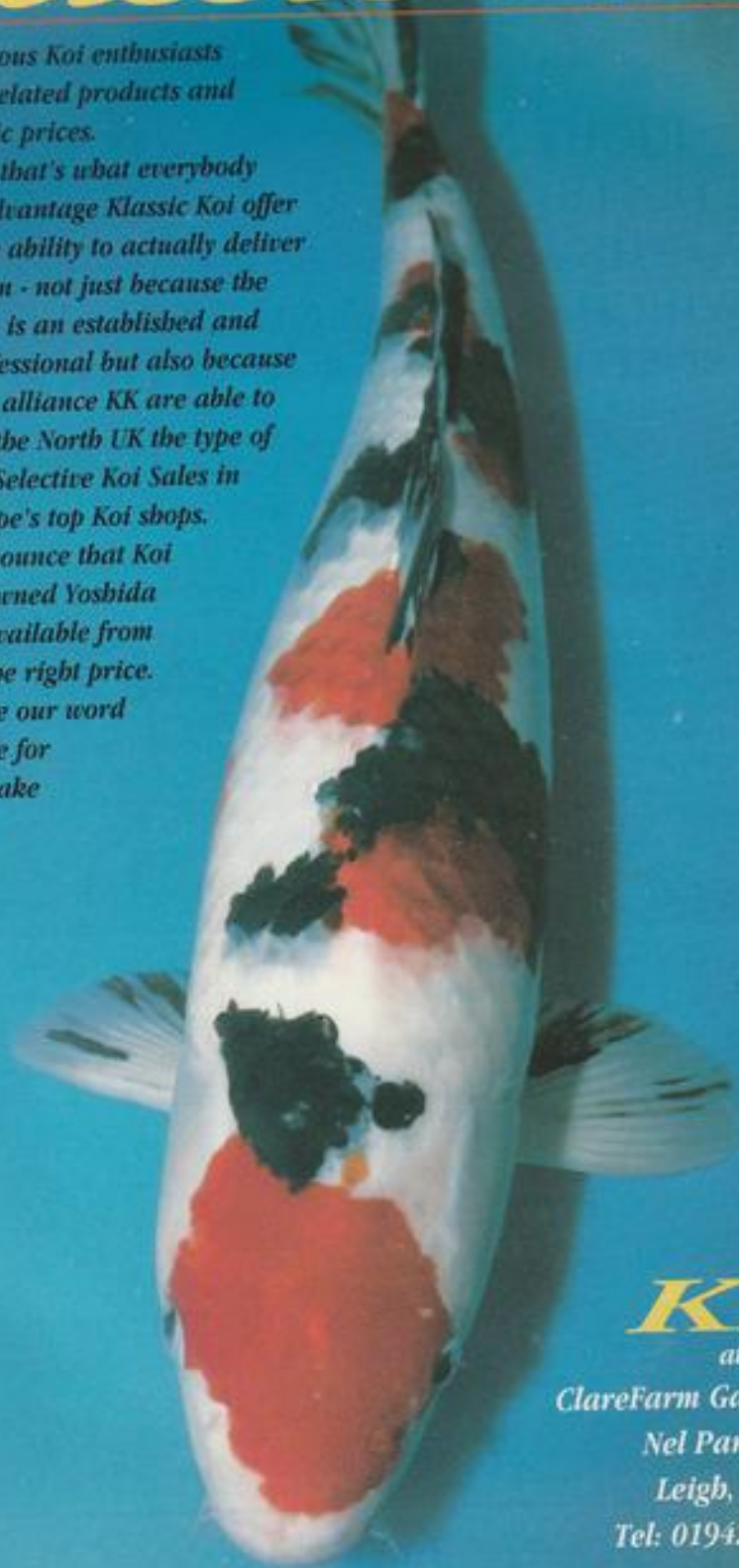
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Jackie's Juniors



Hello, it's me again with your own page. You know by now how I like to share a laugh with you all so I'm pleased that some of you have gathered up some jokes and pictures for me to share with others. Please keep them coming in but don't forget your name, address and age and whether you belong to your local Fish Society.

You can send in any funny stories as well; have a go at a fishy illustration or tell us about your fishkeeping. Don't forget those nice people at John Allan Aquariums are giving a prize for the best received: **DON'T DELAY — DO IT TODAY!** Post it all to Jackie's Juniors, c/o MJ Publications Ltd., Caxton House, Wellesley Road, Ashford, Kent TN24 8ET.



SIMON THE SEAHORSE

Drawn by
Jamie Dollman
(aged 10)

WORD SEARCH

B	A	C	T	F	K	N	A	T
A	Q	U	L	I	G	H	T	S
C	Q	A	P	L	D	E	R	T
T	W	U	L	T	O	A	I	A
E	A	T	A	E	O	T	S	N
R	T	N	N	R	H	E	R	D
I	E	S	T	L	I	R	I	T
A	R	L	S	F	H	U	A	A
L	I	P	F	I	S	H	M	W
F	L	E	V	A	R	G	R	A

FIND

TANK	PLANTS
WATER	HOOD
STAND	LIGHTS
FISH	HEATER
FILTER	BACTERIA
GRAVEL	AQUARIUM

Q. What two fish are needed to make a shoe?

A. A Sole and an 'Eel'

Q. Which are the most valuable fish?

A. Goldfish.

Q. Which fish is very musical?

A. A Tuna!

Q. Which fish do Dogfish chase?

A. Catfish!

Q. If you have an umpire in cricket, a referee in football, what do you have in bowls?

A. Goldfish!

Q. Who is the biggest gangster in the sea?

A. Al Caprawn.

COMPETITION RESULT

Aquarist & Pondkeeper are pleased to announce the result of the LAHAINA LR AQUARIUM Competition featured in the February issue.

The winner of the competition is CHRIS THOMAS, of 642 Mitcham Road, Croydon, Surrey CR0 3AA.

Congratulations to Mr Thomas on winning the magnificent LR36 Aquarium complete with Bio-Media, 2,000 litre/hour pump and reflector worth in excess of £500.

The correct answers to the three questions were:

- (1) THERE ARE 20 FEATURES
- (2) A CONSTANT WATER LEVEL IS IMPORTANT AS A STABLE SPECIFIC GRAVITY IS ESSENTIAL
- (3) THE OXYGENATING, HEATING, CLEANING AND BIOLOGICALLY STABILISING PROCESS WHICH OCCURS WITHIN THE INTEGRATED LIFE SUPPORT SYSTEM BUT OUT OF SIGHT OF THE AQUARIST

LAHAINA AQUARIUM SYSTEMS will be contacting Mr Thomas to make delivery arrangements.

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POND FILTERS

My Quest for the Right One

Why do we need filters? After all, wildlife ponds appear to be quite remarkably self-sufficient, happily sustaining aquatic life.

How? It's all a question of balance; as better balance will mean less problems. Obviously the wild pond achieves this naturally whereas the garden pond with our intended population of fish and/or plants might not be quite right in this respect. A pond too small, or overstocked, will never achieve an equilibrium. Thus the need to employ some type of filtration to tip the scales favourably in the right direction. All the right ingredients must be present (rather like a recipe) if aquatic life is going to be sustained.

Filters can enhance the quality of the water to some extent but this is all dependent on type, i.e. Biological, Chemical or Manual. The introduction of fish and plants play a large role, with oxygen supply and demand being the most vital component. Filtered ponds have one or two advantages over their 'Leave it to Nature' counterparts — stocking levels may be increased with the use of filters (providing regular maintenance adhered to; otherwise losses will occur) or, where a minimum of natural in-pond purifiers exist (plants!), Koi could be kept as the first class water conditions they deservedly require will be provided by the filtration system. Certain constraints must be adhered to in the prevention of over-crowding and unnecessary deaths. As a rule, 1m² will support 75kg of fish but surface area is just as crucial. Allow 10cm² to every 1cm of fish (nose to tail) so to work out how many fish you

DAMIAN MARTIN RESEARCHED IT, REHEARSED IT AND NOW PRESENTS IT FOR YOUR DELECTATION.

• PHOTOGRAPH/GRAPHICS BY THE AUTHOR •

can keep it's a combination of filter and surface area.

MY IDEAL REQUIREMENTS (WITH ALTERNATIVES)

Personally, I want to keep Koi, so filters are high on my list of priorities. After establishing the pond's function (type of fish) and decide where it's going to be, then I look towards what type and style and shape it's going to be. I am restricted for space so my pond will be a combination — both raised and formal, with a natural look.

There are benefits with a raised pond, the fish and plants are closer to you and there is no chance of water-soluble pollutants being leached into the pond, children and pets are less likely to fall in, and maintenance can usually be carried

out a little easier too. On the down-side it needs to be well insulated from frost and some source of heating will need to be installed for the winter months.

Consider every aspect of your requirements in conjunction with the surroundings. Planning is most definitely the key to a successful pond, this in turn will reduce problems and maintenance.

A self-contained combination of both pond and filters would be ideal. This would reduce time and effort during construction, and reduce problems due to frost or damage to pipes. The pump poses no problem, only needing its own chamber, free from plants. Again on the down side not all ancillaries would be compatible because magnets and UV's cannot really be immersed in water (Oh no? See elsewhere in this issue for news of a major breakthrough in this respect — Ed), therefore some type of housing would have to be constructed to house a UV safely. Also half the area of the pond (or less) would be filter, spoiling the overall effect. Plants could be introduced to make the filter partially vegetable. Another option, to help disguise the 'working' part of the pond would be to cover the area making a raised, overlapping patio or just an area on which to put choice potted plants.

The quickest and easiest way is to incorporate a conventional filter into a rockery. In my view it is not the best and if you have nowhere to hide the filter it can look a bit stupid. I nearly fell into the 'cheap and easy' trap, but now feel that it would have been a waste of money as Nitrobacter formation and sediment settlement is limited because water is pumped into the filter instead of (to my mind more preferable) back to



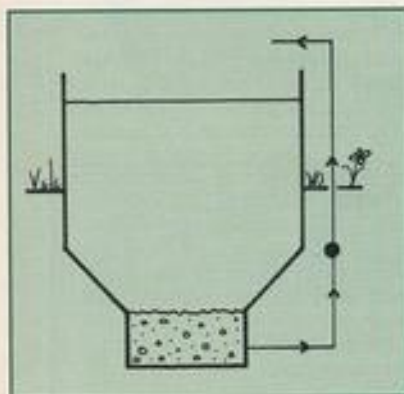
the pond from it.

Vegetable filters are a good idea, but only for a few (summer) months and take up rather a lot of room. Sand pressure filters are expensive and tend to be more time-consuming as far as maintenance is concerned. Need I say more?

DECISIONS MADE

I've chosen a raised pond with in-ground filters (in a manner of speaking) with up-flow gravity fed filters in parallel, four tanks in all. A similar filter set-up can be bought ready-made (all-in-one) without connecting pipes (expensive) so I opted for the DIY approach, made-to-measure. Using this method of filtration a majority of the waste will remain in the bottom section. This will make flushing much easier, with the added advantage should any filter block, the rest will still function.

After finding out how little there is to a vortex, along with its advantages, reducing solid matter entering the filters



SUB-GRAVEL SYSTEM

Drawback: will work quite happily for many years but the large amount of gravel needed may eventually clog or re-release toxins, requiring great effort and disruption of the pond to clean out, and take a long time to re-establish.

I decided to make my own. As I am striving to prolong the life of all components after the filter I've added extra protection: a pre-pump filter (manual, fine stainless steel mesh). Solid matter can also be reduced before it even reaches the vortex with the use of a skimmer, which will remove solid matter before it sinks, begins to pollute the water and making maintenance far more troublesome.

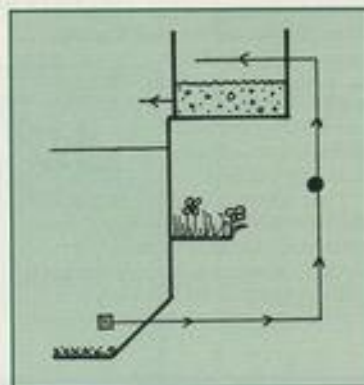
In my view there are three areas to obtain a flow of water from the pond to the filter. Bottom drains, side drains and surface (skimming technique). Using the

aquarium as a role model, a large scale undergravel filtration is quite feasible but, on the downside, very difficult to maintain. It can clog easily, depending on gravel size, and should the pump ever be turned off for any length of time the aerobic bacteria will release toxins into the water as they die.

Time to follow a well-worn path. Bottom drains must be the best way. They pose no problems to fish nor will they clog (unless water flow is too slow) and they draw larger waste particles into the vortex, that's why I've opted for them.

Gas exchange is crucial, so the pumped water needs to be used as beneficially as possible. Venturis, fountains or cascades can all play their part in re-oxygenating the water after the filter's bacteria have depleted oxygen levels during the nitrification process. Air pumps can be added to increase levels of oxygen both in the pond and in the filter itself, but air stores erode due to their pulsating source. Diffusers made from more robust materials are available.

To take a back step and to point out one or two 'don'ts'. Don't use copper pipes (as I did!) as chemical reactions at



PUMP-FED REMOTE FILTER SYSTEM

Water returns to pond by gravity, and naturally re-aerated if fed down watercourse or waterfall. May need lengthy pipework and extra head will require large size pump. Filter can overflow if medium becomes blocked.

low pH will produce toxins. Don't use untreated cast-iron central-heating pumps unless you want eventual rust problems setting in.

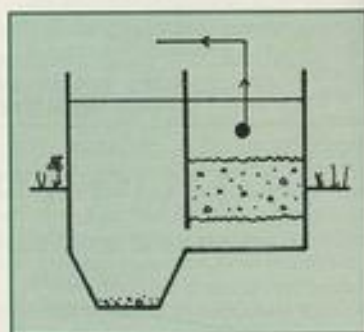
Ground consistency is quite important. If there is any risk of ground movement (do you live on a well-patronised lorry route, or next to the M25?) then thin un-reinforced concrete ponds will crack and leak — often through ice damage too — as I've

discovered. Follow guidelines set out for rigid ponds and even then you may have problems... I suggest it's better to stick with a shock-absorbing flexible liner!

MAINTAINING THE POND ENVIRONMENT

There are many views of dealing with ponds in winter. Mine is to retain an overall consistency of conditions so as not to stress the fish, striving for an average temperature of 10°C or slightly above. I have already mentioned that a raised pond runs slightly 'colder' than in-ground ponds so heat losses can be reduced if, during construction, thick sheets of polystyrene are incorporated around the pond and filter, not forgetting any exposed pipes, especially those brought out for intentional drainage purposes.

Heat must be applied if a steady temperature is to be achieved. Electric heaters are fine, but expensive to run; a heat exchanger connected to your central heating system produces a



GRAVITY FED ADJACENT MULTI-CHAMBER SYSTEM

Advantage: no lengthy pipe runs or extra head for the pump to cope with. Pump is only pumping clean water. In-ground siting means filter can be easily hidden. Venturi often incorporated to re-aerate water return. Maintenance relatively easy.

cheaper solution. I am in the design stages of one such item which will be made from ABS (or stainless steel?)

Summer can bring even more problems. Take evaporation for a start. If the device (described in Letters, February, **A&P**) is added, the pump is prevented from running dry; a simple plastic ballcock valve (BCV) can be added to achieve a constant water level. Ideally the water should first pass through a water purifier with addition of a stopcock tap for maintenance (and as a safety precaution). You must be careful with the installation of BCVs as there are stringent Water Company Bye-laws

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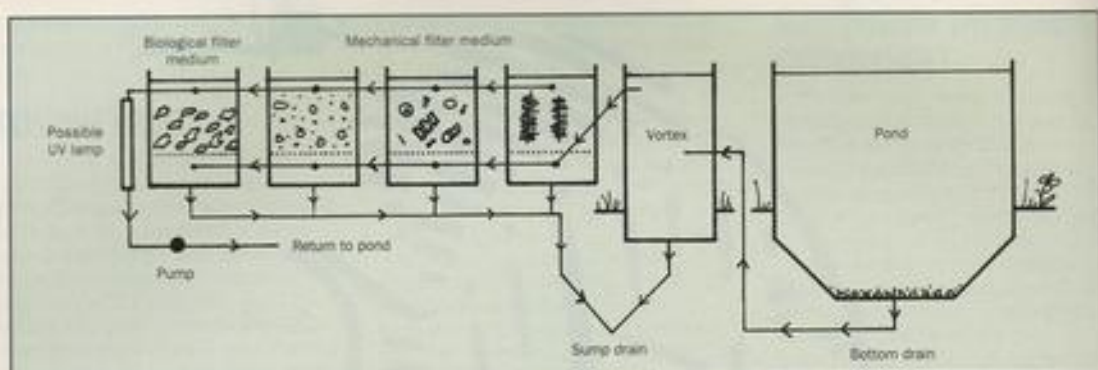
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POND FILTERS

My Quest for the Right One



MULTI-CHAMBER, IN-GROUND SYSTEM

Gravity fed water is first delivered from the pond's bottom drain to the vortex chamber where most solids settle out. Brushes in the next chamber give more protection against debris-blockage to the subsequent chambers. Accumulated sludge can be flushed away simultaneously, or separately, from all or any single chamber, the connecting system allows for continuous operation in the meantime.

against back-siphoning with possible pollution of the mains water supply. You must use either a anti-siphon, silent fill BCV or a standard BCV well above the water level.

A variable-flow central-heating pump, treated internally accordingly to minimise rust, is my choice as it can be set to match the pond and filters. By using the post-filter installation design, all the pump is asked to do is pump clean water; there is little chance of it becoming damaged by solid materials.

I'm almost planning blind when it comes to UVs and magnets. The expense puts me off and benefits are limited in some respects. At this initial stage of things, I cannot predict whether the pond will get blanket weed or not so the magnet (minimise this) may turn out to be a redundant investment and I feel the fish will have a better chance of survival with their natural immune system intact (to my mind, UVs kill too much bacteria).

However, space will be left for both should they be needed (I like to think I have an open mind, other people might call it belt and braces!).

GETTING THE BITS TOGETHER

Many of my home-made elements were devised through experimenting with different media. ABS being the final choice. It is easy to use, cheap and readily available with a great array of fixtures to suit all purposes with little or no altering.

To make bottom drains, very little imagination is required — a shower trap and half a ball cock — but it does take a little confidence to install it through a liner! Venturis? Yes, plural for great re-oxygenation, costing approximately £1.40 each (very effective, with millions of small bubbles being diffused). Be prepared for some failures: just persevere.

The choice of pipe size is important

depending on required flow and pond/filter size (21.5, 38, 40, 50mm). Your pond may be too large to use 50mm pipe so it looks like it's either waste pipe or the right pipe for the job — Terrain. The only rule that applies to ABS pipe (or any other pipework for that matter) is to minimise lengths, ensure all bends

are sweeping where possible or blockages may occur (90° bends and long lengths all reduce flow rate too). If an area looks as if it may become prone to blocking incorporate a back flush system or 'rodding eye.' Don't rush to try everything out after gluing it all together. The adhesive/sealant needs to dry or cure and you may well end up with leaky, weakened joints — and we all know the hard work involved in locating and mending leaks in well-hidden (well-buried) pipes.

Finally, I must point out that whilst the basic research and experimenting about may be of obsessive interest to some, DIY is not for everyone and often, in the long run, it is better to go for the commercially-produced item; after all, the manufacturers have done all the designing, testing and worrying for you, things that are very hard to cost out (and often ignored) when you're planning things — to say nothing of having to start all over again when things just don't go according to plan — and they do offer guarantees usually both for materials and performance.

There is also the safety aspect to be considered; again, most aquarists are only too proud of their 'lash-ups' — the 'I fixed it up myself so I know where the dodgy bits are' attitude — but, seriously, you will in all instances be dealing with combinations of two very lethal elements, water and electricity; cutting costs usually leads to ignoring safety and unfortunately you cannot put a price on life, nor can you buy it back once lost.

Plan it well, take your time and, most of all, enjoy it!
Happy pondkeeping.



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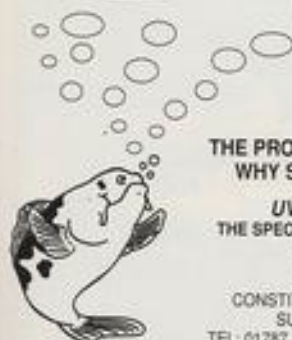
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DAVID TWIGG'S

KOI C A L E N D A R

April, the last of the 'winter' months. At time of writing there is about three inches of snow on the ground and the temperatures have been well below freezing overnight for most of the last couple of weeks. I hope we are now seeing an improvement. As it happens this was not such a bad thing as the bad spell coincided with my period of fast for my Koi. By the time you read this they should be well on their way out of winter. My cover usually comes off during the last weekend of April or first of May and I am really looking forward to seeing them at their best again. Colours are usually very good at this time and look superb in daylight.

For those of you who do not heat your ponds during winter, your Koi will almost certainly have spent some of the time lying on the bottom of the pond. Whilst as Koi keepers we do our best to keep the pond bottom clean this can be difficult if covers are in place, certainly access will be restricted. If this is the case then it is probable that a certain amount of dead and rotting algae etc. will accumulate and the fish may well lie in it. This can lead to soreness on the underbelly of the Koi which in turn, if not spotted and treated early enough, could lead to death. Careful observation of your fish, particularly when feeding, may pay dividends here.

Apart from catching up on the gardening this month I try

to do those things that haven't been done over the winter period; the mechanics of Koi keeping. Our Koi have to be prepared for the coming summer months. Water temperature will be rising to feeding level and our fish will be eagerly awaiting our visit, food in hand, to the pond side. Please keep a watchful eye on water quality during this time as the bacterial bed in the filter does take its time to re-establish again after the cold winter spell and water quality can suffer as a consequence.



PHOTO: DAVID TWIGG

A letter just received from Kevin Monk advises that **The Oxfordshire Section of the BKKS** has just been formed. Their meetings will be held on the last Thursday of each month and any interested persons should contact Kevin on 01865 874008.

Another communication was from John Timmis of the newly formed **North of England Koi Chapter of Zen Nippon Airinkai**. Monthly meetings are held on the first Thursday in each month. For further information contact John on 01226 289507.

Club reports

The January meeting of the **Leicestershire Koi Section BKKS** was held in a spectacular venue for Peter Waddington's 'Koi Question & Answers' evening. Peter with the aid of remote speaker and a console

housing video facilities that projected the film onto an 8' square screen, gave members a thoroughly enjoyable and informative evening.

Gary Pritchard, Chairman of the BKKS was the speaker at the last meeting of the **Heart of England Koi Society**. Gary's talk on Koi Appreciation was

wonderfully informative, well illustrated with slides and very entertaining.

A well supported and fiercely-contested Skittle evening, with supper, was arranged by the **South Hants Section BKKS** in January. It shows the social side of Koi keeping is just as important as those lovely fish.

My thanks go to all Koi club Secretaries or PROs' and others who send me their latest calendar for inclusion in this column. Although I do my best to ensure all events are mentioned it may be that some information, which arrives a little late, misses my deadline. Ideally I need to have information at least 10 weeks before the date of the event to guarantee publication. You may of course ring me direct on 01926 495213 which will allow a little leeway. This request also applies to dealers with special events, auctions, etc. I look forward to hearing from you. All Koi keepers are welcomed to the events mentioned in this calendar (an entry fee may be payable). Further details can be obtained from the contact telephone number quoted alongside the diary entry.

Please write to me at your earliest convenience via the Editor at MJ Publications Ltd., Caxton House, Wellesley Road, Ashford, Kent, TN24 8ET. Thank you.

1996 SHOW CALENDAR

MAY

4/5 International Koi Show. Bletchley Exhibition & Leisure Centre, Milton Keynes. Contact D.J. Koi, 01922 493290 for further details.

26/27 Merseyside Section BKKS. Open Show at Camphill, Woodton. Contact Phil Adamson, 0151 2202970.

26/27 South Hants Section BKKS. Open Show at South Downs College, Crookhorn, Havant. Contact George Rooney, 01420 473169.

JUNE

1/2 Yorkshire Section BKKS. Open Show at Lotherton Hall, Leeds.

15/16 Crouch Valley Open Show. Barleylands Farm, Billericay. Over 3,000 people are expected over the two days of this show that is expected to attract up to 30 dealers who specialise in fish, or fish-related dry goods. The Show, housed within modern steel framed marquees, is considered one of the best on the circuit. Contact Vic Boveham, 01268 524232.

29/30 Middlesex & Surrey Border. Indoor Open Show, Kepton Park Racecourse, Sunbury. 20+ dealer stands for the Koi keeper as well as bouncy castle, swing boats, shooting gallery and face-painting for the children. Mobile catering units will be on site and a full indoor restaurant facility will be serving snacks and all day breakfasts, etc. The bar will be open for the full 2 days. Contact Cynthia Hudson on 01372 453215.

30 Suffolk & North Essex Section BKKS. English Style Open Show. Langham Community Centre, Nr Colchester. Contact Mavis Carter, 01206 866011.

JULY

7 Lower Thames-Side Section BKKS. English Style Open Show. Ford's Sports & Social Club, Rush Green, Romford, Essex. Contact Albert Ruffley (01702 529675).

AUGUST

10/11 BKKS National Show. Billing, Aquadrome, Northampton. Contact Lou Jackson on 01322 453869.

SEPTEMBER

8 Leicestershire Section BKKS. Annual Show at Smeathone Farm Park. Contact Mick Reffin, 0116 2712517.

29 Northern Koi Club 4th Annual Open Show (Japanese Style). Preceding this Sunday Show on the Saturday afternoons, 2-5pm, is a celebrity speaker. Further details from Tony McCann on 01461 794 1958.

MONTHLY MEETINGS

APRIL

3 Leicestershire Koi Section BKKS. A.G.M. Contact Mick Reffin, 0116 2712517.

4 Suffolk & North Essex Section BKKS. Monthly meeting. Contact Mavis Carter, 01206 866011.

4 North of England Koi Chapter of Zen Nippon Airinkai. A slide show by Eric Duffield. Contact John Timmis on 01226 289507.

8 Northampton Section BKKS. A.G.M. Contact Albert Day, 01604 407361.

9 Nottingham & District Section BKKS. Speaker is Derek York of the Northern Koi Club. Contact Shirley Hind on 0115 981 0923.

10 South Hants Section BKKS. Monthly meeting at Denmead Church Hall. Contact George Rooney on 01420 473169.

10 Merseyside Section BKKS. Speaker is Dave Scrivens. Contact Phil Adamson, 0151 220 2970.

13 Heart Of England Koi Society. AGM in Warwick. Contact me on 01926 495213.

14 Lea Valley & Harlow Section BKKS. Meet at Halling Hill. Contact Mick Fahey, 0181 508 5155.

14 Mid-Somerset Section BKKS. Kevin & Lloyd speak on 'The art of Koi keeping'. Contact Alan Purnell, 01458 272132.

17 Crouch Valley Section BKKS. Speaker is Frank Prince-Isles, his subject 'Filtration and Water Quality'. Laindon, Essex. Contact Ron Parlour, 01277 840863.

21 Northern Koi Club. George Carnall Leisure Centre, Urmston. Barry Goodwin speaks on 'Water Quality and pollution of same'. Contact Tony McCann, 0161 794 1958.

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"Ooh, that looks nice!"

How every retailer longs to hear these words. The customer makes his mistakes in private but a retailer's can be very public and his customers can be very harsh critics. For this reason, when Friends In Soggy Homes Ltd. (F.I.S.H.) moved into Country Gardens' Harlestone Heath Garden Centre in Northampton and the Centre's manager asked them for help to put in a water feature at his new entrance, they knew it had to be right. The Garden Centre had trained staff with the expertise to plant out the planned flower beds. F.I.S.H. had many years of fishkeeping experience to draw on when installing the filtration system but for that elusive "ooh, lovely" factor it needed an artistic eye. Mark, of "Natural Falls", a Chelsea Flower Show prize winning designer, was approached and to green fingers and technology was added the missing link, a landscaped design.

So was born an "Anneka Rice" race against time. It was mid-January and the weather forecast was bad but the feature had to be in and looking good by mid-March ready for Easter.



1 The physically hardest work is digging the hole.



2 One way of defining the shape is laying in a concrete collar.

3 To protect the liner, the collar must be covered with a good layer of sand.



4 Linderlay is also used on difficult to cover areas before laying down the liner.

5 As the pond fills with water, pleat the liner to minimise creases and mould into contours.



Through rain, wind and snow the work proceeds. Weather that would have driven even the hardest of customers indoors but the time ticks away. Come Easter the results would be judged by the Garden Centre's customers and no excuses of chapped fingers and frozen feet would be accepted.



6. Having fitted the liner, now start the landscaping.

7. If using very large rocks, possibly a J.C.B. is better than a slipped disc! (trade secret).

8. At this point install filtration unit in order to disguise pipework with careful planting.

9. Even experienced landscapers can benefit from discussion with garden centre staff and plant supplier.

10. If you are foolhardy enough to build a pond in February, nature tries to slow you down but we are assured that the pond is back on schedule and awaiting your inspection at Easter.



The moral of this story is: — If you are going to do a job, do it right. If you don't know how to do it yourself, ask someone who does. Plan your pond with people who have the experience and expertise to help you. Maybe you have the green fingers. There are many experienced aquatic outlets around the country who have the knowledge and equipment to make that water feature a joy to behold. Take the time to find out what you are going to do before you start.

The other moral of the story is "Do as we say, not as we do". Only a fool or a member of the Ornamental Aquatic Trade builds a garden pond in January. A sensible person builds it in the Spring!

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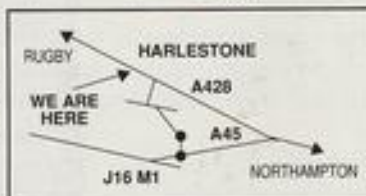
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14 X 12	23.44	31.92	58.60
16 X 12	26.78	36.48	67.20
16 X 14	31.25	42.56	78.40
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Snakeskin (Pigeon Blood)
PHOTO: BRIAN MIDDLETON



DISCUS HEALTH

The Discus, more so than any other species seems to carry an unfortunate legacy of being difficult to keep. I can assure any prospective Discus keepers that nothing could be farther from the truth. It is as simple as this — as long as Discus are provided with the environment they require, the nourishment that they need to grow, and the occasional adjustment of water conditions, they are amongst the most hardy of species.

One of the absolute essentials however is to make sure you have healthy fish to begin with. I covered this in last month's article and, if you followed the criteria you should have no difficulty in raising and keeping Discus.

Generally, Discus do not contract disease from out of thin air. One thing that is important, however, is that they can be carriers of a disease for months before clinical symptoms become apparent. The one thing you should try and achieve is a good quarantine regime, regardless of whether the fish looks healthy or not. There really is no excuse for not doing so, as the fish will benefit in its future health and you, its keeper will benefit in the respect of minimising future diseases and losses. This following procedure can be equated to starting with a "clean slate". I make no apologies for repeating myself on occasions, as I feel this is the one procedure that really should be carried

BRIAN MIDDLETON SAYS DON'T LET IT WORRY YOU TO DEATH.

out by the Discus keeper, irrespective of where the fish were obtained. I do, of course, realise that it is sometimes impossible to quarantine. Due to human nature being what it is, and the impulse purchase of Discus under the pretence of "if I don't buy it now, it may be sold tomorrow". In that case, you just have to be extra observant and hope the Gods are with you, although I can practically guarantee you will be "caught" one day.

So, my advice is:

1. New acquisitions should be kept in quarantine for six weeks; wild-caught fish should be kept in quarantine for eight weeks.
2. Never transfer water from the quarantine tank into the main aquarium.
3. The quarantine tank should have its own set of utensils, syphon tube, net, etc.
4. Do not introduce anything into your aquarium from the quarantine tank until you are absolutely certain of it being disease-free.
5. Observe your Discus as much as possible, and any change in behaviour or appearance should be noted and acted

upon.

6. Gives as varied a diet as possible with plenty of roughage (Spinach, Parsley etc)

7. Only transfer the fish when you are sure that they are healthy.

THE QUARANTINE PROCEDURE

The quarantine tank should be large enough to house the fish, as they are going to be in there for a few weeks. It is important that the tank has a bare bottom so that faeces can be observed. Noting the colour and conditions of Discus waste is probably the most important aspect of Discus health, as it is a perfect early warning system. You will also need an airstone, a good supply of air and a filter that is capable of turning over the volume of the tank about twice an hour. If your newly-acquired fish are infected with a disease you can be fairly certain that it will show itself during the period of quarantine. The water quality should be monitored at least every two days and pH and nitrite values should be noted and adjusted. If the Discus does not exhibit any odd behaviour, feeds normally and produces firm, earth-coloured faeces during the quarantine period it can be assumed that it is healthy, and can be safely transferred to the main aquarium. One thing that I should mention at this stage is that disease cures are a lot easier to put into a tank than they are to

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remove, so try not to over react. Another thing I feel I should mention is that different Discus keepers have different methods and I respect any methods that work for you. The following tips are methods that work for me and have done so for a number of years.

Household Salt (Vibet, Ectoparasites)
Should not be underestimated, it is very effective against most Ectoparasitic infestations e.g. *Costia*, etc. Should be used at the rate of 1g per 15 litres of water for a continuous treatment or 10g per litre for short baths of 15 minutes. The salt should be dissolved in a litre of water and then added slowly to the vessel containing the fish. The fish should be observed for signs of distress and removed if they show signs, but this is not unusual.

Flagyl®. Metronidazole®, Octazin® (Spirochaetes, Hexamita, Hole-in-the-Head Disease)

The early symptom of this disease is long, stringy, milky-white faeces trailing from the fish as shown.



DIAGRAM 1 Hexamita, Spirochaetes (Flagyl).
ILLUSTRATION BRIAN MIDDLETON

Healthy faeces should be earth-like in colour and break off at approximately 3cm.

Flagyl® and Metronidazole® are prescription drugs (which must be obtained from a veterinary surgeon), but are by far the most effective. Treatment with is as follows:

The tank temperature should be raised by 5°F. Flagyl is available in 200mg tablets and should be used at the rate of one tablet per ten gallons of water for three days, after which the temperature should be returned to the normal 86°F.

for six days rest. At this stage, a substantial water change will help and then after six days normal rest the treatment should be repeated. At the end of this second treatment, another substantial water change should be carried out. Your fish should then be completely cured of Spirochaetes and Hexamita.

DON'T BE AFRAID OF APPROACHING YOUR LOCAL VETERINARY PRACTICE. THEY ARE VERY WELL-INFORMED ON MOST FISH AILMENTS DUE TO THE EXPLOSION OF FISH FARMING RECENTLY AND MOST ARE KEEN TO HELP.

C.O.D. (Gill Flukes, Body Flukes, Trichodina, Chilodactyls, and most importantly, Capillaria) also an ideal quarantine cure.

Gill-flukes are recognised by abnormally wide gill movements, and the gills opening on one or both sides at a more rapid speed than one per second.

Body Flukes can be diagnosed when a fish is rubbing itself on firm objects, as if it is trying to get rid of something that is aggravating it.

C.O.D. is one of those drugs used by the Germans for the last twenty years. It is very difficult to obtain in this country, which is a shame, as it is without doubt one of the most powerfully effective cures for Gill and Body Flukes available. Another ailment it is superb treatment for is Capillaria. Capillaria can be identified by long trailing faeces that are not stringy but very bulbous and cotton-woolly.

Again C.O.D. cures it effectively and quickly.

C.O.D. can be obtained from a couple of Discus Specialists advertising in this magazine and I personally believe no Medicine cabinet should be without it.

BACTERICIDAL CURES

As no bacterial disease can be accurately diagnosed without expensive examination, a broad-spectrum bactericide is the only option open to most aquarists and, as it is very

important that you don't break down the bacteria in your biological filter, we need one that will work without doing just that. The one I have had great success with over many years is MYXAZIN. It is broad-spectrum and does not touch filter bacteria.

Only use antibiotics under strict veterinary supervision, as it very important we do not get our fish immune to these antibiotics.

Some Discus develop red noses and sometimes look as though the base of the pectoral fins are haemorrhaging slightly. This is often a mild bacteria disease which tends to cure itself.

IT IS EXTREMELY IMPORTANT NEVER TO MIX CURES OR DRUGS AS THEY CAN HAVE CATASTROPHIC EFFECTS WHEN COMBINED.

When a treatment regime is concluded, to eliminate the cure from your tank, you should do a large partial water change and filter the rest of the water over good quality activated charcoal for 24 hours.

Water Toxicity (Acidosis, Alkalosis, Raised Nitrate

levels, Raised Nitrite levels)

The above all come under the subtitle of "Something in the water that shouldn't be there" and the cure is the same for all of them, in the respect that you have to get the water quality back within acceptable limits as quickly as possible. With Acidosis, ie, pH reading too low, this can be simply corrected by adding dilute Bicarbonate of Soda slowly to the water until a correct level is achieved. Alkalosis can be corrected by adding one of the proprietary "pH Down" remedies or, if you have access, very dilute Phosphoric Acid, but needless to say, this is extremely corrosive and needs to be handled with the utmost care.

Raised Nitrate and Nitrite levels are due to the tank biology becoming unbalanced in some way. This is usually due to a malfunction in the biological filter, uneaten food or decay of some sort within the water. Large water changes will generally sort this problem out.

The symptoms shown for most of the "Toxic" type problems show up in one of two ways: first, and foremost, fish will try



DIAGRAM 2 Capillaria (C.O.D.).

ILLUSTRATION
BRIAN MIDDLETON

TROPICAL Discus Health

and get out of the toxic environment. They show this by flapping and darting around in the tank and trying to get out into the room with you. The other way that it can show is a darkening of the body and gasping for air at the surface. If any of the above symptoms show themselves, increased air supply will help.

DISCUS PLAGUE

(Otherwise known as the New Discus Disease)

No article on Discus health can be written without a reference to this disease. The last thing I want to be is alarmist, but be warned. This disease is definitely a problem that seems to be introduced by fish from the Far East, and Pigeon Bloods in particular. Quite frankly, unquarantined imports are causing the problem in this country. I have even heard of such fish changing hands in motorway service car parks!

THIS IS NOT THE WAY TO BUY DISCUS. IF YOU GET CAUGHT OUT, IT IS YOUR OWN FAULT

The simple answer to eliminate the

chances of this devastating disease is to steer clear of fish from that part of the world. It is just as important to avoid their offspring as they will be carriers of this virus. It is quite virulent in West Wales and the West Country at the moment, and unfortunately people seem to learn the hard way. The excuse is always the same, "I bought them because they were cheap" **THEY USUALLY TURN OUT TO BE THE MOST EXPENSIVE MISTAKE A DISCUS KEEPER WILL EVER MAKE!**

I have only given an outline of the more common Discus ailments in this article but I will go into them a little

more deeply in future issues. I am quite happy to answer letters on your Discus problems but it would help me, to help you, if you write to me c/o **A&P**. We can then share the problems, and hopefully the remedies to them, with the Discus-keeping readers out there.

Next month we will be covering filter systems, a few more invaluable tips AND A PIECE OF PRICELESS FURNITURE

DISCUS KEEPERS PLEASE NOTE: The First International Discus Championships will be held this year in Duisburg, Germany between the 3rd and 6th October. There will be 1,200 tanks of some of the finest Discus in the world on show. Lectures are being given by Discus Gurus such as Jack Wattlely, Dr Clifford Chan and Manfred Gobel. I shall be there flying the flag for **A&P** and will, of course, inform all of you unable to attend whether you missed anything or not. Further details of the event can be obtained from: Dipl.-Biol. Christiane Loose, Zoo Zajac, Baustrasse 15-17, 47137 Duisburg, Germany. Fax: 0049 203 450 4551.

B.T. Foden

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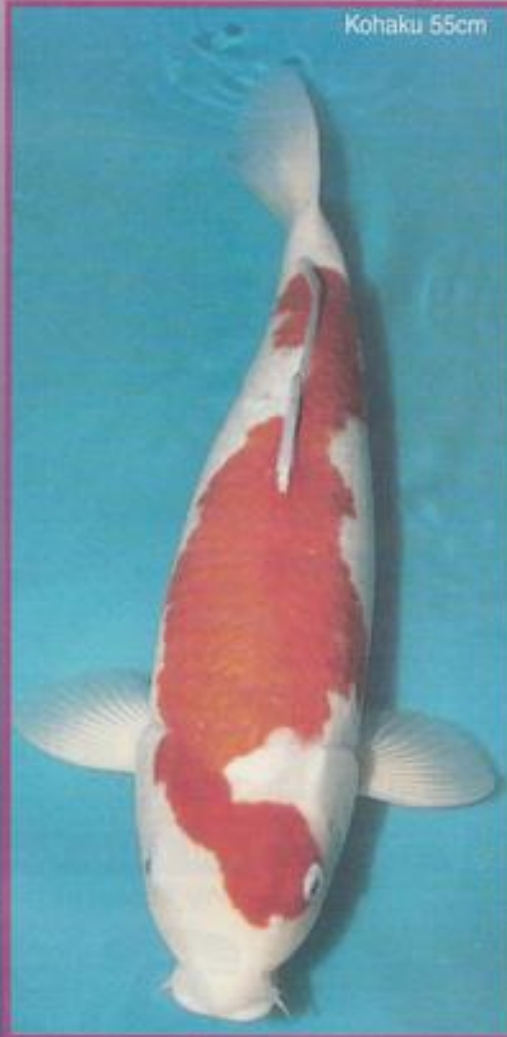
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10m x 15m	£37.80	£18.90	£16.80
12m x 10m	£30.60	£15.30	£13.80
12m x 15m	£43.20	£21.60	£19.20
15m x 10m	£37.80	£18.90	£16.80
15m x 15m	£50.40	£25.20	£22.80
20m x 10m	£50.40	£25.20	£22.80
20m x 15m	£63.00	£31.50	£28.20
25m x 10m	£63.00	£31.50	£28.20
25m x 15m	£75.60	£37.80	£34.20
30m x 10m	£75.60	£37.80	£34.20
30m x 15m	£88.20	£44.10	£40.20
35m x 10m	£88.20	£44.10	£40.20
35m x 15m	£100.80	£50.40	£46.20
40m x 10m	£100.80	£50.40	£46.20
40m x 15m	£113.40	£56.70	£52.20
45m x 10m	£113.40	£56.70	£52.20
45m x 15m	£126.00	£63.00	£58.20
50m x 10m	£126.00	£63.00	£58.20
50m x 15m	£138.60	£69.30	£64.20
55m x 10m	£138.60	£69.30	£64.20
55m x 15m	£151.20	£75.60	£70.20
60m x 10m	£151.20	£75.60	£70.20
60m x 15m	£163.80	£81.90	£76.20
65m x 10m	£163.80	£81.90	£76.20
65m x 15m	£176.40	£88.20	£82.20
70m x 10m	£176.40	£88.20	£82.20
70m x 15m	£189.00	£94.50	£88.20
75m x 10m	£189.00	£94.50	£88.20
75m x 15m	£201.60	£100.80	£94.20
80m x 10m	£201.60	£100.80	£94.20
80m x 15m	£214.20	£107.10	£100.20
85m x 10m	£214.20	£107.10	£100.20
85m x 15m	£226.80	£113.40	£106.20
90m x 10m	£226.80	£113.40	£106.20
90m x 15m	£239.40	£119.70	£112.20
95m x 10m	£239.40	£119.70	£112.20
95m x 15m	£252.00	£126.00	£118.20
100m x 10m	£252.00	£126.00	£118.20
100m x 15m	£264.60	£132.30	£124.20
105m x 10m	£264.60	£132.30	£124.20
105m x 15m	£277.20	£138.60	£130.20
110m x 10m	£277.20	£138.60	£130.20
110m x 15m	£289.80	£144.90	£136.20
115m x 10m	£289.80	£144.90	£136.20
115m x 15m	£302.40	£151.20	£142.20
120m x 10m	£302.40	£151.20	£142.20
120m x 15m	£315.00	£157.50	£148.20
125m x 10m	£315.00	£157.50	£148.20
125m x 15m	£327.60	£163.80	£154.20
130m x 10m	£327.60	£163.80	£154.20
130m x 15m	£340.20	£170.10	£160.20
135m x 10m	£340.20	£170.10	£160.20
135m x 15m	£352.80	£176.40	£166.20
140m x 10m	£352.80	£176.40	£166.20
140m x 15m	£365.40	£182.70	£172.20
145m x 10m	£365.40	£182.70	£172.20
145m x 15m	£378.00	£189.00	£178.20
150m x 10m	£378.00	£189.00	£178.20
150m x 15m	£390.60	£195.30	£184.20
155m x 10m	£390.60	£195.30	£184.20
155m x 15m	£403.20	£201.60	£190.20
160m x 10m	£403.20	£201.60	£190.20
160m x 15m	£415.80	£207.90	£196.20
165m x 10m	£415.80	£207.90	£196.20
165m x 15m	£428.40	£214.20	£202.20
170m x 10m	£428.40	£214.20	£202.20
170m x 15m	£441.00	£220.50	£208.20
175m x 10m	£441.00	£220.50	£208.20
175m x 15m	£453.60	£226.80	£214.20
180m x 10m	£453.60	£226.80	£214.20
180m x 15m	£466.20	£233.10	£220.20
185m x 10m	£466.20	£233.10	£220.20
185m x 15m	£478.80	£239.40	£226.20
190m x 10m	£478.80	£239.40	£226.20
190m x 15m	£491.40	£245.70	£232.20
195m x 10m	£491.40	£245.70	£232.20
195m x 15m	£504.00	£252.00	£238.20
200m x 10m	£504.00	£252.00	£238.20
200m x 15m	£516.60	£258.30	£244.20
205m x 10m	£516.60	£258.30	£244.20
205m x 15m	£529.20	£264.60	£250.20
210m x 10m	£529.20	£264.60	£250.20
210m x 15m	£541.80	£270.90	£256.20
215m x 10m	£541.80	£270.90	£256.20
215m x 15m	£554.40	£277.20	£262.20
220m x 10m	£554.40	£277.20	£262.20
220m x 15m	£567.00	£283.50	£268.20
225m x 10m	£567.00	£283.50	£268.20
225m x 15m	£579.60	£289.80	£274.20
230m x 10m	£579.60	£289.80	£274.20
230m x 15m	£592.20	£296.10	£280.20
235m x 10m	£592.20	£296.10	£280.20
235m x 15m	£604.80	£302.40	£286.20
240m x 10m	£604.80	£302.40	£286.20
240m x 15m	£617.40	£308.70	£292.20
245m x 10m	£617.40	£308.70	£292.20
245m x 15m	£630.00	£315.00	£298.20
250m x 10m	£630.00	£315.00	£298.20
250m x 15m	£642.60	£321.30	£304.20
255m x 10m	£642.60	£321.30	£304.20
255m x 15m	£655.20	£327.60	£310.20
260m x 10m	£655.20	£327.60	£310.20
260m x 15m	£667.80	£333.90	£316.20
265m x 10m	£667.80	£333.90	£316.20
265m x 15m	£680.40	£340.20	£322.20
270m x 10m	£680.40	£340.20	£322.20
270m x 15m	£693.00	£346.50	£328.20
275m x 10m	£693.00	£346.50	£328.20
275m x 15m	£705.60	£352.80	£334.20
280m x 10m	£705.60	£352.80	£334.20
280m x 15m	£718.20	£359.10	£340.20
285m x 10m	£718.20	£359.10	£340.20
285m x 15m	£730.80	£365.40	£346.20
290m x 10m	£730.80	£365.40	£346.20
290m x 15m	£743.40	£371.70	£352.20
295m x 10m	£743.40	£371.70	£352.20
295m x 15m	£756.00	£378.00	£358.20
300m x 10m	£756.00	£378.00	£358.20
300m x 15m	£768.60	£384.30	£364.20
305m x 10m	£768.60	£384.30	£364.20
305m x 15m	£781.20	£390.60	£370.20
310m x 10m	£781.20	£390.60	£370.20
310m x 15m	£793.80	£396.90	£376.20
315m x 10m	£793.80	£396.90	£376.20
315m x 15m	£806.40	£403.20	£382.20
320m x 10m	£806.40	£403.20	£382.20
320m x 15m	£819.00	£409.50	£388.20
325m x 10m	£819.00	£409.50	£388.20
325m x 15m	£831.60	£415.80	£394.20
330m x 10m	£831.60	£415.80	£394.20
330m x 15m	£844.20	£422.10	£400.20
335m x 10m	£844.20	£422.10	£400.20
335m x 15m	£856.80	£428.40	£406.20
340m x 10m	£856.80	£428.40	£406.20
340m x 15m	£869.40	£434.70	£412.20
345m x 10m	£869.40	£434.70	£412.20
345m x 15m	£882.00	£441.00	£418.20
350m x 10m	£882.00	£441.00	£418.20
350m x 15m	£894.60	£447.30	£424.20
355m x 10m	£894.60	£447.30	£424.20
355m x 15m	£907.20	£453.60	£430.20
360m x 10m	£907.20	£453.60	£430.20
360m x 15m	£919.80	£459.90	£436.20
365m x 10m	£919.80	£459.90	£436.20
365m x 15m	£932.40	£466.20	£442.20
370m x 10m	£932.40	£466.20	£442.20
370m x 15m	£945.00	£472.50	£448.20
375m x 10m	£945.00	£472.50	£448.20
375m x 15m	£957.60	£478.80	£454.20
380m x 10m	£957.60	£478.80	£454.20
380m x 15m	£970.20	£485.10	£460.20
385m x 10m	£970.20	£485.10	£460.20
385m x 15m	£982.80	£491.40	£466.20
390m x 10m	£982.80	£491.40	£466.20
390m x 15m	£995.40	£497.70	£472.20
395m x 10m	£995.40	£497.70	£472.20
395m x 15m	£1008.00	£504.00	£478.20
400m x 10m	£1008.00	£504.00	£478.20
400m x 15m	£1020.60	£510.30	£484.20
405m x 10m	£1020.60	£510.30	£484.20
405m x 15m	£1033.20	£516.60	£490.20
410m x 10m	£1033.20	£516.60	£490.20
410m x 15m	£1045.80	£522.90	£496.20
415m x 10m	£1045.80	£522.90	£496.20
415m x 15m	£1058.40	£529.20	£502.20
420m x 10m	£1058.40	£529.20	£502.20
420m x 15m	£1071.00	£535.50	£508.20
425m x 10m	£1071.00	£535.50	£508.20
425m x 15m	£1083.60	£541.80	£514.20
430m x 10m	£1083.60	£541.80	£514.20
430m x 15m	£1096.20	£548.10	£520.20
435m x 10m	£1096.20	£548.10	£520.20
435m x 15m	£1108.80	£554.40	£526.20
440m x 10m	£1108.80	£554.40	£526.20
440m x 15m	£1121.40	£560.70	£532.20
445m x 10m	£1121.40	£560.70	£532.20
445m x 15m	£1134.00	£567.00	£538.20
450m x 10m	£1134.00	£567.00	£538.20
450m x 15m	£1146.60	£573.30	£544.20
455m x 10m	£1146.60	£573.30	£544.20
455m x 15m	£1159.20	£579.60	£550.20
460m x 10m	£1159.20	£579.60	£550.20
460m x 15m	£1171.80	£585.90	£556.20
465m x 10m	£1171.80	£585.90	£556.20
465m x 15m	£1184.40	£592.20	£562.20
470m x 10m	£1184.40	£592.20	£562.20
470m x 15m	£1197.00	£598.50	£568.20
475m x 10m	£1197.00	£598.50	£568.20
475m x 15m	£1209.60	£604.80	£574.20
480m x 10m	£1209.60	£604.80	£574.20
480m x 15m	£1222.20	£611.10	£580.20
485m x 10m	£1222.20	£611.10	£580.20
485m x 15m	£1234.80	£617.40	£586.20
490m x 10m	£1234.80	£617.40	£586.20
490m x 15m	£		

TECHNICALITIES for beginners

This month
PETER MOON looks
at Living Rock —
the Natural
Biological Filter.

Living Rock — what is it?



PHOTO: PETER MOON

Of course, the rock itself is not living but is primarily made up of limestone and volcanic material or the remains of organisms that grow calcareous shells or leave calcium-rich skeletons. It is on the surface (and in the pores) of such rock that organisms such as Protozoans, sponges, soft and hard corals, anemones, molluscs, worms, shrimps etc grow that make the rock 'live.' Bacteria and plants also add to this diversity.

Where does it come from?

Most warm seas, but mainly from places such as Florida, Sea of Cortez, Marshall Islands, Tonga, Samoa, the Caribbean and the coast of Africa. You will find that rock from different parts of the World, have different porosities so, if the type of rock is equated with weight and rock is either sold by the pound (kilo) or by the box, you will find therefore, that the price will

obviously differ for different amounts of different rock, but check with your dealer, most should be able to offer alternatives if you are working to a budget.

What to buy

Most of the rock available is called Base Rock and as the name suggests it is used to build up your reef from the bottom of the aquarium upwards. On top of this you would then place your 'Cured' rock (kept wet, aerated and scrubbed clean of unwanted algae etc by the collector), or your 'Seeded' rock (similar to 'Cured' but given longer time by the collector to fully leach out all dead organic matter; this extra time gives beneficial bacteria time to colonise the surface and inner areas of the rock).

Unfortunately, the ideal combination of Base/Seeded/Cured rock, depending on the size of your tank (and ultimately your wallet!) could prove to be expensive, but you could use

Tufa, or Ocean, rock as your base and then purchase your live rock to top this off as required. A word of warning — avoid all rock that does not have a fresh Ocean smell, or is covered in a white film and generally looks unhealthy.

Live Rock in the aquarium

Live Rock makes the Aquarium look more natural and interesting. If you view the rock in close up you can see a myriad of tiny creatures going about their daily business. Whilst live rock gives an authentic appearance to an aquarium the real benefit lies in filtration. Each rock is honeycombed throughout with tiny holes and bored-out passages and this enables various bacteria to colonise these areas and aid significantly in the breakdown of unwanted compounds. Getting slightly technical for a moment, aerobic (oxygen-loving) and anaerobic (oxygen lacking)

bacteria proliferate in these different areas to nitrify and denitrify. If fish are present in your system, then live rock can act as a supplementary natural food source, so cutting down slightly on your feeding regime is not a bad idea.

As mentioned earlier most living rock is made up of a calcareous material (Calcium Carbonate) so this acts as an additional buffering system helping to maintain the aquariums alkalinity (KH). If you are adding rock to an established or fairly new aquarium you may experience an increase in nitrite levels, so have your test kit ready, but this should only apply if you are adding a considerable amount of rock and also assumes your water quality parameters were acceptable to begin with. You will need approximately two pounds of live rock per gallon for a reef tank set-up, depending on the weight and structure of the rock being purchased.

Until next month — Happy Fishkeeping.

BUY LINES

Barry James'

round-up of latest innovations for your pond and aquarium

Interpet launch Submarine UV

A real major breakthrough has been the abolition of the fragile quartz glass tube which, until now, had been mandatory in UV clarifier designs. Unfortunately, necessary regular cleaning all too often put the quartz tube at physical risk but using an alternative material, Teflon®, famed for its non-stick properties, has eliminated even this problem. Water enters the unit at one end and through a spiral flow pattern moves around the special high output, long-life PLS lamp (single end fixing only, making for easy changing) in a specially enlarged path length for optimum exposure time before exiting at the other end. Flow rate can be adjusted by a simple turning action on the inlet. The unit is easily installed 'in series' in any water flow — the easiest situation being between a Pond Worker filter and a submersible pump. The design concept also makes the unit extremely versatile and it can be used in several options — even out of water if necessary.

Two units are available, the nine watt unit will service up to 9,000 litres (2,000 gallons) and an 11 watt unit for ponds up to 13,500 litres (3,000 gallons). Both comply with the EU's stringent safety standards and are CE marked. A double 'O' ring seal, ultrasonic welding and full UV shielding protect the outer casing. An integral 'lamp on' indicator warns against opening the unit when in use. Each unit comes with five metres of mains cable. Replacement tubes are easily available.

Details from: INTERPET LTD., Vincent Lane, Dorking, Surrey RH4 3YX. Tel: 01306 881033. Fax: 01306 885009.

New fish food

The AQUA COMPANY LTD have announced the launch of a new fishfood for pond owners. It is called AQUADAPHNIA and contains 100% cultured zooplankton (90% of which is Daphnia). The material is preserved in its original body shape. Free Amino Acids are present in the fluid which surrounds the zooplankton which constitute a powerful attractant and appetite stimulant for fish and invertebrates. The zooplankton is pasteurised at 90°C for 14 hours, a method that is very rigorous and is almost akin to sterilisation. After this process the product is either frozen, or sterilised, to ensure its future preservation. Its applications are:

1. Feed to tropical and coldwater fish and invertebrates in pond and aquarium.
 2. Can be added as an attractant to fishing bait and lures.
 3. Can be incorporated into compound foods such as extruded pellets by mixing it with the other ingredients before the extrusion process.
- Recommended levels of 1.0-2.0% by weight.

The product is presented in two forms:

- A. In 500 gram jars to be kept in the refrigerator.
- B. In 3 Kilo frozen packs. (Generally for professional breeders).

The liquid form has an unlimited shelf life when it is unopened, and approximately three weeks after opening.

Note: The sample pack I was sent for testing purposes was greedily consumed by my tropicals and pondfish. The former put on weight quite noticeably over the three week period in which I fed it.

These products at the moment are distributed entirely by Mail Order. The 500 gram pack

A new generation of internal filters, heater/thermostats and powerheads



Rolf C. Hagen in introducing the new TRIO 2000 and TRIO 3000 have made an attempt to bridge the gap between the expensive but sophisticated outside power filters and the cheap but somewhat basic internal power filter. With these two filters they have largely succeeded.

The new filters offer mechanical, biological and chemical filtration. Other attempts have tried to employ trickle filtration but with only limited success. The

Trios have a three chamber design in which either, Hagen's own media, or other variants of the customer's choice, can be employed. The powerful pump is fitted with a fully adjustable control mechanism. The media can be easily removed for cleaning or replacement without the need to remove the whole filter from the aquarium; the pump, too, can be removed separately for maintenance so all in all this is a very user-friendly bit of equipment. The last features which will be even more welcome, are the prices for these units.

The Trio 2000 services a tank of 16 gallons and costs just £34.99 inc VAT whilst its bigger brother, the Trio 3000, will filter a 30 gallon tank and is priced at £44.99.

The new TRONIC heating systems incorporate a new patented sensor system which monitors the water temperature outside the heater tube. The units also incorporate a calibrated temperature control and a fail-safe system which switches the unit off when it is removed from the water. Delivering constant even heating, delivered reliably, the Tronic provides aquarists with a tool that will provide them with an ideal temperature control system for all aquatic environments.

Designed specifically for 15 gallon (24in) aquariums, the AQUACLEAR 101 is light, compact and powerful.

A flow control enables the output to be lowered for passive fish and plants sensitive to strong currents. This unit is an ideal way to maximise biological filtration. Price is £18.99 inc VAT.

Details of all the products detailed above from: Deborah Gair, ROLF C. HAGEN (UK) LTD, Whitwood Industrial Estate, California Drive, Castleford, West Yorkshire WF10 5DH. Tel: 01977 556622. Fax: 01977 513465.

retails at £9.85 inc VAT And delivery.

Further details from: Mrs Claire Stewart, Aqua Company Ltd., Abbot House, 14a Hale Road, Farnham, Surrey GU9 9QH. Tel: 01252 712307. Fax: 01252 712308.

New Koi food

Major changes in the management of the Phoenix 2000 team designed to consolidate and further develop the tremendous success of the market leading Phoenix 2000 range are now in place and the first innovation of 1996 is the launch of a PHOENIX 2000 KOI STICK.

The premium quality Phoenix 2000 Koi Stick enables serious

Koi Keepers to have Phoenix 2000 foods available in a variety of formats. The launch of the new Phoenix 2000 Koi Stick is a direct response to hobbyists demands who now have Phoenix available for all season nutrition — Phoenix 2000 as a staple diet, Phoenix XL for high temperature feeding, and now the new Koi Sticks provide an ideal lower temperature food.

Koi sticks are especially important to Koi Keepers who prefer the enhanced digestibility provided by Koi sticks to bring their Koi out of their Winter regime into Spring. The Koi Stick format is ideal for encouraging Koi back into full feeding as Spring temperatures rise, as the Sticks are soft and easy to swallow and will often be taken in the early Springtime by Koi

► Continued on page 118

Pond Diary

APRIL 1996

Sun		7	14	21	28
Mon	1	8	15	22	29
Tue	2	9	16	23	30
Wed	3	10	17	24	
Thu	4	11	18	25	
Fri	5	12	19	26	
Sat	6	13	20	27	

With Spring in the air, **Susan Stephenson** finds there are increasingly necessary, but worthwhile, tasks to be done in and around the pond.

April is the time when the increased activity of plants and animals in the pond should become really noticeable. The weather should be improving but late severe frosts can still occur.

Trim back any dead foliage but leave some protection in case of late frosts as these can set back some plants. Tidy up the bog garden and lightly fork over any bare areas of soil. When the danger of frosts has passed remove the pond heater, clean and store for summer. Clean netting of leaves and debris and re-stretch to keep herons and cats off.

Any extensions to water features should be planned now as the ground becomes workable and there will still be time to stock with plants and fish for late spring.

Pool planting can start towards the end of the month if the weather is warm enough. Aquatics need enough food like all plants so the choice of soil for the pool is as important as

for the rest of the garden.

Use good soil which is slightly alkaline or neutral. If acidic soil is used, add some chalk (except for concrete pools which have their own source of calcium.) Use clay soils in preference to light ones as they tend to contain more nutrients. Avoid very chalky soils which encourage algae and also soils with a high straw or manure content. Do not use very soluble fertilizers as the nutrients will dissolve out.

and encourage algal growth while not performing their intended purpose.

Plants need enough soil and to be covered by sufficient depth of water. You can either put 4in of soil in all areas where plants are to be grown or put a shallow layer (2in) on the bottom which is enough for oxygenating plants, 4in on the shelves for marginals and use 6in deep slat-sided containers for water-lilies. Alternatively you can use different sizes of slat-sided containers for plants and place them in the correct depths.

Flood the soil in containers by standing them in water for half an hour (before placing in the pool) to remove any air.

Rhizomes of water-lilies should be set about 15 degrees to the horizontal with the crown just under the soil. Oxygenating plants should have the lower ends of their stems pushed 1in into soft soil. The roots of marginals need to be spread and pushed down into the soil. Rhizomes of plants

like bog arum and irises should be planted roughly horizontally while floating plants are simply placed on the surface.

Seedlings of water-hawthorn should be planted out now and primula seeds may be sown in boxes for planting out in August. Mimulus (musk) seeds can be sown now for July flowering.

Bog garden plants may require a light feed now and it is much better to use natural organic feeds than chemicals as the latter may leave excess nitrates in the soil that can leach into the pond.

Prevent any spillage of fertiliser into the pond as it will encourage algal growth.

If Toads appear in your pond which take fish in error, remove them (to a pond not stocked with fish) as this habit is permanent.

April can be the month when the results of all the winter vigilance begin to be seen and the pond really begins to come to life again.

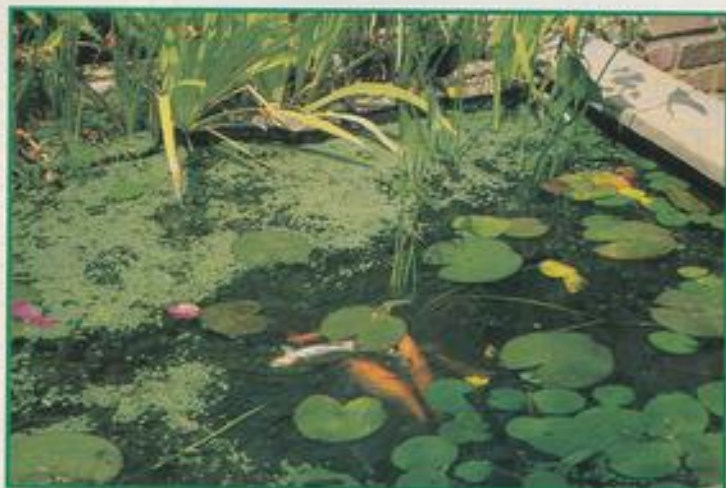


PHOTO: KEITH LAMBERT

Useful April Tips

- (1) You can contain individual plants by building a circle of stones around their maximum area on the bottom of the pond.
- (2) Remember if you use containers for all plants the pond will take longer to become established as the smaller members of animal population, essential to the pool's ecosystem, will not multiply until there is enough sediment on the base to offer them food and shelter.

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New fluorescent lighting controller

The new **ARCADIA CONTROLLER** is initially being launched with two ranges: The **STANDARD RANGE** consists of five Controllers: the **AC08** having 1/4in tube holders and the other 4 models (AC157

AC18, AC30 and AC36) are designed for the popular 11in fluorescent tubes.

The **SPECIALIST RANGE** includes 3 Controllers (ACS20, ACS30 and ACS40) which all operate 1/4in fluorescent tubes.

The new Controllers, approved by the BSI to European Standard EN 60598-24:1989, have been awarded the "CE" mark (enabling distribution throughout Europe) and come in a stylish, dark grey plastic casing complete with splashproof tube holders, longer tube leads, a marked on/off switch at the side and UK three pin fitted plug. Also included are tube clips, fasteners and an instruction leaflet which includes details of our new 5 YEAR GUARANTEE. The modern eye-catching packaging has been designed to be displayed standing up vertically with the size details on the pack front and includes a simple guide to customers to make it easy for them to select the correct size of Controller.

All Controllers have an RRP of £14.99 with the exception of the Standard 36W and the Specialist 40W which are priced at £15.69.

Further details from: **JERRARD BROS plc, Arcadia House, Cairn New Road, Croydon CR0 1XP. Tel: 0181 681 3119. Fax: 0181 688 8222.**

who may otherwise refuse pelleted feed.

Phoenix 2000 Koi Sticks provide the already highly-digestible Phoenix formula in a readily whetted and easy to swallow stick format which has all the nutritional value of Phoenix 2000 in an easily taken format. The new Phoenix 2000 Koi Sticks also have the additional benefit of stabilised vitamin C, vital in stimulating the Koi's immune system which is especially important in the Springtime.

In addition to great quality and low price, Phoenix are launching the new Koi Stick in 20% extra free packages. So not only can Koi and pond enthusiasts have great Phoenix 2000 quality at the usual low prices but also for a limited period they can also

enjoy 20% extra completely free.

Philippa Cornwell, Phoenix 2000 product manager, commented: "The Phoenix total commitment to product quality, nutritional excellence and providing Koi enthusiasts with a balanced complete Koi food is paying off as the range is now firmly established as a market favourite with the fastest growing sales in Europe. The amazing success of XL in 1995 and the ongoing success of Phoenix 2000 inspired us to meet the growing demands from Phoenix product users for a premium quality Koi stick".

For more information contact your local Phoenix stockist or Kerry Brookes or Howard Lilly at: **GOLD LINE FEEDS, Private Road No 3, Colwick, Nottingham, NG4 2BA. Tel: 0115 940 2220. Fax: 0115 961 3537.**

... News Desk



Party time at Waterlife Research's opening of PET UNIVERSE.

Waterlife opens new attraction

To the strains of a traditional jazz band, Graham Cox welcomed guests to the official opening of Waterlife Research's brand new retail section, PET UNIVERSE.

Readers with fond memories of Seaquarium's huge marine tanks will wonder where they've all gone and how they have been replaced. There are wide walkways between display tanks and yet the tanks are capable of holding just as many fish as before, if not more. There are 200 tanks in the fish-holding displays (coldwater, tropicals and marines) arranged in three tiers, sloping away from the viewer. The aquariums are made of acrylic materials, each with its own connections to and from the downstairs central filtration system. Here, well-mannered pipes (of varying diameters), control valves, dials, media-containing towers, reservoirs, pumps and UV lamps all throbbing away to maintain the sparkling (and healthy) conditions in the tanks above.

Such has been the technological advances in recent years, it is possible to display fish in physically smaller tanks without any stress; as each tank is a small part of the whole water volume, each fish collection is probably convinced that it is occupying its own territory on the coral reef, stream or river.

The careful arrangement of lighting means that you'll never cast a shadow over what you're looking at — a very welcome condition when you're a hard-pressed assistant trying to catch a fish! Aquatic plants are presented in similarly arranged tiered tanks.

The dry goods area is but a step away from the livestock. Despite the proximity of the northern east-west runways of Heathrow, the sound of departing or arriving jets never intrude into the calm of Pet Universe to distract your attention from the attractions on display. Check it out soon at: Waterlife Research Industries Ltd., Bath Road, Longford, nr. West Drayton, Middlesex, UB7 0ED. Tel: 01753 685696. Fax: 01753 685437.

OFI (UK) warns against 'private dealers'

Chief executive Keith Davenport explains: "How often have people been tempted by unbelievable low prices on offer for pond pumps or aquariums of fish in the local newspaper? These 'bargains' turn up week after week and always the same address and telephone number to reply to.

"A buyer goes to the address — often a garage or garden shed — a 'brand new' piece of equipment is purchased at a

price never advertised anywhere else, and when the equipment is installed nothing happens."

Keith added that such a sale is not fully covered by the Sale and Supply of Goods Act 1994. A bona fide retailer, however, would be required by that act to supply goods which are fit for their purpose, and would be obliged to provide a refund for any equipment they sold which did not work. "The 'black economy' businesses operate outside the law and deprives the public of at least part of the law's protection," added Keith Davenport. "The same position can arise when live fish are sold by these 'businesses'. If they

► Continued on page 120

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are not licensed by the local authority as pet shops they are not subject to annual inspection of the district council."

Keith explained that unlicensed pet shops deprive customers of the protection of the law when fish and other goods are sold. "These unlicensed retailers are quite different in scale from members of the hobby selling off fish that they have bred as part of their hobby, or of equipment that they have replaced or no longer need, and which are truly private sales."

"The local licensed retailer must meet the requirements of the planning authorities, pay rates, and pay for a Pet Shop Licence, all of which increase the overheads and make that retailer a professional trader, who must comply with the law and protect the rights of customers."

Ullesthorpe events for water gardeners

A series of events designed to provide the public with information and practical advice on water gardening and pondkeeping is being organised by Ullesthorpe Garden and Aquatic Centre at Ullesthorpe, near Lutterworth, Leicestershire.

Among the highlights of the series will be a free prize draw, an open evening with a talk and slide show and a weekend aquatic gala.

The prize draw will be open throughout the Easter weekend (April 5-8 inclusive) and every customer will be invited to enter the draw for a Koi (ornamental carp), from a range of the highest-quality imported specimens at Ullesthorpe Garden and Aquatic Centre.

Aquatics Centre Manager Keith Watson will present a talk about how fish are imported, and this will be illustrated with slides taken on a buying trip to the coldwater fish farms in Israel; while a discussion forum on all aspects of fish- and pond-keeping will also be held.

A May Day gala weekend rounds off the series of pondkeeping events, with exhibitions and demonstrations, an aquatics advice centre, and special discounts; as well as the

draw for the winner of the prize Koi.

Ian Tallis, director of Ullesthorpe Garden and Aquatic Centre, remarked: "Easter is the time when gardeners and fishkeepers turn their attention to the pond and its inhabitants, and these activities provide the perfect opportunity for them to get the season off to a head start. In addition, more and more people are complementing their garden design with a pond or water feature and these events will enable them to gain all the information they will require to enhance the success and enjoyment."

Sharks and high tides on the M40!

The new National Sea Life Centre will be opening in June in Birmingham and, as any experienced aquarist will tell you, things have to be set up well in advance for the wellbeing of the fish. So, during this month supplies of seawater will be making their way from Weymouth to Birmingham to fill up the tanks ahead of the livestock, which will be following in their tracks during May.

The new Sea Life Centre, the first ever city-centre aquarium will house Europe's largest collection of both native freshwater and marine creatures including Sharks, Eels and Eels. It will also feature the world's first 360 degree transparent tunnel: walk through this and you'll be surrounded on all sides (including overhead and underneath) by fish and marine life! In conjunction with Severn Trent Water, you will be able to follow the cycles of fresh and seawater using one of the many Virtual Reality Headsets.

Since the first Sea Life centre was opened in 1979 at Oban, the Centres have employed innovative, state-of-the-art aquarium display techniques to give both astonishing views of marine life to the public and which also replicates their natural habitats as closely as possible. Conservation, preservation, captive breeding and rescue programmes take place at the various Centres who also work closely with school children producing National Curriculum-based education

peaks.

A six month, national, pro-active marketing and promotions campaign for Sea Life Centres has already begun with an on-pack promotion linked to Quaker Oat Krunchies.

There are 15 existing Sea Life Centres located at coastal resorts throughout the U.K., and three more in Spain, Holland and Belgium with a fourth opening in Germany this summer.

For further information about Sea Life Centres ring 0800 600 800.

Give these fish funsters wheels and wings

On April 27 there will be a mass break-out from Dartmoor! Teams dressed in prison clothes will try to travel furthest, attract most publicity or raise most money all within a time limit and without paying for any fares.

A team from Pets Needs, Exeter — a family-run pet shop specialising in tropical and coldwater fish — hope to fly to London, cycle in Hyde Park, fly to New York, cycle round Central Park and return — all within 36 hours and without paying for transport.

All money raised will go to Vranich House School and Centre for children with Cerebral Palsy and will be used to buy much needed equipment. If you can help with sponsorship or publicity (the more outrageous the better) or just want to offer your support, please contact Carl McAdam, whose daughter attends Vranich School, on 01392 860854, or send any donation to Pets Needs, Cowick Street, Exeter, Devon.

Maytime in April

Despite the ominous date (April 1) the London Aquatic Company will launch a new aquatic plant, available to the Trade for the very first time.

The strikingly beautiful variegated Water Forget-Me-Not is without doubt one of the most exciting introductions for many

years. Discovered in 1993 as a single variegated leaf in an old clump of *Myosotis scorpioides* by London Aquatic's propagator, John P. Allwork, it was removed and struck as a cutting. After many months of propagation and selection it was eventually stabilised and by the following year 1,000 cuttings had been established to be tested in growing trials; stability and hardiness tests proved exceedingly satisfactory.

Named "Maytime" (after the family house and John's mother, May Allwork) the plant will be distributed to the Aquatic Trade by LAC and to the general Garden centre Trades in the U.K. and overseas by Blooms of Bressingham Ltd.

Plant Breeders Rights have been applied for.

Details from: London Aquatic Company, Theobalds Park Road, Enfield, Middlesex EN2 9DH. Tel: 0181 366 4143. Fax: 0181 367 6256.

FBAS goes into the garden

Throughout the coming season the Federation of British Aquatic Societies is organising an AQUATIC ROAD SHOW which will be appearing at a selection of Garden Shows ranging from major events such as Hampton Court Flower Show and BBC Gardeners World Live! to smaller regional venues such as Redhill, Salisbury, Bourne-mouth and Poole with others to follow.

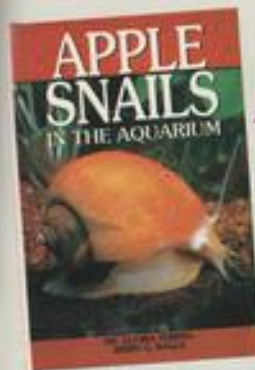
The objective is to present the organised hobby to the thousands of enthusiastic fishkeepers and water gardeners, and to provide practical advice, information and educational material to all amateur fishkeepers and water gardeners.

Formal Speakers, amateur experts, Trade specialists, Junior Fishkeeping Competitions, incentives and bonuses will all be there — come and see us at your local Garden Show.

Our first stop will be the Redhill Garden Show over the Easter Weekend.

For further details about this new venture, please contact Alan Benson, 25 Blewitts Cottages, New Road, Rainham, Essex RM13 8SL.

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P4021	Freshwater Aquarium Fish, Mini Atlas of	Axelrod	H1152c	24.95	P6077	Poison Frogs			
P4020	Freshwater Fish, Atlas of (8th Edition)	Axelrod	H1152c	69.95	P6052	Jewels of the Rain Forest	Wells	H288c	49.95
P4052	Garden Ponds, Atlas of	Varika	H285c	34.95	P6030	Reptile Care (2 Volume Set)	Frye	H652c	125.00
P4101	Goldfish & Koi in your Home	Axelrod/Wanderwilder	H223bc	11.95	P6047	Reptile Keepers Dictionary	Wareham	H248	18.99
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PC0040	Koi & Garden Ponds - Complete Introduction	Axelrod	S126c	4.95	P6029	Snakes, Keeping & Breeding	Coburn	H591c	89.95
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								H224bc	25.00

Recommended Reading

KEY: S: Soft cover H: Hard cover A: 400+ pages B: Back/white picture C: Colour picture

Please send me the following books. I enclose a cheque/P.O. order payable to Waterlooville.

Book No.	Title	Price

My order is for the following books: S H A B C

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My telephone number is: _____

My post code is: _____

My signature is: _____

My date is: _____

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Signature: _____

Date: _____

You Write



Dear Sir,

As part of the training given at Sparsholt College, the students on the National Certificate and National Diploma in Aquatics and Ornamental Fish Management study water chemistry in great detail. At the end of this section of work, many Companies were invited to a water chemistry trade show, to display their products which related to the areas of study i.e. water monitoring and

modification. The trade show was an opportunity for the students to look at the products on the market and for them to ask questions about the pricing, packaging and marketing of the products, as well as their uses in the hobby. It was very much a two-way process however, with the representatives gaining some new ideas from the students.

At the end of a very stimulating day the response from both sides was excellent.

The representatives had met about 40 prospective retail managers and given their sales pitch, and the students said that they had seen a good range of products and would like to repeat the

day, next time looking at filtration systems.

Students and Staff at Sparsholt College would like to thank very much Tetra, Interpet, Coral Reef Technology, AllClear, Purity on Tap, John Allan Aquariums Ltd (Sera), Underworld Products and New Technology for giving freely of their time, knowledge and in some cases, equipment, for the benefit of the students. Our close links with the industry are very important.

**Jane Lloyd,
Course Tutor,
National Diploma in Aquatics
and Ornamental Fish
Management,
Sparsholt College**

nothing would clear it; the scum would collect on either side of my pond and waterfall as well as lurking in the corner of the pond too. We purchased two bags of PRO-VITAL PEAT from our local garden centre and placed them in the pond. Within one week we could see the difference and now, after a month, the pH has stabilised the scum, which has gone completely, and the fish are healthy. One fish did have an ulcer on its side but this is now repairing nicely and nearly gone.

The Pro-Vital Peat has solved our ongoing problem and appears to have helped my pond a great deal, so I hope you understand the reason for this letter and that other readers can be helped who may have been trying to solve the same problem without too much success.

**Mrs Pearl Kempson,
Southend-on-Sea**



Dear Sir,

I had to drop you a line to let you know what a great relief it was to have found a product to remove the scum off the top of my pond.

I had tried everything but



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Champion of Champions Contest 1996

I wish to point out to all Society Secretaries, that the new owners of Aquarist & Pondkeeper will be continuing to run and sponsor this contest as it has been for the last 28 years. I hope you will all give them your full support.

This year again saw many entries, which came from various parts of the Country, Macclesfield, Wrexham, Workington, Basingstoke, Hounslow, Dumfries, Doncaster, Motherwell, Gwynedd. The winner was Steve & Ted Derrick of **Halton Society**, with a *Melanotaenia splendida splendida*. Ian Rowbottom of Silk Town was second with a *Distichodus sexfasciatus* and third were N. and S. Lenders of St Helens with a *Aulonacaras jacobfreibergi*.

Almost every weekend, three people will become eligible to enter for this most coveted award in the "World of Fishkeeping." All Societies, from all Federations and Associations, holding an Annual Open Show can apply for the Entry Form to the Champion of Champions contest at the British Aquarists' Festival, from Aquarist and Pondkeeper magazine. Since the inception

of the contest in 1967, only 50 or so Societies each year have applied for the honour, for their Open Show contestants, to become an entrant to this contest. Why? It puzzles me, because Secretaries who fail to apply not only lose three good prizes for their Open Show visitors to win but also deny those winners the chance to claim further success with their prize winning fish. Why let them miss out on what may be the only opportunity they get from all their efforts in showing fish?

The Champion of Champions contest forms part of the British Aquarists' Festival, which is organized by the Federation of Northern Aquarium Societies, held each year, in October, in Manchester. The fish are judged on the Friday, prior to the open days, and have to be benched by 10pm on Thursday or, by special arrangements, they can be benched early Friday morning. Competing fish are judged by judges invited from all over the country, and the judging sheets are available on Saturday and Sunday of the Show for all to see who won — or why not.

I write this article mainly for the many fishkeepers who telephoned me just before the Festival last year asking why I had not sent them the forms to enter the Champion of Champions Contest. Having explained my position, and that

of A&P, I said in each Society Open Show Schedule there should be a mention of the C of C Contest together with the list of awards to be won at that Show. I regret, due to the lack of time, and possible non-return of the forms by the Secretaries to A&P, I had to turn down their request to enter the Contest, although they had Champion fish to exhibit.

May I remind the Secretaries of the new rules that came into force in 1993. Secretaries should inform A&P of the date of their Open Show. A&P will then send an entry form with full details of the contest. Within five days after their Show, Secretaries should complete and return the entry form showing names and addresses of the winners of the first, second and third best fish in the Show. On return of the form, A&P will arrange for all three winners to receive an attractive individually-inscribed certificate, plus 12 months free subscription to A&P for the first, six months for the second, and three months for the third. Nice Prizes for your Open Show Contestants to win!

All three winners will later receive an invitation, from A&P, to enter their fish in the Champion of Champions Contest at the British Aquarist's Festival. In addition to the above prizes, each entrant in the Champion of Champions Contest at Manchester, will receive a Gold, Silver or Bronze lapel badge, depending on the position their fish came at the Open Show, plus the chance for their fish to be the Champion of Champions. But you must bench your fish at the Festival to receive these prizes. If you attain first position you will receive a Cash Prize of £100, plus a Solid Gold Lapel Pin and a Commemorative Tankard. Second will receive £75 cash prize and commemorative tankard, and third place will receive £50 cash prize plus commemorative tankard.

Arnold Chadwick, Federation of Northern Aquarium Societies, looks forward to the 1996 Champion of Champions Contest.

Early qualifiers!

The three Best Fish at the 1995 Festival were: 1st M. Agnew of **B.K.A.**, with a *Northbranchius egeri* 'Blue', 2nd Mr & Mrs Jones of **C.A.S.T.**

38 with a *Melanotaenia splendida inornata*, and 3rd P. and J. Bailey of **Tameside Society** with a *Xiphophorus nezuelanahof*. All three have been entered into the 1996 Champion of Champions Contest at the British Aquarist's Festival in Manchester on the 26th & 27th October. Hope to see you all there.

For further details of the awards and entry forms Societies should write to Aquarist and Pondkeeper.

Details of the British Aquarists' Festival can be obtained from: Mr A. Chadwick 9 Bronville Close, Chadderton, Oldham OL1 2RH. Tel: 0161 652 6207.

Wycombe want members

Wycombe and District Aquarist Society is actively looking for new members. For further details, prospective members should contact the Chairman, Andy Cluer on (01494) 524549 or Brian Mawdsley on (01844) 343888.

Even more glory to be won!

Each year, aquarists winning Best in Show Awards at the numerous Open Shows qualify for an annual further Competition at the various major aquatic Festivals such as YAF, BAF and Weston. Naturally, each eventual winner of these top competitions is rightly proud of the achievement which represents months (and maybe years) of dedicated fishkeeping. However, whilst it is true that many of these events are won by aquarists from out of the area, showing a strong capacity for travelling and competing (and that goes for the fish too!) there never seems to be a definitive, all-round winner recognised as the year's Best Fish. But there is another event which offers the winning fishes even more prestigious glory by taking all the top winning fishes a little further along the line.

The British Open Fish Championship, sponsored by Interpet in association with the Federation of British Aquatic Societies, is held every year at

the **Corby, A.S. Open Show** — this year 12th May). Here, the event is open to all winners of Best in Shows and winners of those top competitions at major festivals too. Here is the opportunity to 'put up, or shut up' as they say. Pit your award-winning fish against already well-proven, high-quality fish from all over Britain.

All you have to do is write in with details of your fish's qualifications (date of Show, award gained) and you will receive an invitation to the BIG ONE; remember, the event is open to any fish winning a Best in Show Award (or better) at any Open Show or major Festival during 1995.

Details of the 1996 British Open Fish Championship can be obtained from: Paul Corbett, The Orchard, Galtcombe, Isle of Wight PO30 3EF. Tel: 01983 721246.

Attention mariners!

There are very few marine clubs in the country and therefore marine hobbyists don't get in contact very often. However, one Club — THE WEST YORKSHIRE MARINE AQUARIST GROUP — is going from strength to strength, doubling its membership in the last year alone. They decided to "go for it" and really get the big names in marine speakers. In the last year they had Les Holliday, Rudy Mealef, Les Melling, and from the USA, Julian Sprung. This year an even more ambitious programme is planned with more international speakers.

WYMAG meet on the third Wednesday of every month and have a monthly newsletter. They also do a stand at the Yorkshire Aquarist Festival every year. The membership ranges from absolute beginners to very advanced hobbyists and marine biologists. Quizzes, slide shows, raffles, auctions, social evenings and discussions, a library and video library and of course top class speakers are all features of

this dynamic but friendly club.

We are pleased to announce that Mr Jack Kent, President of Kent Marine Inc. will be presenting a Talk to WYMAG on Wednesday 24th April 1996 starting at 8pm at the Club's headquarters at: Bruntcliffe Working Mens Club. Situated on the A650 Bradford/Wakefield road, half a mile from Junction 27 off the M62.

So, if there are any marine aquarists out there feeling lonely and on their own amongst all the freshwater people, please don't hesitate to contact WYMAG — they would love to hear from you!

Contact: Roy Meeke, Secretary WYMAG, 57 Albert Avenue, Idle, Bradford, W. Yorkshire BD10 9QJ. Tel: 01274 611822.

South-East Area Marine Aquarist Club formed

Monthly meetings of this new group are held on the third Tuesday of every month. At the moment meetings are held either in members' homes or at Island Aquatics, Margate. Newsletter, Raffles, Talks, etc., for the marine enthusiast. Phone 01843 298778 (evenings for more information).

Toothcarps galore!

The Kent Group of the British Killifish Association, in collaboration with Viviparus, are presenting the annual TOOTHCARP SHOW on Sunday 14th July at the YMCA, West Hill, Dartford, Kent — a venue easily reached from the nearby Dartford River Crossing. Benching is from 11am to 12.30pm. Entry Fee 20p. Entries are limited to the Toothcarp species — Killifishes and Livebearers — and the Classes will be for single fishes

DIARY DATES

APRIL

4 Washington Aquarist Society & Pondkeepers. Meeting, Springwell Village Hall, Springwell, Gateshead
14 Gloucestershire A.S. Day Trip to Y.A.F. (Doncaster) Contact Andy (01452 372948) or Christina (01242 520428)

21 Preston & District A.S. Spring Auction, 12 noon, Students Union Hall, University of Central Lancashire, Fylde Road, Preston, Lancs. Booking in 11am onwards. Admission: Adults 50p, Children Free. Contact Steve Spencer, 01772 321145.

28 Gloucestershire A.S. Day trip to Seahorse Centre, Exeter and Watermanjoe. Contact Andy (01452 372948) or Christina (01242 520428)

MAY

7 Gloucestershire A.S. Talk on Aquarium Plants. ANNUAL GENERAL MEETING. Table Show Characins/Cyprinids, A.O.V., Bell & Gavel, Cattle Market, St Oswalds Road, Gloucester. Contact Andy (01452 372948) or Christina (01242 520428)

12 Association of Midland Goldfish Keepers, Foleshill Community Centre, Foleshill Road, Coventry. 2pm. Adult Fish Show. Contact Anne Bloor, 10 Barnett Crescent,

Woodford Halse, Daventry, Northants NN1 3SP (01327 261198)

18 Gloucestershire A.S. Day trip to Wholesale Tropicals, London (plus others if time allows). Contact Andy (01452 372948) or Christina (01242 520428)

19 Rothwell & Waterfield A.S. Open Show & Auction, Worley High School, Swallow Crescent, Leeds 12. Contact Kevin Swinson, 01977 511464

JUNE

4 Gloucestershire A.S. Birthday Party!! Quiz, Buffet and Raffle. Table Show: Catfish and A.O.V., Bell & Gavel, Cattle Market, St Oswalds Road, Gloucester. Contact Andy (01452 372948) or Christina (01242 520428)

9 Tamworth Aquarist Society, Open Show & Auction, Festival Hall, Queen Street, Denton. Contact Bob Street, Show Sec., 3 Great Gable Close, Hegginsshaw Village, Oldham, Lancashire OL1 3RF (0161 287 2305)

30 Association of Midland Goldfish Keepers, Foleshill Community Centre, Foleshill Road, Coventry 10.30am. Open Show. Contact Anne Bloor, 10 Barnett Crescent, Woodford Halse, Daventry, Northants NN1 3SP (01327 261198)

and breeders' teams.

In addition to the Competitive Show there will also be a Grand Auction at 1pm — Killifish in sexed pairs/trios, Livebearers sexed pairs or sexable young. Refreshments available all day. For further details contact Chris Cheswright, 01268 472095.

Talking Fish with Tetra

The popular Talking Fish Seminars presented by TETRA are scheduled to continue throughout 1996 and a number of dates have just been released. Following up a very successful evening at the Queen's University in Belfast, featuring a solo performance by the Head of Tetra Information Centre, Roger Foggitt, the next Seminar will be held at London Zoo on the 2nd May with further Seminars at Birmingham, Southampton and Edinburgh

later in the year. Watch this space for more information. In the meantime, details about the London Zoo Seminar can be had by contacting Maureen Torrance, at the Tetra Information Centre, Lambert Court, Chestnut Avenue, Eastleigh, Hampshire SO5 3ZQ. Tel:0703 643339.

Full programme for Thorpe & DAS

Thorpe & District A.S. have announced a full programme of competitive Table Shows for 1996 in addition to their well-packed programmes of activities and Guest Speakers. In publicising their changed venue and meeting times in last month's **A&P** (every 3rd Monday at the Norfolk Dumping, Norfolk Livestock

Society World is provided to help all Societies to promote themselves and their activities. One of the most difficult tasks within any Society is that of Programme Secretary, who is expected to fill every meeting with something of interest. These columns are a source for all manner of ideas for Societies' entertainment, and could lead to many a Speaker finding time (if not fortune!)

So do your bit to let readers know of your good fortune, whether you have found an excellent Speaker or have come up with good ideas which have helped to entertain your Club's membership.

We can help you only if you provide the information. Depending upon availability of space, we are also pleased to incorporate highlights of Show results (major prizewinners only, please, and DO please include first names) together with photographs if they are suitable.

And, of course, ensure that as many people as possible have advanced warning of your Meetings, Shows, and other events, by sending us details for our comprehensive 'Diary Dates' column in good time.

Send your information to: **Society World Aquarist & Pondkeeper**, Caxton House, Wellesley Road, Ashford, Kent TN24 8ET; or you can e-mail direct to: societyworld@demon.co.uk (please let us have your information at least six weeks prior to publication).

Market, Hall Road, Norwich) we wrongly made a mistake in identifying the Society's Secretary as Mr Wier; it should have been John Beddingfield of 8 Hubbard Close, Wymondham, Norfolk NR18 0DU (01953 605394).

It's not too late to join

If you are reading this section of **A&P**, you are probably already a member of a Society but are you aware of the benefits and incentives available to members of those Societies affiliated to the Federation of British Aquatic Societies?

For the princely sum of £12.00 per year your Society could be the recipient of Show Packs, Trophies, Quarterly magazines, specialised publications discounted programme aids, complimentary packs of Fish Food and many other benefits obtained for member Societies by the negotiating strength of

the federation. Add them all up and you'll see they exceed the joining fee by a considerable factor.

In these days of increasing costs and declining memberships can you afford not to at least investigate what such an investment could mean to your Society?

Contact me now for more detailed information to enable you to make up your mind; membership benefits begin on receipt of your fee with the issue of a Starter Pack to any brand-new affiliation.

Alan Bensons, FBAS PRO, 25 Blewitts Cottages, New Road, Rainham, Essex RM13 8SL.

A Cichlid Secret to tell everyone about!

Mary Bailey has moved. Her new address is: 1 Copper Oak, East Village, Crediton, Devon EX17 4DW.

1996 OPEN SHOW DATES

(Rule Codes: A = A of A; FB = FBAS; FN = FNAS; FS = FSAS; NG = National Goldfish Standards; N = NEFAS; U = USofA; Y = YAAS)

5/7 April Strathclyde Fishkeepers Festival (FS)	Goldfish Keepers (I)
7 April Malvern A.S. (FB)	19 May Carliff & D.A.S. (FB)
7 April Oldham & D.A.S. (FN)	19 May Isle of Wight A.S. (Grocklemania) (FB)
13/14 April Yorkshire Aquarists Festival (Doncaster) (Y)	19 May Rothwell & Wakefield A.S. (Y)
21 April Habon A.S. (FN)	2 June Erith DAS (FB)
21 April Kirkcaldy A.S.	8 June S.P.A.S.S.
21 April Strood A.S. (FB)	9 June Derby A.S. (Y)
21 April Caer URFA A.S. (FB)	9 June Merseyside A.S. (FN)
28 April Robin Hood A.S.	9 June Redcar A.S., NEFAS
28 April Swindon A.S. (FB)	9 June Tameside A.S. (FN)
29 April Hull A.S. (Y)	23 June YAAS Scunthorpe A.S. (Y)
4 May Southend, Leigh & D.A.S. (FB)	23 June Workington A.S. (FS)
5 May Aberdare A.S. (FB)	30 June Seascale Juniors A.S. (FB)
5 May Bracknell A.S. (FB)	6 July Port Talbot A.S. (FB)
5 May Gateshead A.S. (FB)	7 July Scarborough A.S. (Y)
5 May Musselburgh A.S. (FS)	21 July Ashby A.S. (Y)
12 May Bournemouth A.S. (FB)	3 August Gloucestershire A.S. (FB)
12 May CAST BB (FN)	10/11 August Koi '96 BKKS National Show
12 May Corby A.S. (FB)	11 August Grimby & Cleethorpes A.S. (prov.) (Y)
12 May Four Lane Ends A.S. (FB)	11 August Salisbury A.S. (FB)
12 May Association Midland	

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The Pond Workers™ in-pond filter works with any design of pond fountain pump with a capacity of up to 800 gallons per hour. It is simply connected to the pond pump using a length of hose and then positioned anywhere in the pond. The pump sucks water through the Pond Workers™ in-pond filter. This reduces pump cleaning and means filter efficiency is no longer limited by the pump's small pre-filter.

As water enters Pond Workers™, it is sucked through a synthetic, polymer filter floss which removes solid matter down to the size of green water algae when used with the supplied Clear Pond. The water then travels through a central chamber containing 800g of Bio Media™, which has a unique honeycombed structure, giving a huge surface area for the bacteria which breaks down toxic fish waste, ie, ammonia, nitrite and nitrate — the principal cause of pond algae.

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of your pond water, so preventing fish problems.

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The Questions

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Send your answers on a postcard, or the back of a sealed envelope, with your name and address to: INTERPET COMPETITION, A&P, Caxton House, Wellesley Road, Ashford, Kent TN24 8ET, to arrive no later than Friday, May 3rd 1996.

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The halls have natural daylight thus enabling the true colours of the Koi to be appreciated. A fully equipped theatre is adjacent to the main hall for speakers during the two days on Koi related topics. Once you have paid the admittance to the show, you are considered for the weekend only, as members, with the member's privileged prices to any or all of the centre's amenities: leisure swimming (for you not the Koi), eight lane bowling alley, snooker room, squash courts, paradise health suite, etc., not forgetting the restaurant and bars.

WEEKEND PACKAGE

The weekend package consists of accommodation in Milton Keynes top four star hotel "The Forte Crest", admittance to the show on both days and the dinner and dance Saturday evening for 7.30pm. A top band has been booked, hence a super evening is assured. £55 per person sharing a twin/double room.

LOCATION

Bletchley Centre is situated some six miles off junction 14 of the M1. Travelling times are London 1 hour 15 minutes, Birmingham 1 hour 30 minutes, Manchester 3 hours. The city of Milton Keynes is in close proximity to four international airports and has a main line link to London by railway.

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The pond can be home for all sorts of fish other than Koi and our SUPPLEMENT looks at the **GOLDFISH** and some of its more aquarium-suitable strains as well as considering some alternative **POND FISH**.

A&P's resident Coldwater Jotter, **STEPHEN J. SMITH**, produces a Compara-File on the Goldfish family.

ALEX STEPHENSON considers the Telescope-eyed Strains whilst Bristollan **JIM DAY** can only be looking at Shubunkins.

If big or little Catfish are to your taste, then **DEREK LAMBERT** and **JANET MARSHALL** have the information you need.

Aquatic Vet **LANCE JEPSON** focuses on what could be the last unfortunate phase of any fish's life — Euthanasia.

Having not had too much initial success in locating his anabantid prey, **DAVID ARMITAGE** tries again in Sri Lanka.

Some like it hot, some like it cold, but how does temperature really affect fish? **BOB GOLDSTEIN** tells all.

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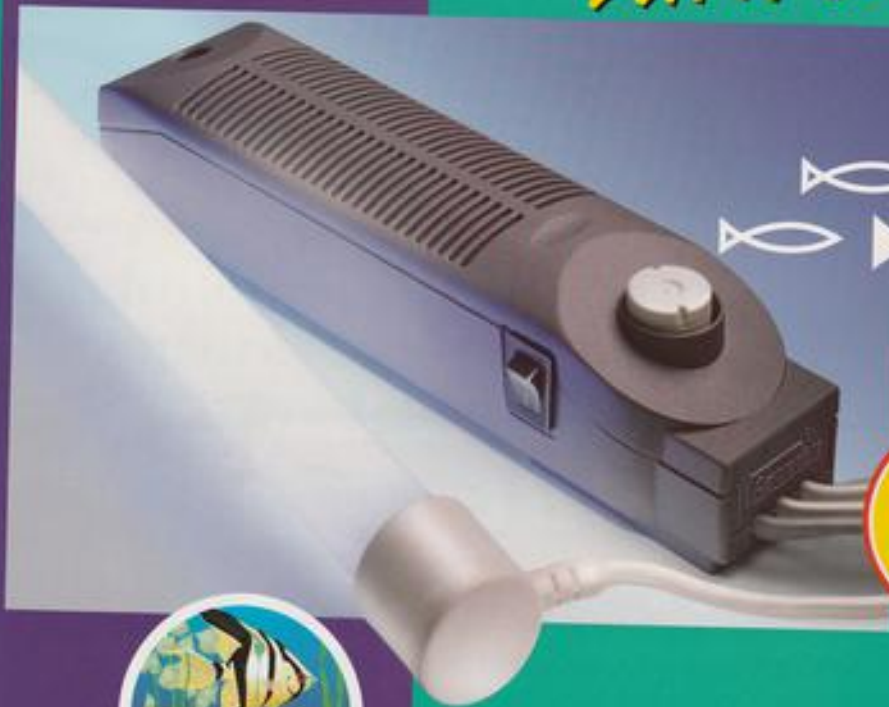
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