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AQUARIST AND PONDKEEPER

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GUEST EDITORIAL

THE MARINE HOBBY AS I SEE IT

Inspired by an architectural water display project that will involve my company in planning/design of filtration and water treatment systems for an unusual tropical marine aquarium of some 70,000 litres capacity, I have spent some weeks meeting with colleagues, researching my notes, reading various textbooks and, of course, consulting many back issues of our favourite aquatic magazines.

The object of this exercise was to update our computer data-file on marine systems to provide a base from which to begin the project Design-Brief and Specifications.

As I worked my way through, it began to dawn on me that, while the 'science, technology and art' of marine fishkeeping has progressed in leaps and bounds, the understanding of this progress and its many implications by aquarists, retailers, traders, manufacturers and, indeed, some self-styled experts and writers on the subject, is lacking, has stagnated, or become totally confused.

Even in 1991, it seems that marine aquariology begins and ends with undergravel filters! Ozone reactors, metal halides, redox potential and venturi skimmers are merely terms thrown around for good measure and then dismissed because they are either too expensive or too complicated to understand.

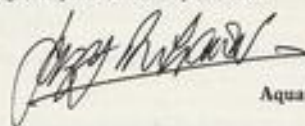
Let me qualify my statement further by saying that this situation appears to me to exist mainly in the UK. Our American and European fellow aquarists have been tinkering with trickle filters,

fiddling with Redox controllers, and generally playing the game, far more professionally and successfully than we, in Britain, for some years.

I'm not into bashing any sector of our hobby and supporting industry; indeed, there are many truly professional, pioneering and well respected individuals and companies in the UK with one aim in mind — to design and provide better aquarium equipment and a better aquarium environment for marine fish.

As marine aquarists, though, we all have a responsibility and duty to the animals we keep in our aquaria which, surely, has to begin and end with nothing less than providing *the best aquarium conditions possible*. It is up to each of us to seek out information and learn as much as we can about marine aquariology. To do any less is to fail in our responsibility.

The future of our hobby demands a more professional approach to the way we design and run our marine aquarium systems. Thank goodness we have Messrs Moe, Thiel, Tunze, Sander and others with the foresight to pioneer the way forward.



Jerzy Gawor
Aquatic Consultant
Aquality

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OBITUARY FOR HAROLD

Recent years have seen the appearance of numerous new species in the aquatic hobby, including freshwater crabs. Unfortunately, however, guidelines on how to look after these creatures often appear to lag sadly behind, as **Jason Endfield** discovered.



Crabs might not be the most exciting animals to behold for most people. But I am not most people and, to me, a crab is very special. This somewhat unusual affection I have for them stems from my rockpooling days (who am I trying to kid — I still go rockpooling!), when a crab was a prize find.

Guide books constantly tell me that, in an average rockpool, I can expect to come across the occasional cuttlefish or lobster. Well, in my many years of rockpooling, I've never seen any — so much for guidebooks, but I'll come back to that later on... So I've always had to make do with crabs, which, in my experience, are rare enough to be cause for great excitement (sad, isn't it).

Perhaps I look in the wrong places, but my local beaches are more likely to yield plastic cartons than cuttlefish and lobsters. To find a crab among the plastic debris is, at least, some sign of nature fighting back. Anyway, that is why I like crabs and that is why, when I saw some of those little red freshwater tropical crabs on sale locally, I literally jumped at the chance to buy one. After I'd stopped jumping, that is exactly what I did.

It was a nice crab, as crabs go, though I'm not sure that I would recommend one to a

friend. My crab (called, simply, Harold for want of a more suitable name) spent most of his time above the water line on the little grass shelf underneath the tank's hood. He was housed with a large 'Plecostomus' and two Gouramis — no, it wasn't the most exciting display...

Incidentally, the purchase of Harold brought home to me once again the thin line that exists between keeping an animal as a pet and eating it as a food. It seems terrible when one stops to think and realises that the contents of one's tank is often alarmingly close to the contents of the freezer. I won't delve into this strange phenomenon again, though; suffice to say that I find it really strange that we can quite happily maintain creatures as pets and, at the same time, tuck into a meal of our friends with a clear conscience.

However, back to the absorbing subject of crabs. Harold was a mere one and a half inches wide (crabs are measured by width rather than length, I imagine), but despite his small size, he was quite a character. I'm told that crabs serve a useful purpose in the aquarium, too, by eating bits of leftover food — though they are also known to enjoy slow-moving fishes — leftover or otherwise.

So, that old adage 'never trust a crab' probably still holds true (I think I just made that 'old' adage up, but it would appear to be good advice!).

A friend of mine provided me with some useful information regarding these little animals. For example, they can live perfectly happily with only seven legs, instead of the usual ten. This, he discovered after his crab was in armed (or legged?) combat with a large cichlid. The results were predictable, though apparently not for the crab... Such information is always welcome (even though it should always be treated with flexibility as aquarists' minds have sometimes been known to, shall we say, 'elaborate' on the facts).

I like to find out as much as I can about any new charges I find myself with, but I was unable to find out very much at all about Harold. Indeed, there seemed to be a great shortage of information about him in print — perhaps that's why Harold died recently.

There was no obvious reason for his demise. He was eating well (anything he could stuff into his little mouth!), but maybe just one tip gleaned from an up to date book could have saved him. It really is no good when, as is happening, so many weird and wonderful creatures are appearing on the fishkeeping scene and little or no information exists as to their maintenance.

Thankfully, we can rely on *AGP* to supply as much information as space allows. What bothers me more is the book market, which seems to be flooded with 'revised' and 'updated' fishkeeping publications, that, from what I've seen, fail to keep pace with the changing markets. Harold was a case in point, but he's by no means alone, and it isn't only new invertebrates that aren't catered for — even fish species which have been around for some time, are never mentioned in the commonly available books.

'Revised' and 'updated' should mean exactly that, and though I'm aware of the work involved in such a mammoth task, surely it must make sense to take account of newly available species when reprinting a publication or compiling a new book. It is very frustrating for us aquarists to turn to our favourite book in vain for information, and then have to track down to the library to try to make sense of some highly scientific work on crustacea just to find out what their own particular Harold likes to eat.

Well, it's too late for my own Harold, and too late, no doubt, for many other people's Harolds. I won't be buying another crab until I can find out what went wrong last time. Indeed, since purchasing him, I've heard the sad story of many dead crabs from other hobbyists.

Something is badly wrong. Should one not be able to obtain guidelines on how to look after them, when we buy them, not just for our own use, but also to pass on to others who might want to keep them alive? For the moment, I, for one, will be happier to go down to the beach in future to look at the crabs, even if they do have to be searched for among the rubbish. Who knows, if I persevere long enough, I may even spot a lobster. I think the excitement would kill me!



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Tomorrow's Aquarist

By David Sands

ROCKY'S LAST HEADSTAND

Last month I asked you to write to me about your experiences relating to public aquaria. It's interesting to note that a long-term captive dolphin called Rocky, moved from Morecambe's Marineland across to Flamingoland Zoo in North Yorkshire, has now been forwarded on to a new home in the Caribbean West Indies.

It seems an age ago (August 1981 was an age ago . . .!) that I photographed Rocky performing to a packed crowd at

Marineland. In those days I didn't even think of any of the issues raised by the subject of dolphins in captivity. I, like everyone else in the crowd, simply marvelled at the acrobatic or 'aquabatic' antics of Rocky under the close control of his trainer. The aquarium side of Marineland was basic public aquarium stuff and I analysed that aspect rather than the dolphin's captive world.

After twenty odd years in captivity, Zoocheck arranged to send Rocky off to a new dolphin sanctuary. Now that dolphins are under threat almost every-

where they live, it would appear sensible for this sort of thing to happen. Have you ever seen dolphins in 'Marineland' style public display areas?

FUNNY FISH COMPETITION

At one of the many fish shows I attended last year, a young man, who convinced me he was a regular TA reader, suggested we should have a competition to decide who owned the funniest fish. He said his Weather Loach was the craziest fish he'd ever kept, and he went on to tell me how his loach liked to stand on its head and in various funny positions in among the plants.

I can remember owning such a loach. It would sit in the plants sometimes releasing bubbles as though it had eaten too much!

I think we could stretch to a good prize if one of you imaginative readers out there could let us know about your funny fish. If you can draw him/her, all the better.

POND TIME

I wondered if any TA readers have a pond or help their parents with their garden pond. It is about this time of year that the fish begin to rise up from the wintry depths and make an appearance. It's a good time to net out the old autumn leaves (which should have been removed months ago) and trim off any dead marginal leaves that may still be sticking up out of the water.

How many pondfish do you have and what kinds? How long have you had them and how do you filter the pond, if at all? I will send some new 'Aquarian' Floating Pond Food, to feed your rising fishes, to the first ten or so readers who can tell me about their garden pond.

UNIDENTIFIED SWIMMING OBJECTS

Have any readers seen a fish in a local aquarium shop that is not identified? A mystery fish that you would love to know about?

I would like to read a few letters from any TA readers who have come across some-

thing fishy in the 'tanks down the road' and who would like to share the news with the rest of us. I'm not saying that I will know what the fish is, but if you can give a good description or, better still, a drawing, we will try to feature it in up and coming columns.

STREET AQUARIUM

Did anyone see Curly's mother/father-in-laws-to-be aquarium in Coronation Street? I only caught a glimpse of it in the background, but I've been convinced by people that it's a regular feature to be seen when Curly goes down there. Judging from the latest problems he's got, that will not be much longer!

Does any business or public place locally display a fish tank? Dentists, doctors, hospital and fish/chip shop etc. What do you think about tanks in public places? Are they well looked after?

Finally, a young fishkeeper came into my place to ask me about his sick goldfish. He said it kept on swimming upside down and rising up to the water surface. He said it fed . . . sometimes . . .

I found it difficult to explain what I thought the problem was:

As man has developed this wild carp species into the various ornamental forms, he has shortened the body, extended the fins and, as a secondary effect, shortened the swim bladder. If an infection does occur, then Fantails and the like (i.e. short-bodied goldfish) seem to show secondary problems in orientation, thereby losing balance in the water.

There then ensued a discussion with him and his father/mother as to how he could help the goldfish to swim upright in the water. A cork tied to the body (perhaps), was one of the suggestions. His grandmother had also suggested a drop of whisky or brandy! Then, a light appeared to switch on in his head. "I'll make it some miniature water wings!" With that, I put away the tonic salts and anti-bacterial medicine and hoped the fish would survive. Happy fishkeeping.



Rocky performing his tricks. He has now been retired to a dolphin sanctuary in the Caribbean.

Seaview

By Gordon Kay

STRONG WORDS

We had a very strong letter addressed to the editor attacking me and David Sands, accusing us both of being hand in hand with the environmentalists who want to put an end to this hobby. David is big enough, and ugly enough(!), to look after himself, but I feel that I must make some attempt to defend myself.

The letter came from Mr S J Chambers of Tunbridge, in Kent, and started by saying:

"I, and I know very many others, are sick and tired of the free publicity that you give to the enemies of fishkeeping in the Environmental Investigation Agency and Zoocheck, courtesy of David Sands and Gordon Kay. Kay appears to believe that only his view is valid, especially on the subject of Dolphinariums."

The fact that three million plus people annually flock to watch the dolphins and killer whales in San Diego's SeaWorld (a figure that increases annually) clearly demonstrates the views of millions who do not find Dolphinariums objectionable and, on the contrary, enjoy the shows. These are in no way cruel and, as is well documented, several successful breedings have occurred in captivity — hardly the actions of animals unhappy with their surroundings.

It was with considerable amusement that I read Kay's January outpouring, where he describes his 'pleasant chat' with Bill Travers, in the context of talking to a star. If this is his idea of stardom, he really is easily satisfied, since the only thing Travers has succeeded in doing is being totally ignored by Zoos and Government in his pathetic attempts via Zoocheck to ban Zoos."

I found the letter both a little offensive (was there any need to express your views in such an objectionable manner, Mr Chambers?) and confusing — quite what captive dolphins performing tricks for the gratification of humans has to do with the hobby is beyond me.

I accept the point about American dolphinariums. They do seem to be better than those anywhere else in the world, and I have a strong suspicion that people care more about animals when they have firsthand experience of them. However,

for every good dolphinarium there are dozens of terrible stinking holes all over the world which should be closed. Your point about the attendance figures for San Diego are irrelevant, and if you really think that a breeding dolphin is necessarily a happy one, then you don't know much about dolphins. If you had ever seen dolphins in the wild, then you would know that the animal which you see performing tricks is very different from the one in the oceans. There was a follow-up story in the Mail on Sunday about Rocky on 27 January, and when I read this and saw the photographs of Rocky in his new home, I knew that I was right.

One final point on Cetaceans, Mr Chambers says that he knew that very many people agreed with him. Well sir, you are more than welcome to inspect my postbag, because I can assure you that I get many letters of support and yet, yours is the first in over four years voicing such opinions. I shall not even bother to dignify Mr Chambers' unnecessary attack on Bill Travers with a reply.

The letter goes on to say: *"Surely, it is an editor's job to ensure that the magazine campaigns FOR the hobby it represents. Allowing unlimited publication of the likes of Sands and Kay undermines such an ambition."*

Can we have more articles from the many aquarists truly dedicated to preserving the hobby as it exists now, and less from those only too keen to climb into bed with the Environmentalists such as the EIA and Zoocheck who have clearly stated that they wish to abolish the right of people to keep animals (fish included) in captivity (whether wild-caught or captive-bred)?

Sands' and Kay's disgusting willingness suicidally to support these Organisations is a stab in the back for aquarists and should be condemned as such by anybody wishing to see a longterm future for our hobby — editor's included!"

I have been keeping fish for thirty two years and am 100% committed to the future survival of the aquarium hobby. If I were not, then why would I have spent so much time and effort in helping to run the British Marine Aquarists' Association and the West Midland

Marine Aquarist Group? Why would I spend so much time and effort teaching people to keep fish in a better manner? It certainly isn't for gain, and neither is it for the glory, because there has been precious little of that over the years.

I have been telling people about the threats to this hobby for over five years and, with very few exceptions, hobbyists have done damn all about it until now. Only when we are on the threshold of 1992 — with all that next year threatens — is anyone really interested!

It is because I am so concerned about it that all I am so willing to help people like Dr Elizabeth Wood and Colin Grist — to meet them halfway, so as to find a central point where we can all agree. In my view, the only way to save this hobby is by making sure that we are beyond reproach. Both trade and hobbyist alike must be like Caesar's wife — above suspicion. Only by being squeaky clean can we have any hope of ensuring the future survival of the hobby which we all love so much — and that means efforts on captive-breeding, protection of habitats (especially coral reefs!) and the monitoring and management of the fish importing industry.

It is all too easy to sit back and let someone else do our campaigning for us — if everyone did that, then our enemies would take it as a signal of compliance and would win the victory which they seek.

Before I rest my case once and for all, I just want to make one final point to set everyone's mind at rest. I have never been to bed with any member of the EIA or Zoocheck! Now, lets get on to something interesting.

'REEFORM' CORAL

As a conservationist, I have always objected to the use of coral skeletons for the decoration of aquariums. I want nothing to do with the desecration of any natural environment, least of all the one which has given me so much pleasure for so many years. We have, of course, all seen many man-made products to take the place of natural coral, some very good indeed, and others not so.

One product which will be in the shops soon threatens to outdo anything that has gone before. Aquarium Systems (the manufacturer of Instant Ocean) have introduced a synthetic decorative coral range called 'Reefforms' and it is brilliant! It is a product which is far better than any synthetic coral I have ever seen, accurately representing living reef organisms in their natural shapes, sizes and colours. Each piece of 'Reefform' is hand-crafted and hand-decorated and, as with natural coral, no two Reefforms are exactly alike.



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Coldwater jottings

By Stephen J. Smith

SOCIETY NEWS

At last! Blow away the winter cobwebs, the coldwater season is upon us after a long, dormant winter. And one of the country's most active coldwater societies, South Park Aquatic Study Society (SPASS) is the first to write to me with their calendar for the 1991 season. Full praise to SPASS for keeping us informed, so the least we can do is to pass this information on.

Tuesday meetings (7.30pm at Wimbledon Community Centre):

16 April

Talk by **Bill Leach**: Judging dorsal-less Goldfish and Shubunkins

21 May

Talk by **Eric Franklin**: Fish dissection

18 June

Talk by **John Parker**: Singapore Trip

16 July

Talk by **Fred Pearl**: Live foods

22 August

Koi evening

17 September

Project Goldfish evening

15 October

Members' fish-houses - part two

19 November

Bring-and-buy sale

Shows (Whiteley Village Hall):

Saturday 15 June

Annual Open Show

Sunday 1 September

Closed Show

Sunday 3 November

Isle of Wight inter-club competition.

For further information, please contact the SPASS public relations officer on 081-397 9765.

COLOUR ENHANCER - WITH A DIFFERENCE!

With the ever-increasing number of proprietary medicaments available to assist the fishkeeper with his/her hobby, it is hardly surprising that someone has come up with the idea of a colour-enhancing food which will enable you to enjoy show-quality Koi - to your own design.

Ever fancied a blue-and-white version of a Kohaku, or a Matsuba Ogon which has every scale edged with red? Well,



according to the Scandinavian manufacturers of Color-Skope pellets, anything is possible.

Containing all the constituent proteins for a balanced Koi diet, Color-Skope is a floating pellet with a difference which is likely to turn the Koi-keeping world upside-down.

Each tub (the pellets are available in 250 and 500 gramme packs) is accompanied by what the manufacturers call a "pellet palette" comprising apparently harmless hormones which trigger the colouring process of the Koi at individual targeted areas of the fish, such as: complete scales, scale edges, finnage, or lips.

The only drawback is that Koi need to be kept in individual ponds or aquariums, otherwise the wrong fish would be susceptible to the change. A detailed scientific explanation of the process is enclosed with the pack, together with suggested patterns, as well as colour photographs of treated Koi. In addition, the manufacturers inform me that a variation for Goldfish is scheduled to be released this summer.

Further information on Color-Skope pellets is available from the manufacturers, Olof-Prahl A/S, in Denmark, via **Coldwater Jottings** (Also included within the package is a large pinch of salt, so now check the cover-date of this issue of *A & P* and write to Stephen! - Ed.)

WINNING COMBINATION

"Why change a winning combination?" was the conclusion of quite a lengthy discussion with **Derek Harrop**, one of the organising team of the Yorkshire Aquarist Festival. According to Derek, traders are clamouring for space at this year's event, which takes place at Doncaster Racecourse on the weekend of 20/21 April.

Last year's highly-successful format (see *Out and About A & P* June 1990) is to be repeated, with some significant additions. The introduction of a new competition provides a new trophy, for the Best Exhibit of the Year, open to anyone in the country with a current Best in Show winner, or a specific number of points award, while a holiday in Spain for two is the top prize for the visitors who can correctly guess the stocking levels of an aquarium.

The prize is offered by Bryan

Dainton, of Aqua Top in Manchester, who is offering runners-up prizes of a furnished aquarium and a tank, as part of his company's promotion of coloured lava rock.

One of the highlights of last year's event for me was a superb display of Chinese Fancy Goldfish presented by **Andrew Hudson** of Golden Phoenix Fisheries, who has been responsible for the introduction of some high-quality specialist Goldfish varieties over the past couple of years, so I was delighted to see Andrew's name again on the list of exhibitors.

Speakers at the festival will be *A & P* editor **John Dawes**, **Dr David Ford** of 'Aquarian', and **Dr David Pool** of Tetra. Further information about the event is available from **Derek Harrop**, Croft View, Oldfield, Honley, Huddersfield HD7 2RL. Telephone 0484 666591.

If you missed it last year, you missed a treat, so there's no excuse this time around.

Coldwater Jottings provides the perfect forum for information and discussion on all aspects coldwater, so whether you are an enthusiastic hobbyist, or simply keep a Goldfish in a bowl, your comments and views are always welcome. Please address your correspondence to: **Stephen J Smith, Coldwater Jottings, Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent, England TN23 1QN** (enclosing a stamped, self-addressed envelope if you would like a personal reply).

Koi Talk

By John Cuvelier



ORIGINAL HERON DETERRENT

My experiences with the loedly herons of late prompted a Lancashire lad to send me details of a deterrent device he has put on the market to guard against that very subject. Basically a passive infra-red device driving a 109 decibel alarm sounder, the compact unit can be mounted adjacent to your pool, or whatever, and covers an elliptical area of 18 metres by 12 metres.

In addition, there are various 'bolt-on' goodies as extras, such as in-house indicators, uprated sounders etc. Floodlights can also be connected if desired.

The price of a basic unit is around the £150 mark, which might sound a lot, until you think that one stab from those lethal beaks could beat that many times over! Naturally enough, one of these devices will also guard against a visit from the non-feathered type of predator, so it could be a very worthwhile investment.

One word of caution, however. Should you have close neighbours, consideration should be given to how they would react to the sound of an extremely loud audible alarm going off at odd times. In this situation, a very bright pulsed xenon flasher, strategically positioned, might be just as effective at scaring, with an audible alarm in the house, and could well avoid any 'over-the-wall' disagreements.

Anyway, should you want further information, the ad-

dress is as follows: Aqua Alarms, 30 Albury Drive, Norden Park, Norden, Rochdale OL12 7SX. Tel: (0706) 860542 or (Mobile) 0836 257579.

RECESSIONARY THOUGHTS

For some months now there have been rumours of financial problems being encountered by some of the larger Koi dealers around the UK. Obviously, this is bad news for all Koi-keepers, as it is these dealers we look to for just about everything connected with our hobby. But, being realistic, it must be accepted that in times of economic recession such as this country is presently going through, hobbies of all kinds are the first to suffer.

Personally, I cannot help questioning the wisdom displayed by some Koi outlets in placing their reliance largely upon sales of Koi which have price tags containing as many as four zeros. However buoyant an economy, there can only be a limited number of persons with the financial clout available to pay these prices. This is only my opinion and, naturally enough, I fully expect someone to shoot me down, but it is a valid thought.

It is rather revealing, though, to see that many of the smaller dealers so far appear to be riding the troubles out, although it's early days yet. They do say there's always a silver lining, and I gather, in this case, that a bit of haggling can prove beneficial at the moment.

AMMONIA NOT THE CAUSE

I've had a couple of replies to my call for suggestions as to the cause of death among my 'guest' Koi, both of whom suggest ammonia poisoning as the cause. I can only reiterate that constant water testing throughout the seasons have never shown the slightest presence of any ammonia, my filtration being literally state-of-the-art as befits my background in the water industry.

It really was a puzzling episode, and one which will be a worry for some time to come.

KOI FRY PICS

I've finally got around to photographing my batch of last season's Koi fry. It's quite difficult to photograph a glass tank because of reflections from the flash gun etc, but having fiddled and fuffed around with a couple of photo floods, the result is, I think, fairly reasonable for an amateur. The principal colours showing are orange/red, black, silver and blue but, of course, these are liable to change out of all recognition as time passes. I'm trying very hard to get the fish to a good size ready for transfer to the pool, thus making room for the next batch, as spawning time will soon be upon us.



I've warned potential Koi-keepers many times that, once their first pool is finished, they will not be satisfied. Guess who's digging again? My neighbour Martin has started the operation to double the size of his pool. Some people never learn, but isn't it nice? Pictures of his trauma later in the year.

CONTENTIOUS FOOD

Someone asked me recently what my opinion was regarding maggots as a food for Koi. My reply was fairly non-committal in view of the fact that, since moving to my present home, these delectable(?) morsels are no longer so easily obtainable.

While living in Yorkshire, maggots formed a popular part of my fishes' menu, the old rule regarding moderation being

strictly applied as the high ammonia content in this food is only too evident to one's nose!

What we did delight in doing was to feed our Orfe with maggots at the pupal stage, the feeding antics of our large Orfe being something else, as the pond was literally thrashed by striking fish. So the bottom line is to feed maggots to your Koi, by all means, but don't overdo it, giving them perhaps just a few as a treat.

Food for Koi can be yet another bone of contention within the hobby. I know many people who feed ordinary earth-worms to their fish, having carefully cut the worms into pieces beforehand (something I simply cannot bring myself to

do, being an old softie, old being the operative word!). Should I come across a worm while gardening, I have been known to throw it in to the pool, but it is a relatively rare event. The protein content of food 'on the hoof' is excellent, but too messy for my liking.

What I can recommend, however, should they be available, is a handful of the angler's friend, the wasp grub. These are really succulent and very welcome to almost all fish. All(?) one has to do is find a nest, stuffy the adult wasps (with smoke only) and remove the grubs. This job is a necessity should the nest be under your own house eaves, but whether or not it's worth searching around the woods for a nest, I'll leave to the reader. Personally, I'd now sooner open a canister of Koi Sticks.



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- 5 What helps remove harmful substances from pond water?
- 6 What size is our biggest Koi?
- 7 What types of fish food do we stock?
- 8 What is the ultimate answer to green water?
- 9 What are our opening hours?
- 10 Which sea do we get our marine fish from?

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PROJECT 16 (PART 1)

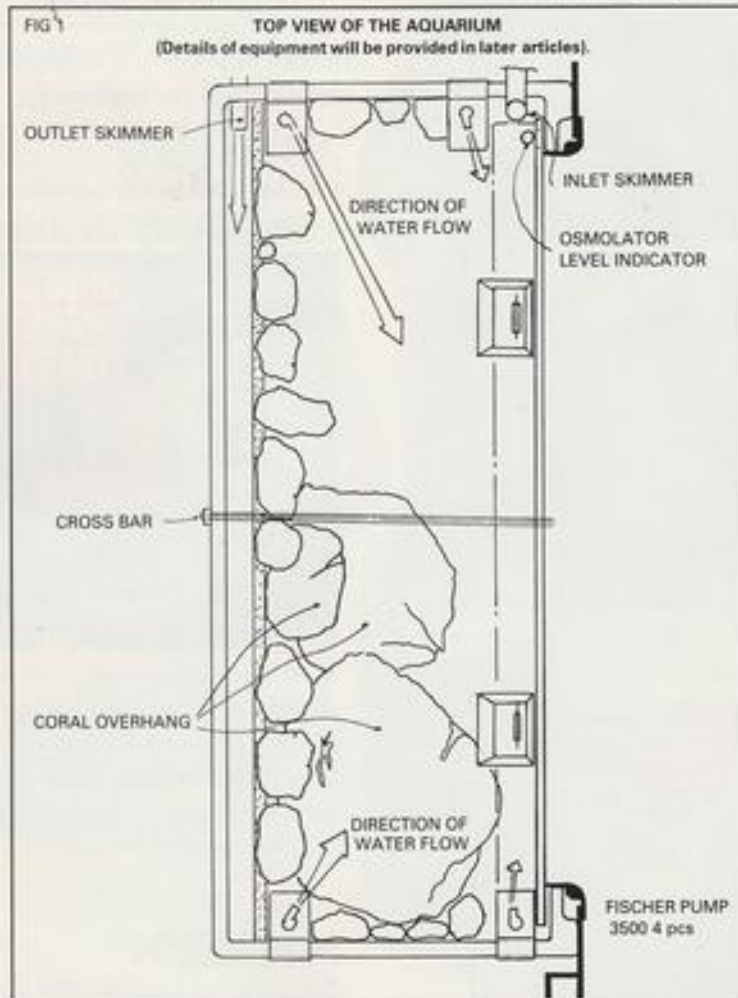
Not content with his 500-litre marine tank, Swedish aquarist **Thore Kjellberg** used the fact (excuse?) that he was moving house to construct an aquarium to beat all his 15 previous aquaria — Project 16. In Part 1 he describes the detailed planning and construction of the tank itself, and the arrangements that had to be made to accommodate it.

(Illustrations by the author)

It was snowing outside. The time was eight o'clock in the evening and the temperature was -16°C (around 3°F)! I had just had a shower and was sitting in my favourite chair looking at my 500-litre marine aquarium. This piece

of coral reef filled me with the inner harmony that comes only from an appreciation of nature.

But, although I was supposed to be relaxing, my mind was hard at work. In the near future I was going to be very busy as my



wife and I had just decided to move to a new house. This meant that I was not going to have an aquarium to watch for two years; my 500 litre tank had to be broken down and sold. The new house had to be designed and plans drawn up; then the house had to be built; even the garden had to be planned. I had to comfort myself with thoughts of a bigger aquarium in my new home.

It would take a lot of time and careful planning to decide on a good place to put the aquarium. This would involve strength calculations, choice of materials, and research into the most up-to-date equipment for lighting and maintaining water quality. It would also mean sacrifices for all the family.

MAIN REQUIREMENTS

The aims of the new aquarium were many and complicated, and to achieve optimum results many factors had to be combined. Here are some examples of the considerations I went through, based on 13 years' experience. The tank would:

- ① be built into a wall so that all the equipment would be concealed;
- ② have a low noise level, so no vibrator air pumps would be used;
- ③ require little maintenance, so no bacterial filtration would be installed as this requires 'nursing';
- ④ be idiot-proof, so there would be no exposed hoses, pipes and cables;
- ⑤ have a natural interior from substrate to surface;
- ⑥ contain a natural mix of occupants, i.e., fish, invertebrates, and algae;
- ⑦ contain nutrient-free water, so there would be efficient skimming.

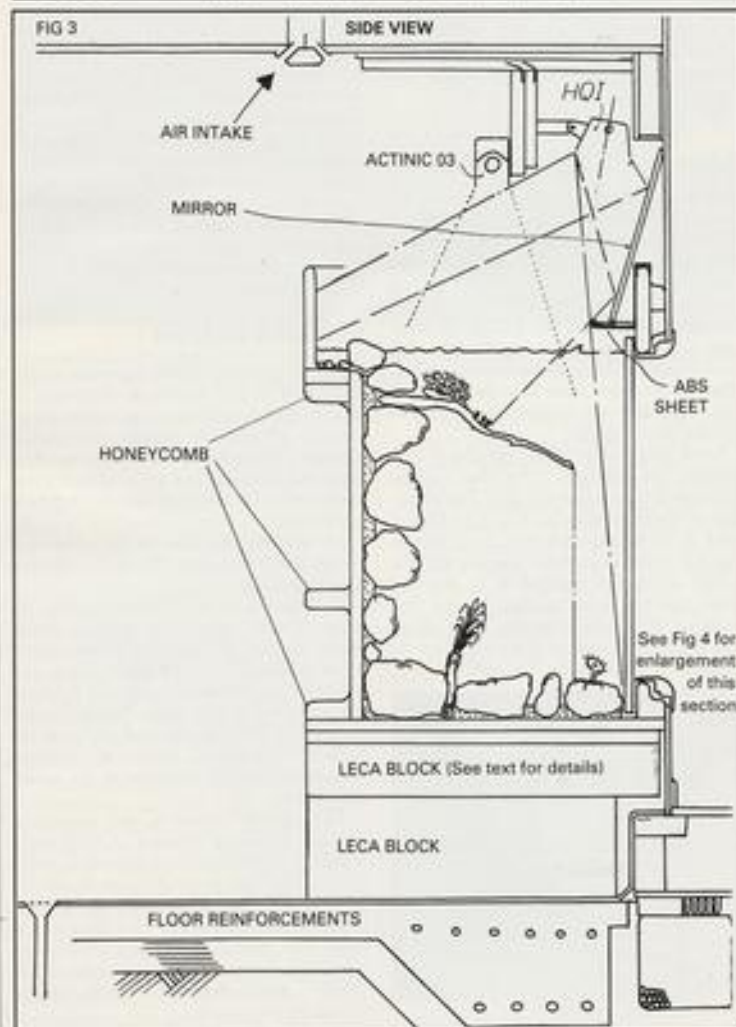
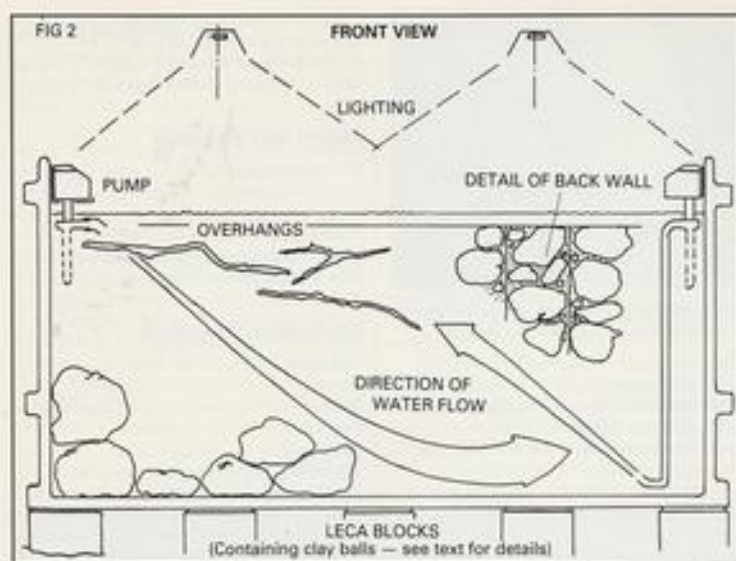
LOCATION OF THE AQUARIUM

At an early stage the house construction firm and their carpenter-in-charge were consulted regarding the siting of the aquarium. The weight was estimated at 3 tons! The floor in the house is made of so-called 'cassettes' of wooden beams with mineral wool as insulation. In view of the need for load-bearing capability and the fact that the insulation material would absorb water, the floor of the house was not a good place for an aquarium. On the other hand, the floor of the garage seemed perfect — it is made of solid concrete. And so, I chose the floor of the garage.

An area 5 metres long and 2 metres wide was divided from the garage by building a wall. A detailed drawing was made so that I wouldn't forget anything important which I might regret later on.

THE AQUARIUM ROOM

The area of the aquarium room is 10 square metres. To avoid any future problems I strengthened the floor with an extra reinforced concrete beam under the aquarium. The room was equipped with a sink with hot and cold water, drainage at floor level, water-proof wallpaper, plastic flooring, a window, fluorescent ceiling lights, and two earthed electric supplies. The base was made



of five carefully positioned blocks of clay balls. The loading relationship between the aquarium and this base was calculated at 0.25 kg/sq m; these Leca Blocks were capable of taking a loading of 30 kg/sq m so there was an adequate safety factor.

AIR CIRCULATION

As icing on the cake I fitted a fan system which vents to the rest of the house and thereby provides extra heat and humidity there. This can lower the energy consumption by around 10% compared with venting the aquarium room to the fresh air outside.

SHAPE AND SIZE

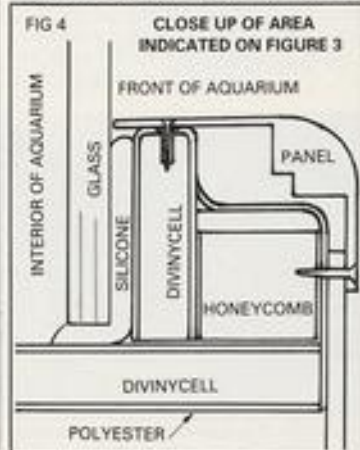
In the first flush of enthusiasm I planned a tank with a volume of 2.7 cubic metres but, because of the high cost of this, I later reduced it to 1.6 cubic metres. The next problem was the shape of the aquarium. I had four different shapes to choose from:

- Square** — but this would mean a long distance to the rear;
- Rectangular** — but this would be too long, making it difficult to enter the room;
- Round** — but plexi-glass gives aquarium inhabitants an unnatural appearance;
- Half-oval** — but this would be difficult for me to design and manufacture.

I liked the half-oval idea very much — it would allow me to enter the room easily; needed fewer pumps as the water would follow the curved surfaces; and the width was variable. I had seen this type used at the Wilhelma Zoo in Stuttgart, West Germany, and it worked well. I was sorry that I couldn't have this curved aquarium because I didn't have the technical know-how to make the curved sides.

As a compromise I chose the ordinary rectangular form and made the room 15cm longer so it would be easier to enter.

(For information only, let me mention that none of the above is perfect for an aquarium. The best shape is that of a yacht, i.e., two curved shells with the water contacting the convex sides. This distributes the forces more evenly and permits a reduced





Construction of the back wall (tank is lying on its side). The Faxa Limestone blocks can be seen resting on their appropriate sections, with black tape in between (see text for details).

thickness of the sides compared with that required for a straight side. Compare this with the shape of a hydro-electric dam ...)

CHOICE OF AQUARIUM

The choice of material seemed easy. Many materials were quickly rejected:

Wood — needs too much maintenance;

Concrete — too heavy and increases pH;

Glass — too heavy, has to be built on site, and would be difficult to move if we eventually moved from the house.

There is one more material: it is called Divinycell (*see Footnote) and is made of a skin of PVC over closed cells containing a neutral gas. The manufacturing process involves mixing several chemicals under pressure and heat. A hardening procedure then creates a hard cake. This is then laminated with two layers of polyester and a coarse glass-fibre mat. This can be done by the manufacturer or by the user, and it is then ready for use. The sheet size is 1.22 x 2.45 metres and the thickness, in my case, 25mm, and the hardness code is H80.

This sandwich construction acts like a steel I-beam, but instead of the steel, there is Divinycell with plastic laminate. The PVC keeps the two laminates at a constant distance from each other and it can therefore withstand the strong bending and shear forces which occur when the aquarium is filled with water.

Divinycell has many positive advantages and just a few disadvantages:

- + high strength
- + good insulation properties
- + tolerates chemicals
- + non-inflammable

- + easy to saw
- + wooden frame not necessary
- + cheaper than glass
- + freedom to choose shape and size

- time-consuming
- poisonous fumes when hardening polyester.

According to the Swedish manufacturer, this material can be used in the manufacture of aeroplanes, railway wagons, trucks, and sea-going boats (both the Norwegian and Swedish navies have ships utilising this material).

To this list I can add aquaria ...!

MANUFACTURE

After several telephone calls to the manufacturer and to two plastic experts at Saab Cars, I found out there are two ways to build with Divinycell. The method I chose involves laying the cakes on a flat surface (this is important, as otherwise, the cakes will be distorted and useless) and adding the laminates to both sides by turning the cake after the first layer of laminate has been hardened. After all the cakes have been laminated in this way, they are assembled simply by gluing them together.

I took great care to spread the glue so as to improve the strength. After that I added polyester and fibre over the glue. The advantage of this method is that you don't have to work in the poisonous fumes; the disadvantage is that you need a lot of space to work in.

The alternative method is to glue the cakes together before lamination and then laminate the whole aquarium. The advantage and disadvantage of this method are the opposite of those for the first method.



The back wall and overhang (right at the top of the shot) nearly completed.

In both methods, accuracy, good ventilation, a temperature of at least 16°C (61°F) in the working area, and a tight-fitting gas mask containing charcoal, are essential.

Materials needed

- Divinycell cakes
- Polyester plastic
- Glass-fibre mat
- Plastic glue
- Honeycomb beams (*see Footnote)
- Top coat plastic with wax
- Plastic sheet

Equipment needed

- Gas mask
- Brushes
- Scissors
- Overalls
- Roller
- Measuring jug for hardening liquid

When the aquarium was completed I painted it with two layers of top coat. In my case the colour was white, but there are many other possibilities. Top coat is a polyester plastic with a small amount of wax. The wax fills the pores in the plastic material. As you will have read in the materials list, I used a material called Honeycomb. This has a core of aluminium with layers of glass-fibre reinforced polyester plastic on both sides. The Honeycomb is much stiffer, and more expensive, than Divinycell, so I used it only as a reinforcement beam at the top, bottom, and water column centre of gravity — one-third of the height of the water column, measured from the bottom.

During the hardening time, I started work on the interior.

INTERIOR DESIGN

A well designed interior is important for the well-being of the aquarium occupants. It should provide protection and resting places for the animals. It should also permit strongly illuminated and shaded areas, deep areas and shallows, and areas of strong and weak current. It can even hide the technical equipment.

The most important function the interior must provide is a large surface area for the oxidation bacteria to fix on.

This can be achieved by positioning the material with its porous surfaces downwards, so that the bacterial population is protected against strong light, algae, and sediment accumulation, and can function efficiently for a long time. Denitrification occurs in a thin layer of coral gravel on the bottom. This doesn't matter, as reduction doesn't add further nutrients to the aquarium system.

This type of interior is very important, and no amount of cleaning or filter technology can substitute for it because it works even if the filtration system is out of order. If you are unable to design such an interior, then you will need to rely on a large trickle filter with bio-balls (or their equivalent), especially if you are running tanks which require medication, or tanks whose occupants are for sale.

Choice of materials

Before I started to design my interior, I searched through many magazines and talked to a lot of marine aquarists to see if I could discover a new material. Unfortunately, I didn't, so I had to use materials commonly used in the aquarium trade:

① Lava and grotto ceramic, so-called 'slag', was not good for my needs. I don't like it because it has a brownish colour and accumulates lots of debris (even coral does this). Moreover, I am not sure these materials are free from poisonous agents.

② Sprayable foam or its equivalent are not good either. Their incredible buoyancy may result in the decor floating to the surface. Their 'lifespan' is about five years — not long enough for a permanent aquarium.

③ 'Faxe' Limestone: None of the above-mentioned materials has the same natural structure to its surface as this fossil limestone rock from Denmark. It is white to grey

well as this overhang, a further five pieces of limestone created a superb grotto.

Moving into the garage

I started this task by tilting the aquarium so that the rear side was towards the floor. A strong plastic sheet was then placed on the side and secured by several pieces of tape to prevent the polyester plastic from cutting into the top coat. I then marked off the aquarium length into ten equal sections using a wide glass-fibre reinforced black tape, running from bottom to top. Each section had an estimated load-bearing capacity of 75 kilos.

After this had been done, I positioned the largest pieces of Faxe Limestone between the sections. Small stones, the size of potatoes, were added between the big rocks. Despite the use of lots of stones, there were still places between the stones where the plastic was visible.



Some of the invertebrates which clothe the overhang area. To the right of the picture, two of the vertical 'slits' in the Faxe Limestone back wall are visible.

in colour, and is found in sizes ranging from 3mm to $\frac{1}{2}$ metre. I have used this material successfully for nine years, and so decided to use a similar decor, somewhat simplified.

Rocks, rocks, rocks

To start with, I had to decide on the desired appearance of the interior decor. I made two plans: one had large pieces of limestone at the right hand side extending in a wide arc down to the bottom of the left hand side. I called this 'continental plate meets continental plate'. The other plan involved random positioning of the stones. I rejected the first idea as it looked a little bit too 'man-made'.

The interior decor consisted of 500 kilos of limestone and 200 kilos of polyester plastic, from the substrate to the surface. The previously-used blocks (i.e., those used in my earlier 500-litre tank) were used along the short sides of the aquarium and the bottom area. As the new tank was bigger, this was obviously not enough. I added two large (0.7m diameter) blocks and several small coral skeletons to create a shelf with a large cave below. On the shelf, I proposed to keep invertebrates that need strong lighting. As

To solve this problem, I crushed several pieces of limestone to make 10 litres of very fine dust. Lots of this dust was spread out between the stones just after the polyester plastic had hardened into a thick skin. This is important. If you add the dust before a skin has appeared then it will sink into the polyester plastic; if you add it after the skin has hardened, the dust will fall off the polyester plastic. In both cases it will be useless. It is therefore very important to do it at the right point of the hardening procedure.

To build the large coral overhang I temporarily positioned the two large rocks before plastic was added. I experimented to find the most stable positioning. The overhang was then removed, to be reassembled after the tank was installed in the aquarium room.

2kg of polyester plastic was then added slowly. When this difficult and poisonous work was done, I left the interior to harden for three months. It takes this long for a thickness of 30mm to harden. If you want to do the same, make sure you wear a gas mask and ensure there is good ventilation.

This method is simpler than the old technique in that the new interior was moulded directly into the aquarium and not

in a wooden mould. This avoids the leaving of a small gap, some millimetres wide, between the aquarium sides and the moulded decor, in which small fish and debris may become trapped.

To achieve perfect results, it is important to have the same thickness throughout, and so I added the polyester equally in every section. By adding small extra amounts of hardening liquid, the plastic was allowed to flow slowly horizontally before it began to harden. A problem to avoid is getting spots of polyester on the rocks. This was solved by using a large plastic bucket, and then it was easy to steer carefully between the stones.

I didn't sell the decor from the old 500-litre aquarium (although I sold the tank itself). I was therefore able to use this on the short sides and along the bottom beneath the overhangs. The new and the old decor together weigh 700kg and the polyester 300kg.

Glass = soda + sand

The choice of material for the front panel was easy — acrylic plastic or glass. A quick calculation showed that, with the pressure exerted by a one-metre water column, the acrylic plastic would have to be thicker than the appropriate glass, so I couldn't expect any reduction in cost or weight by using it. What I could expect was a more readily scratched surface. So I chose 15mm glass.

An important issue was whether the front glass should be a single thickness or laminated, i.e. several thin sheets glued together with a special glue under high pressure into a single sheet. I have greater confidence in laminated glass, as if one layer is broken, the other two are left, and there is no risk of being speared by pieces of glass. So laminated glass was chosen.

The formula required a thickness of 15mm, but the manufacturer produces only 3 x 6mm — unnecessarily strong, but erring in the right direction. The glue is, in fact, a transparent plastic layer with a thickness of 1.52mm. Total thickness of the front glass is, therefore, $3 \times 6 + 2 \times 1.52 = 21.04$ mm.

Other dimensions: length 2110mm; height 1050mm; weight 105kg.

After a delivery delay of two months, summer holiday not included, I finally had the front glass in my garage. When I checked it I almost fell through the floor — the length was 70mm short...! A fortnight later I had a new front glass in my garage.

(To be continued)

***FOOTNOTE**
1. For further details of Divinycell, contact the UK agent: Barracuda Technologies Ltd, 1 Eastville Close, Gloucester, GL4 7SJ. Tel: 0452 501860. Fax: 0452 307031.
2. Further information on Honeycomb may be obtained from Bonded Structures, Ciba-Geigy Plastics, Duxford, Cambridge, CB2 4QD. Tel: 0223 833141. Telex: 81250.

Book/Video/Tape Reviews

Recent releases from International Dolphin Watch

BOOK Dance to a Dolphin's Song

By: Dr Horace Dobbs
Published by: **Jonathan Cape**
ISBN: 0-224-02628-3
Price: £11.95

Note:

If ordered direct from International Dolphin Watch*, please add £1.20 for postage and packing (UK), plus 50p extra (Overseas Surface Mail**)

VIDEO The Dolphin's Touch

Produced by: Jonathan Levy
Directed by: Garfield Kennedy
Published by: **Pentagon Communications Ltd**
Price: £14.95

Note:

If ordered direct from International Dolphin Watch, please add £1.05 (UK), £5.05 (Overseas Air Mail)

AUDIO TAPE Dolphin Dreamtime

By: Taramath Andre (Side 1) and Glenda Lunn (Side 2)
Produced by: **Dolphin Encounters International**
Distributed in the UK by: Poppie Adam, 'Three Rainbow House', Martin Lane, Bawtry, S Yorks, DN10 6NL.
Tel. 0302 710 743
Price: £7.95

Note:

If ordered direct from International Dolphin Watch, please add 65p for postage and packing (UK) or £1.55 (Overseas Air Mail)

*International Dolphin Watch, Parklands, North Ferraby, Humberside HU14 3ET. Tel. 0482 632650

**Overseas payments to be made by International Money Order.

I've never touched a wild dolphin. Few people have. I've been pretty close to them, though, but that was a long time ago when I was a boy and used to sit, legs dangling over the side, on the bow of my father's little motor boat as we sped along during our frequent 'cruises' in the Bay of Gibraltar. Dolphins would unfailingly come

up to us, to ride our bow wave and look up at me, as if winking, with those soulful, friendly, intelligent eyes . . . always temptingly just out of reach. Happy, carefree days those.

All the same strong emotions I used to experience then came flooding back to me today — long-lost friends from a distant past that had been somehow forgotten in the chaotic mellee of my childhood memories.

The powerful stimulus that took me back came, not from an actual close encounter with a dolphin, but from an audio tape of all things. **Dolphin Dreamland** is part of Dr Horace Dobbs' all-embracing, fascinating work on dolphins, their world and the effects they have on humans.

Hypnotic messages — and hypnotic music — make up the audio tape which was originally developed as part of **Operation Sunflower**, a project designed to investigate the uplifting effect of dolphins on clinically depressed humans.

Of course, you don't have to be depressed to be uplifted. In fact, Dr Dobbs and his team are interested in the effects of dolphins and 'dolphin music' on all types of people, as part of a much larger research programme. So, if you would like to take part in this project, please contact International Dolphin Watch at the address given at the top of this review.

Along with **Dolphin Dreamland**, arrived a video, **The Dolphin's Touch**. This film is an extended version of a highly acclaimed programme that was screened on ITV some time ago. It tells the touching (forgive the pun) story of three depressives who were introduced to wild dolphins by Horace Dobbs, and who experienced remarkable improvements merely through swimming with, and touching, these gentle creatures. Great stuff!

Then there's **Dance to a Dolphin's Song**, the third part of the dolphin package reviewed here. In this book, Horace Dobbs takes us through a series of dolphin encounters — including those depicted in the video — in a vivid, eminently readable, informative style that shows his effervescent on every page.

Dance to a Dolphin's Song is a great book in its own right, but, taken in conjunction with the tape and the video, it helps to create a whole that is considerably larger than its individual component parts.

I thoroughly enjoyed my escape into the world of dolphins and know that many of our readers would feel the same, if the extremely favourable feedback we receive on our whale, shark, and other non-aquarium-based features is anything to go by.

My only personal regret, having gone through the dolphin package, has absolutely nothing to do with its quality. It's, rather, to do with the fact that the genuinely nostalgic, uplifting emotions which the audio tape elicited in me, were followed (on my return to reality) by an equally powerful sense of sadness that those wild dolphins of my

childhood are only too rarely seen these days. They've become innocent victims of our incomprehensible onslaught on the planet and, even, of some misplaced minds who, apparently, shoot dolphins that become ensnared in fishermen's nets in the belief that their screams will frighten others away. Scary, isn't it?

John Dawes

The Interpet Manual of Tank Busters

By: Gina Sandford and Richard Crow
Published by: **Salamander Books Ltd**
Price: £14.94
ISBN: 5 012922 000278

Quite literally, a tank buster is any fish (or object) that will do just that, ie, bust a tank. However, if this were to be the only criterion used, there would hardly have been any point in writing this book in the first place. After all, why write about the needs and characteristics of a selection of fish if they can't be kept in aquaria because of their tank-destroying tendencies.

Happily, the definition adopted in this well-presented book is considerably more accommodating. Tank busters are seen as freshwater fish that present a challenge to fishkeepers, principally because they grow somewhat larger than most other aquarium fish. Size is not the sole qualification, though. Space required, either for shoaling or territorial purposes, is also an important factor.

As a result, we find that the large selection of species includes such non-tank-busting examples as some Spiny Eels which, while being long, could hardly smash a respectable tank even if they tried. Similarly, cichlids like the Frontosa, the Five-Spot Cichlid or the Nicaragua/Macaw Cichlid, or catfish such as the Whiptail, or cyprinids like *Labeobarbus burmanicus*, the Tinfoil Barb and the Silver Shark, all feature in this out-of-the-ordinary, colourful, interesting, and very well written book.

The text is divided into two main sections, the first one entitled Practical Matters, and the second, A Selection of Fishes.

Under Practical Matters, all the main aspects of setting up and maintaining an aquarium for tank busters are very adequately dealt with, while the second deals with the fish themselves arranged by family.

Gina Sandford and Richard Crow specialise in catfish and cichlids respectively, so it comes as no surprise to find that these two large groups of fish are particularly well dealt with. In fact, all the families receive good coverage, although in at least one case — the Bony Tongues — I would have liked to have seen some references made to the fact that two of the fish, the Arapaima and the Asian Bony Tongue or Dragon Fish, are CITES listed. Trade in these species is therefore

banned (although the Indonesian population of the Dragon Fish has now been transferred to CITES Appendix II, allowing an annual quota of captive-bred specimens to be exported).

Knowing that the author of this section (G.S.) is well acquainted with the CITES lists, and that she is also conservation minded, I am led to assume that, for some reason or other, the publishers have decided, in their wisdom, to omit this rather important piece of information. If so, this is a real shame, since aquarists would, undoubtedly, appreciate knowing about such matters.

I think there has long been a need for a

book specialising in large fishes. I therefore warmly welcome the appearance of **Tank Busters** — so (I'm sure) will all those aquarists (not a tiny minority, by any means) who have been crying out for help with their sizeable(!) problem fish.

Produced by Salamander in their usual colourful, well presented, excellent value for money format, and written by two very knowledgeable and most welcome newcomers to the 'fish-book-writing-scene' (the competition is getting tougher by the day!), **Tank Busters** should do very well indeed. It certainly deserves to.

John Dawes

NEW BOOK NEWS

LETTS GUIDE TO AQUARIUM FISH

Authors: Eleanor Lawrence and Sue Harniss

Publication: 7 March 1991

Price: £3.50

Letts Pocket Guides is a series of practical compact identification guides covering many different subjects. Each book has more than 100 full-colour, detailed illustrations to enable easy identification. The series has a unique system of symbols and colour-coded bands which give the reader immediate access to the correct section of the book. No previous knowledge of the subject is required and the concise, informative text makes learning simple.

Letts Pocket Guide to Aquarium Fish covers the many exotic and amazingly coloured varieties of fish that can be kept in a home aquarium. The colour-coded bands guide the reader to the right variety of fish for each type of aquarium. There is also information on the habits and requirements of the different species. With this guide, the reader will be able to put together the most interesting and suitable collection of aquarium fish.

Video News from Kingfisheries

We have been informed by Kingfisheries Ltd, producers of a large collection of videos (some of which have been reviewed in *A & P* — see for instance, October 1990), that response to our reviews, and their advertisements, has been very encouraging over recent months.

However, some postal customers have sent in cheques for particular videos but, for some reason, have omitted to send in their addresses! We therefore make a special plea on behalf of Kingfisheries to any readers who may wish to purchase videos by post, to ensure that they send in their full postal address, including postcode, with their orders. So, if you have ordered a video recently and haven't heard, get in touch with Stan Kemp on 081 650 3716. Your cheque could well be one of those, still uncashed, awaiting a call.

Finally, if you have seen — and enjoyed — **The German Experience** which we reviewed last October, you'll, no doubt, be interested to learn that a full-length video of **Aquarama '91**, which *A & P* is officially supporting, plus a trip around some of Singapore's leading fish farms, is being planned for later on this year.

For further details, contact Stan Kemp at Kingfisheries Ltd, 308 Croydon Road, Beckenham, Kent BR3 4HR.

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Left, Gordon McGregor Reid holds a medium-sized Nile Perch — a large and voracious predator recently discovered in the Cross River just north of Lake Barombi Mbo. The introduction of this species to the crater would likely result in the destruction of all the indigenous fishes. Length of specimen: c 100cm (c 39in); weight: c 20Kg (44lb).

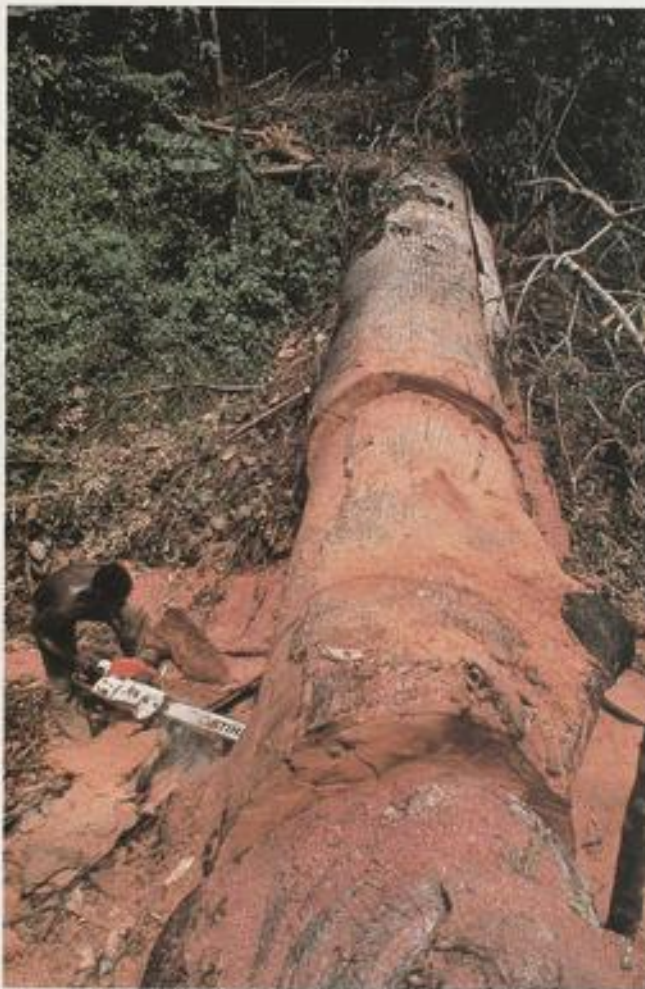
Right, Kumba Town. Aerial view of an urban sprawl reaching north towards the Lake.

Bottom left, the loss of rainforest trees through logging around the Lake could lead to local climatic changes and a loss of terrestrial food (berries, insects etc) dropping into the water.

Centre, slash and burn agriculture. Interlopers are moving relentlessly towards the Lake from Kumba Town.

Below centre, Onga (*Sarotherodon linnellii*) — one of Lake Barombi Mbo's cichlids — has an enlarged maternal mouth cavity to accommodate eggs and fry to a larger size than is possible in other mouthbrooders. Length of specimen: c 22cm (c 8.7in).

Below right, amphibian larvae from the Lake. Recent research at the Smithsonian Institution, Washington, suggests that some tadpoles from Lake Barombi Mbo and its surrounding rainforest are of strange forms so far unrecognised in Africa. Length of specimens: c 3cm (c 1.2in).



CAMEROON

Troubles at the Source of Life (Part 2 – Modern Threats and the Future)

Lake Barombi Mbo faces an uncertain future as the modern world encroaches on it from all sides. Dr. Gordon McGregor Reid and Moise Shewa fear for its longterm survival.

(Photographs by Edward Parker)



For the Barombi, survival has always depended on their intimate knowledge of the natural history of the lake, seasonal cycles and sustainable methods of fishing.

Through the ages, they have clambered out over the rim of the crater, donned 'town clothes' and trekked to the urban market. The fish are used to barter for oil, salt, poultry and goats. Returning, the villagers offer ritual sacrifices to the "deep water" that supports them. Chanting incantations in a cult language, they worship the lake at the altar of Ndengo. This has always been the custom; it is what gives a meaning to life and allows them to continue.

MODERN THREATS

Sadly, this time-honoured traditional existence is now threatened by external factors. The growth of Kumba (the nearest town) has led to disruptive, unsustainable activities near the lake, such as hunting, logging and slash-and-burn agriculture. There is also an ever-increasing demand for water from the town. The lake now supplies this domestic need via a pipeline.

A small concrete barrage was erected some time ago to maintain a slightly higher level at the outflow, but the altered levels may have somehow disturbed the ancient biology of the lake. The Barombi now report that the mouth-brooding cichlid Mongo has not been seen for two years, and that Dikume is becoming scarce. Sadly, it is now possible that Mongo — the product of thousands of years of evolution — is already extinct. There are evidently grave dangers for the ten remaining kinds of cichlid. The construction of a bigger dam could quite likely seal their fate and that of the Barombi villagers.

An increased number of outside visitors has resulted in the contamination of the lake with bilharzia, a human disease spread by urinating in the water. Local public health authorities have, fortunately, taken commendably prompt action to control the dis-

ease, which is transmitted by an aquatic snail and which could have debilitating effects on the Barombi.

But the chemicals which the health officials spray to control the water snails are toxic to fish and other life. In a small, enclosed and delicate lacustrine environment, the immediate and longterm effects of these pesticides cannot be calculated. Their intended beneficial effects may well be outweighed by the harm which they can do. Who knows how much poison has already entered the aquatic food chain and what effects this might have, say, on the breeding cycle and fertility of the fishes and on the health of the people who eat them?

Unlike the Great Lakes of East Africa (unfortunately, also beset with environmental problems) Lake Barombi Mbo is not large enough to contain or buffer the physical and chemical onslaughts which come from outside. Adverse processes which require decades to affect a large underwater ecosystem can bring catastrophe to a small lake in a few years or months.

LAST GUARDIANS?

The state requirement that Barombi youths are educated away from the village, in Kumba town, places large pressures on the cohesion of a tribal society. Will the educated offspring want to continue in the same way as their forebears? Can they deny the pervasive influence of a materialistic culture rapidly developing on their doorstep? Even if the children stay, the increasing demands from the town for fish caught in the lake will conflict with the necessarily limited catches. Will the Barombi always be able to resist the immediate-profit motive to harvest the fish at a rate which cannot be sustained?

Alert and sensitive to the biological and social problems, the Cameroonian Government and the World Wide Fund for Nature are now considering a proposal to make the lake an aquatic nature reserve, while preserv-

ing tribal fishing rights. In this way, the traditional existence of the Barombi could be rescued, at least for a time.

The promotion of tourism at this attractive site — via, say, a small visitor centre — could bring material benefits to the local people and supplement their limited earnings from fishing. The grave dangers of such a development are also evident. Improved access to the lake for the purposes of tourism will also increase outside influences. Recreational angling could, for example, cause ecological problems through the careless introduction of alien 'sport fish' or 'bait fish'. Certainly, in other African lakes, the transfer of predatory fishes for commercial or leisure purposes has caused the decline or extinction of native fishes and had a disastrous socio-economic impact.

Ultimately, an overwhelming burden of external pressures could destroy the tribal society. If the villagers stop fishing and earn a living by other means, what will happen to the rare and fragile fish populations with which they have lived in balance for so long? If the Barombi cease to be guardians of the lake, who will protect their besieged and deserted shrine?

FOOTNOTE

This article, along with Part I which appeared last month, is published by special arrangement with *BBC Wildlife* magazine. For full details of acknowledgements, the authors and photographer, see the last issue of *Aquarist & Pondkeeper*.



"Dad's really going to be pleased with us when he finds out we've been feeding his catfish!"

COVER STORY — QUEEN ANGEL FISH

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



The Queen Angel (*Holocanthus ciliaris*) is a truly regal fish that would grace any home aquarium — were it not for the fact that it can, reportedly, grow to a maximum length of 24in (60cm)!

Fortunately, this size is only attained in the wild. Even so, the attractive juveniles that are regularly seen for sale will eventually grow into sizeable adults, given the space and the right conditions, and could therefore pose some problems, if only in this respect.

Queen Angels vary in coloration, depending on locality (they are found in the Western Atlantic, from Florida down to Brazil). Not surprisingly, this can lead to some identification problems, particularly since this species is known to hybridise with its close relative, the equally beautiful, Blue Angel, *H. bermudensis* (*isabellus*).

T.F.H. AD KONINGS COMPETITION WINNERS

Thank you for your enthusiastic response to our February competition sponsored by T.F.H. Publications. We did say — didn't we? — that Ad Konings's *Book of Cichlids* and all other *Fishes of Lake Malawi* was a fantastic book. Hundreds of *A & P* readers obviously agreed.

The ten lucky winners are:

- Barry Taylor — Eglington, Co. Derry
- John Millard — Hurst, Berks.
- David Osborne — Worcester Park, Surrey
- Eamonn Noble — Milton Keynes, Bucks.
- Alan Dunn — Bristol
- Tracy Thomas — Blacon, Chester
- Peter Frost — Ashbourne, Derbyshire
- Peter Parry — Hattersley Hyde, Cheshire
- Edmund Burns — Belfast, Co. Antrim
- Alan Cann — Knighton, Leicester

Congratulations to all the winners, and commiserations to the losers. If you are among the former, we can assure you that you've got a real treat in store.

Thank you all once more for your support, and thank you T.F.H. for yet another super competition.

Naturalist's notebook

By Eric Hardy

GREAT CRESTED RE-INTRODUCTIONS

Llwyini pond, at Connah's Quay Small Copse, Deeside, Clwyd, was preserved recently because it has Great Crested Newts.

At a recent meeting of North-western Naturalists' Union, Rick Parker told us his experience of captive breeding Great Crested Newts and introducing them to new haunts, like ponds by Bolton's Rumworth reservoir.

Normally occupying deeper water in the pond than our two other native newts, Great Crested Newts have been active longer than their usual February to October period in recent mild wet winters. This newt has been shown to reproduce twice in a year in captivity.

SALMON WRASSE

Scottish salmon farmers discovered that the common Gold Sinny Wrasse can do a better job removing salmon lice than chemicals. This small 'cleaner fish' has been in demand for years and is caged with the salmon, which are more infested than free-running fish. Loch Sunart in Argyll, Lerwick and a unit at Ardtoe are good examples.

Supplies are collected in Portland harbour, where Gold Sinny are common, feeding on sand-hoppers, marine worms and brittle-star. They are caught by long fyke-nets, and are kept in holding tanks at Castletown harbour for despatch to Scotland. Unfortunately, this situation has coined a new term for this fish: Salmon Wrasse.

BENEFICIAL GRAZERS

Grazing pond-snails, like *Lymnaea* and *Planorbis*, are sometimes used, with precaution, to keep algae off glass fish-tanks. Sussex biologists have shown that these common snails can benefit some plants, like feeding on Hornwort by selecting its algae rather than the Hornwort tissue, after an association over millions of years.

The number of bacteria and algal cells increases on un-

grazed plants but not on grazed ones. Otherwise, prolific growth of these would restrict the overall plant growth. But snails may distribute the algae to new host-plants by passing them through their guts. Some algae have probably restricted grazing by producing longer forms of several cells together.

STICKLEBACK MORTALITY

Three-spined Sticklebacks are typical inhabitants of Epping Forest ponds. Alwyne Wheeler, the noted ichthyologist, described a study of them during recent summer droughts to London Natural History.

Their high mortality after the end of the breeding season is reputed to be due to the depletion of lipid and glycogen energy reserves after females produce their eggs, and also by the courtship activities of males.

Both draw so heavily on their reserves for courtship and reproduction with sperm and kidney secretions that bind the nest material, that additional stress in drought conditions, elevated day temperatures (with depleted oxygen and nightly carbon dioxide) that mass mortality occurred, even where ponds still contained water. An associate painstakingly mea-

sured 599 sticklebacks in this study, out of 600 caught from a pond containing about 2,000. Length-groups were related to the age of the fish, most living for less than two years.

NATTERJACK RETREAT

The story of the Natterjack Toad in the north-west is a sad one of retreat from a changing habitat. It has retreated from the Mersey shores to Formby and Ainsdale dunes. At the end of the last war, Cheshire had two struggling colonies. In the 1960s their brackish pond inside the sea embankment at Leasowe-Meols was lost because the local council took exception to a Manchester-based deputation from the County Trust not including any Wirral or West Cheshire naturalists, or anyone who had previously known the water.

Now Cheshire's last Natterjacks have apparently become extinct in the Red Rocks Marsh reserves on the shore between Hoylake and West Kirby. None has been seen since the summer drought. A change of habitat is the main cause, with less saline water increasing the population of competitive Common Toads despite transplanting many of the latter. Lack of weekend wardening also resulted in public collecting and invasion

by dogs. The remedy seems to be a new 'scrape' for introducing Natterjacks from the Formby-Ainsdale colony on NCC reserves.

The North Wales colony in the Clwyd estuary disappeared about the middle of the last century. One was recorded at Llandules in 1824, but natural history here was in such a sorry state that nobody seems to have been interested.

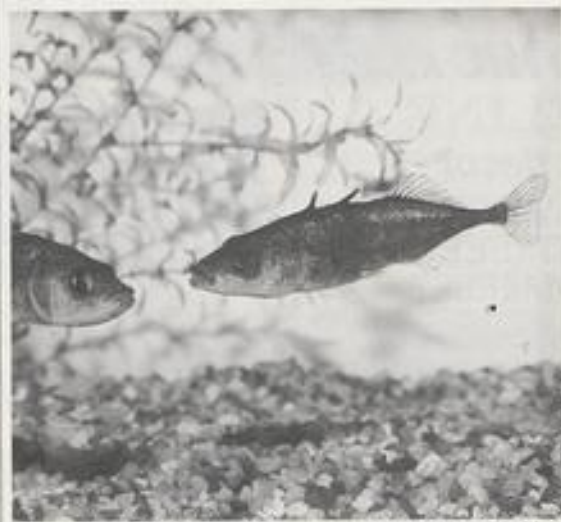
By the way, did you know that Cheshire has a quarter of the ponds in England and Wales — 84,000 — and certainly more Great Crested Newts than was once assumed? Great Sundew, one of its former wetland plants, is among 80 species exterminated by drainage, etc, in the past century. Across the Mersey, our biggest Hawker Dragonfly, the Emperor, which spread from the south to duneland pools in 1976, appeared last September at a garden pond in Knowsley, a late date for this species and a densely built-up area.

MIXED BAG

1 The world's rarest tortoise, *Geochelone ymphora*, is being specially protected in Madagascar.

2 Bombay Natural History Society recently recorded a rare case of twinning in the Ganges gharial, *Garialia gangetica*, a long-beaked crocodile much reduced by generations of hunting and now protected in India, Pakistan, Nepal and Bangladesh.

3 The new national nature reserve declared by the Nature Conservancy for Fenn's—Whixall—Bettisfield moss (684 hectares of lowland raised mire in north Shropshire, near Whitchurch), is the relict haunt of Adder, Marsh Andromeda, Bog Asphodel, Sundew, Royal Fern and Cranberry among its peat-cuttings. Among its 17 dragonflies is the uncommon White-beaked Dragonfly. It is a haunt of the Large Heath, among other butterflies like Silver-studded Blue and Brimstone. It is one of several British peatlands in urgent need of conservation, like Holcroft's moss and uncut peatland near Warrington declared a Cheshire county reserve a few months ago.



Three-spined Sticklebacks. Both males and females exhibit high mortality after spawning, particularly in drought-affected seasons.

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All letters must be accompanied by an S.A.E. and addressed to:

Your Questions Answered, The Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.

Herpetology, Julian Sims. Koi, John Cuvelier. Tropical, Dr. David Ford. Coldwater, Pauline Hodgkinson. Plants, Barry James. Discus, Eberhard Schulze. Marine, Graham Cox.

KOI

IN-DEPTH BREEDING

I have kept Koi for several years and would now like to breed them. However, I am unable to find an in-depth book on the subject. Can you help?

I'm sorry, but I'm unable to bring to mind any book dealing in depth with this subject. However, there is an excellent chapter on breeding in the *Interpet Encyclopedia of Koi* which is still available from the usual sources.

My own technique, which you may find of interest, is as follows:

A month or so before the start of the spawning period (April, May), I set up a 4-foot (120cm) aquarium containing an inter-

nal filter, air bubbling equipment and heater, setting this to maintain a temperature of 68° (20°C). A few sprigs of Canadian Pondweed are also added to improve the naturalisation process of the water.

The Koi are allowed to spawn in the pool naturally and, depending upon what medium is used (branches of Japanese Larch, blanketweed, plastic spawning net), this is lifted out, with the eggs attached, and placed in the tank (you need to be up early, though, as spawning usually occurs about dawn and the eggs are immediately eaten by the other fish).

Hatching usually takes place 5 days later, any infertile (white and furry) eggs being removed in the meantime. Once hatching is complete, the medium can be removed. Initial feeding



The *Interpet Practical Encyclopedia of Koi* has a very good section on Koi breeding.

consists of 'Liquify' until the infants are large enough to manage powdered food. At about 8 to 10 weeks I then feed

these with frozen *Tubifex* and *Daphnia*. Don't be tempted to feed with these in the live form, owing to the risk of transferring disease. Once the fry have grown to, perhaps, two inches (c 5cm) they can manage a coarser grade of powdered food and any other frozen aquatic food which is available. Be careful not to overfeed, however, as it is very easy to kill the fry when they are still tiny.

By the beginning of the next season, the fry should be large enough to introduce to the pool. Don't be surprised if you find a number of deformed fry in each batch, as this is quite common, as are a number of unexplained deaths among the 'crop', this being part of the excitement of breeding your own! I have, at this moment, 15 little beauties coming on nicely.

COLDWATER

UNEXPECTED FIND

Last spring I constructed a small pond and put in some 'weed' which I collected from a nearby canal. Some time later, I found some small fry, presumably hatched out from eggs that came in with the plants.

These fish are now about 2in (5cm) long. The dorsal fin is very large and reaches well down towards the tail, which itself is also pretty large with rounded lobes. The colour of the fish is a greenish hue.

Do you know what they are? If so, would you please supply me with some information on them?

Your fish may be Crucian Carp (*Carassius auratus*).

The young do not have the deep body of the adult, and the hump back develops later. Unlike some other carps, this species does not have barbels on the mouth and, like the

Goldfish (*Carassius auratus*), its dorsal fin grows along its back, almost to the caudal. The colour is an olive-green; in adults it can be reddish-brown along the back, with shades of bronze on the sides and a lighter belly.

The Crucian Carp is able to



The Crucian Carp — sturdy, close relative of the Goldfish. Its eggs are sometimes inadvertently introduced into ponds and aquaria.

live in quite poor conditions, though small, well vegetated ponds are typical habitats for this fish. It is a large fish (it can reach a size of about 20 inches [c 50cm]) so only young specimens are suitable for the aquarium.

Spawning takes place from May to July — it prefers a spawning temperature in the mid-fifties (c 13°C). Like Goldfish eggs, those of the Crucian are adhesive and adhere to water plants. After hatching, the young absorb the yolk sac while their mouths develop, and then they begin to feed on tiny morsels of plant and insect life.

DISCUS

DISCUS TANK 'SWEETENERS'

I have read most of the books and articles published on Discus. With the tank filtration system I have, it seems that I should have few problems.

My local aquarium shop owner also feels that I have nothing to worry about, as far as all the technical equipment is concerned. However, he wants me to run my tank in with some fish for at least one month before I introduce any Discus. I have talked to lots of other fishkeepers about this and get different replies from all of them. Can you help me, please?

The 'running-in' or maturing is, I feel, no longer the established way of setting up any tank. It seems absolutely pointless to keep an aquarium going with a few plants or a few fish for a month and believe that all the nasty effects of the 'new-tank-syndrome' will disappear when one introduces the bulk of the fish.

Even if one were to start the biological purification of the water with a few fish; as soon as the Discus are introduced into the aquarium, the balance — water, fish, filtration etc. — is changed to such a degree that one can talk again about having a new-tank-syndrome. There-

fore, why wait one month — or whatever time — before stocking the aquarium? It will always happen when the bulk of fish are placed into the tank.

Of course, one can take certain precautions to lessen the effects of the 'new-tank-syndrome' on a Discus tank.



Hygrophila difformis — the Discus aquarium 'sweetener'.

For example, one could use biological filtering material from another aquarium, which will help to colonise the new filtration system, or one could 'feed' the aquarium with some flake food, as long as the aquarium also contains an oxydator; or one could filter the aquarium

with a well-run-in power filter from another tank.

All this will lessen the effects of the 'new-tank-syndrome', but it will never completely eliminate it. Nature will have to take its course, and in this case, there are no real ways of shortening this process.

One could also keep the aerial roots of the Swiss Cheese Plant (*Monstera deliciosa*) in the aquarium, or a thicket of Water Wisteria (*Hygrophila difformis*). Both these plants are very high NO₂ users, and will soon reduce the nitrite level of any water. In my book, I mention that *H. difformis* is a very good plant to 'sweeten' the aquarium water and is often used in breeding tanks.

A further way to lessen the problems of running in a new aquarium would be to make sure that the pH level is in the acid range (I would have thought that all serious Discus keepers are aware of that) and therefore prevent build-up of ammonia. The installation of an ozoniser will also prevent the build-up of the toxic nitrite (NO₂).

But, even if the aquarium has a 'high' nitrite level, the Discus will not suffer at all; as long as it is only in a 'high' range for a week or so. If young Discus are kept in a water with a high nitrite level for a long time, they will then get started and, often,

their body shape will suffer. But since the nitrite level of a new aquarium will never be 'high' for longer than one week, there is no need to get worried.

If, however, the nitrite level remains high, one will have to find the cause of this. One should look at the following: type and size of filtration system in relation to amount of water/number of fish/amount of food/type of food.

Some foods are greater pollutants of the water than others, and should be used very carefully at the initial stage of running in the aquarium (eg some flake foods and prepared Beef-heart). It is a good idea only to feed a 'cleaner' type of food for the first week or so, like frozen Bloodworm, frozen Black Mosquito Larvae, frozen Artemia and frozen Lobster Eggs. These foods will give the nitrifying bacteria a chance to build up in sufficient numbers and keep the tank going.

will then get stunted and, often, If, however, the 'new-tank-syndrome' persists over an unusually long time, you would be well advised to seek guidance from a competent aquarist. Any newly set up aquarium will have to cope with the 'new-tank-syndrome', and to keep half a dozen Cardinal Tetras in the aquarium for a month will hardly make any difference.

TROPICAL

TROUBLESOME GIANTS

I have had nothing but trouble with four Giant Gouramis (Ophronemus goramy) I bought some time ago. I was told that they grow quite large so I've put them in a 60 x 20 x 20 in (180 x 50 x 50cm) tank and feed them on spinach, lettuce, bread, fruit, flake food, freeze-dried foods, etc.

However, they are constantly bullying each other (particularly one specimen), often with actual damage being caused. I'm becoming very worried. Nevertheless, I would like to be able to keep these fish, sex them and breed them. Will this be possible?

Ophronemus goramy is 'The' Gourami, often called the Giant Gourami. The 'other' Giant Gourami (sometimes called the Little Giant Gourami!) is *Colisa fasciata*. It is the *Colisa* that aquarists mostly keep in aquaria and details are to be found in the hobby literature. *O. goramy* is not usually detailed because it is not an aquarium fish; it is a food fish originating from the



This juvenile Giant Gourami will grow into a blunt-nosed adult which can cause problems even in the confines of a fairly large-sized aquarium.

Greater Sunda Islands, but widespread in the Tropics as a farmed fish. It grows rapidly on vegetables and cereals and the flesh is excellent eating.

Young fish are pale, with a pointed head, but as they age, the colour changes and the head blunts, giving the fish a strange expression (hence its popularity as a public aquarium fish). Sexually mature fish are brown to

red with a yellow belly, but old fish can turn almost black. They can reach 60cm (24in).

The females have more rounded dorsal and anal fins and the males are said to blow a bubble nest, caring for the eggs and fry in typical Gourami style. To breed the fish, however, you need an exceptionally large aquarium. I suspect that at least one of your fish has matured and is attacking another male or a non-responsive female in your crowded tank — hence the trouble.

Yes, your diet for the fish sounds excellent, but I regret you have a major problem. You need to separate the fish, since each is going to outgrow your aquarium, even the 5-foot one...

PLANTS

'AQUATIC' TRADESCANTIA

I accidentally discovered that the plant commonly known as 'Wandering Sailor' or 'Wandering Jew' grows beautifully underwater. So far, I've kept a piece for two weeks in a coldwater aquarium. Now I would like to grow some in my

tropical aquarium. Will this be safe, or does the plant contain any poisonous substances?

Wandering Jew is the common name for *Tradescantia*. This genus is found in nature in damp places, often by the side of watercourses. Like most plants which grow in this sort of situation, they are capable of sur-

viving submersion for short periods of time. However, by the time you receive this letter, I expect that your specimens will have started to deteriorate.

As far as I know, these plants are not poisonous although, being of a fleshy nature, the decaying stems could cause pollution to both the gravel and the water.

Lots of houseplants are sold in aquatic shops as being 'aquatic', and will survive for varying periods of time underwater. However, I feel that this is a practice which is dangerous and not to be recommended.

As there are something like 180 species of true aquatic plants on the market, why bother?!

MARINE

EXCEPTIONAL SUCCESS

I have a H39 Mini Reef System 145 x 50 x 50 cm (57 x 20 x 20 in) containing 1 Trigger Fish, 1 Sailfin Tang (both about 5in — 12.7cm long), a Squirrel Fish (4in — 10cm), 3 Clownfish (Yellow Tail), a Hermit Crab and a Cowrie.

They live (and have done for a few years) in natural seawater and, if I want to change any water (say 1/3 tank) for any reason, I just go down to the shore at the back of my house (in Kirkwall) and fill a barrel from the sea, put it in the kitchen sink (the barrel, I mean) and let it stand in hot water to warm it up a bit and then put it in the fish tank. Mind you, the water round our island is crystal clear, and so far, pollution-free.

I have tried putting different things from the sea in my marine tank such as Sea Mouse, Clams, Hermit Crabs, Starfish, Sea Urchins, etc., but they don't survive; neither do any sea plants. Could this be on account of the difference in temperature?

I am delighted that you are

achieving such excellent results in your tropical marine aquarium by using natural seawater collected in the Orkney Isles!

This is, of course, in direct contradiction to the advice I have given many times over the last 30 years, and most recently in October 1990 issue of this magazine — namely, that the prudent marine aquarist should NEVER use natural seawater or creatures/objects collected from North Atlantic System beaches in a tropical marine aquarium.

My reasons for giving this advice are three-fold, as follows:—

1 DISEASE/PARASITES

The coral fishes and tropical marine invertebrates which we keep in our heated aquaria have no natural defence mechanisms to protect them against the pathogens and parasites which occur in North Atlantic and North Sea waters.

2 POLLUTION As is now common knowledge, thanks to the activities of the EEC Commissioners, the seawater of the coastline of

many parts of Britain is heavily polluted with sewage and agricultural run-off chemicals, such as fertilisers, herbicides and pesticides.

3 TEMPERATURE As you have already found out, very few of the creatures collected around our shorelines are able to adapt to tropical water temperatures. This is true even of



Temperate species like this Hermit Crab, will hardly ever survive in tropical environments.

littoral zone creatures, i.e. those animals and plants which, habitually living between the high tide level and the low tide level, are particularly well adapted to surviving a wide temperature range. However, when I lived in Brighton during the mid '60s, I did manage to acclimatise Beadlet Anemones, collected from just below the high tide level in high summer, to a tropical temperature of 72-74°F (22-23°C). At this temperature, they bred frequently throughout the whole year.

In conclusion, I must quote the old adage "THERE IS AN EXCEPTION TO PROVE EVERY RULE".

I believe that you have been extremely lucky so far, no doubt enormously assisted by the crystal clear clarity of the seawater of the beautiful Orkney beaches. Owing to your low population density, lack of intense farming methods and almost total absence of industrial pollution, if anyone in Britain could get away with it, you should.

HERPETOLOGY

RED EAR MATURITY

At what approximate age do Red Eared Terrapins mature?

The age at which Red Eared Terrapins (*Pseudemys scripta elegans*) become sexually mature depends very much on the tem-

perature at which they are kept. Temperature controls the growth rate of these reptiles and, hence, how quickly they reach maturity.

In North America, the terrapins which inhabit the 'cooling ponds' which contain warm water from electricity generating stations, don't hibernate. These terrapins therefore conti-

nue to feed (and grow) in the constant, warm environmental conditions all year round, and reach sexual maturity in four to six years.

If captive terrapins are maintained in warm, constant conditions in a large aquarium, for example, six feet in length, or a large, heated pond in a conservatory, then similar rapid growth

can be achieved. Captive terrapins which don't experience cold winter temperatures could reach sexual maturity within six years.

The secondary sexual characteristic of long claws on the front limbs of the male *Pseudemys* terrapins only becomes apparent as male terrapins increase in carapace size.

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Al ALUMINIUM	- 0.012	F FLUORINE	- 1.320 ppm	O OXYGEN	- 857,113.0
Ar ARGON	- 0.610	Fe IRON	- 0.010	P PHOSPHATE	- 0.07
As ARSENIC	- 0.003	Ge GERMANIUM	- 0.000068	Pb LEAD	- 0.000030
Au GOLD	- 0.000012	H HYDROGEN	- 108,230.00	Rb RUBIDIUM	- 0.1210
B BORON	- 4.60	He HELIUM	- 0.0000070	Rn RADON	- 6 x 10 ⁻¹⁶
Ba BARIUM	- 0.03	Hg MERCURY	- 0.00003	S SULPHUR	- 884.50
Be BERYLLIUM	- 0.00000045	I IODINE	- 0.0580	Sb ANTIMONY	- 0.000310
Bi BISMUTH	- 0.0000165	In INDIUM	- 0.0240	Si SILICON	- 3.050
Br BROMINE	- 65.0	K POTASSIUM	- 382.0	Sn TIN	- 0.0030
C CARBON	- 28.050	Kr KRYPTON	- 0.00250	Sr STRONTIUM	- 8.130
Ca CALCIUM	- 508.0	Li LITHIUM	- 0.180	Ti TITANIUM	- 0.00120
Cd CADMIUM	- 0.000110	Mg MAGNESIUM	- 1356.00	U URANIUM	- 0.00280
Ce CERIUM	- 0.00038	Mn MANGANESE	- 0.0020	V VANADIUM	- 0.00170
Cl CHLORINE	- 18,750.0	Mo MOLYBDENUM	- 0.010	W TUNGSTEN	- 0.00010
Co COBALT	- 0.000280	N NITROGEN	- 0.520	Xe XENON	- 0.0000520
Cr CHROMIUM	- 0.0000480	Na SODIUM	- 10,505.00	Zn ZINC	- 0.0110
Cs CAESIUM	- 0.000510	Ne NEON	- 0.000140		

Above is a typical analysis of the formulation of

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1. The *inert gases* are present because this is an analysis of seawater made from 'ULTRAMARINE', not an analysis of the salts.
2. 'ULTRAMARINE' has the highest recorded **CALCIUM LEVEL** of any known sea salts. This is very important to secure a high **ALKALINE RESERVE** and for the formation of bones, teeth, endoskeletons (corals etc) and for most algae.
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THE COMPETITION

First, take a close look at the picture of **Evertite** and **Everplant** products and read the details provided for each product.

Then, using this information, plus your own knowledge of aquatic plant cultivation, answer the **SIX** competition questions and send us your answers on a postcard or stuck-down envelope (READ THE RULES FIRST).

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EVERITE No. 2

Iron-rich substrate additive in pellet form for adding to existing aquaria. 500 gm pack to treat aquaria up to 500 litres (132 gallons).

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EVERPLANT 'M'

A fertilizer in tablet form ensuring a monthly feeding regime for all aquatic plants. Contains basic and other vital elements (the basic elements are nitrogen, phosphorus and potassium). 50 Tablet pack to treat 1000 litres (264 gallons).

THE RULES

1. Write your answers to the competition questions on a postcard or stuck-down envelope.
2. Write your **FULL** name, i.e. including full first name, and address in **BLOCK CAPITALS** on your entry.
3. Send your completed entry to:
Aquarist & Pondkeeper,
Everglades Aquatic Plant Competition,
9 Tufton Street,
Ashford,
Kent TN23 1QN.
4. Closing date: **30 April, 1991** (First Post).
5. Only **ONE** entry per household will be accepted.
6. No correspondence will be entered into regarding the competition.
7. The judges' decision will be final.
8. No responsibility is accepted for entries lost, delayed or damaged in the post, and proof of posting will not be accepted as proof of delivery.
9. The first **NINE** correct entries drawn on **3 May, 1991** will be awarded the prizes.
10. The winners' names will be announced in the **June 1991** issue of *Aquarist & Pondkeeper*.
11. This competition is open to all UK readers of *Aquarist & Pondkeeper*, but not employees or their families of *Aquarist & Pondkeeper*, Dog World Ltd., or employees of Everglades Aquatic Nurseries.



THE QUESTIONS

1. What is the difference between Evertite No. 1 and Evertite No. 2?
2. Why are Everites coloured red?
3. Why is Everplant 'D' used daily?
4. What is a basic fertilizer?
5. Why is undergravel heating so beneficial to plant growth?
6. Which two of the following will encourage plant growth in aquaria?
a) Carbon dioxide;
b) Undergravel filters;
c) Filter carbon;
d) Natural sunlight;
e) Mercury vapour lamps.

THE PRIZES

In total, there will be **NINE** prizes, broken down as follows:
ONE FIRST PRIZE consisting of a collection of Everglades plants for a 48-inch aquarium (71 plants in total), plus one p-acket of each of Evertite No.1, Everplant 'M', and Everplant 'D', plus a copy of Barry James' book *An Interpet Guide to Aquarium Plants*.
TWO SECOND PRIZES containing the same items as the first prize, except that the plant collection is for a 36-inch aquarium and consists of **56** plants.
TWO THIRD PRIZES: as above, but with a plant collection consisting of **44** plants, designed for a 30-inch aquarium.
ONE FOURTH PRIZE: as above, but with a 24-inch aquarium plant collection (32 plants).
THREE CONSOLATION PRIZES consisting of an **Aquatic Plant Potting Kit** made up of 12 two-inch mesh pots complete with pre-split rockwool and Everplant 'M' fertiliser tablets.

Herpetology matters

By Julian Sims

CONFUSING COMMON NAMES

The use of a common name alone can cause real problems in the precise identification of an animal or a plant. In the January 1990 edition of *Herpetology Matters*, some examples of *Binominal Nomenclature* were given. This is the international system which uses two Greek, Latin or Latinised English names scientifically to identify the genus and the species of every living organism discovered to date. An example of the use of this two-name (binomial) system is *Bufo viridis* — the scientific binomial of the European Green Toad.

Of course, more animals and plants are being found all the time, and these new discoveries are scientifically described and given a unique binomial which denotes their genus (with a capital letter) and species (with a small letter). By the use of these two internationally agreed names, everyone can be certain about the animal or plant they are talking about — especially in a telephone conversation or in a letter, even without the aid of a photograph.

However, the same level of accuracy cannot always be guaranteed when only a common name is used. This is because several non-scientific common names can be in use to describe just one species of animal or plant. Unfortunately, to add to this confusion, it appears that common names are sometimes made up on the spot!

In the *Aquarist & Pondkeeper* editorial for April 1990, John Dawes drew attention to the confusion which had arisen regarding the availability of itive identification of the genus and species of these 'fish' proved difficult, even with the help of dorsal fin characteristics.

Now, up-to-date help is available — at least for the reptiles and amphibians of North America. This guidance is in the form of a new 41-page booklet entitled:

Standard Common and Current Scientific Names for North American Amphibians and Reptiles (3rd edition) by Joseph T Collins.

This booklet was published in the latter part of 1990 by the Society for the Study of Amphibians and Reptiles (SSAR) as their latest *Herpetological Circular*, Number 19.



Who am I? It's definite and official now — I'm a Hieroglyphic River Cooter (*Pseudemys concinna hieroglyphica*).

The latest edition of *Standard Common Names* supercedes the previous two, published in 1978 and 1982 respectively. These booklets have helped to ensure that only one common name is used in partnership with the scientific binomial (or trinomial) for every one of the 496 native species (and 578 subspecies) of North American salamander, frog, toad, turtle, crocodilia, worm-lizard (genus *Rhinara*), lizard and snake. This latest publication also contains an Appendix giving the common names of the 23 species of amphibian and reptile known to occur on the Hawaiian Islands. A second Appendix gives the common names for the 29 non-native (introduced) species which are now known to have established breeding colonies on the North American continent.

Owing to the widespread acceptance of the information in the two previous issues, over 85% of the regional guides and books on herpetology published in the USA since 1978 have adopted one standard common name for each species mentioned.

Some of the most interesting examples of these standardised names, both common and scientific, are applied to the freshwater Chelonia of North America. Collectively, these reptiles have frequently caused confusion, being called terrapins in Britain and turtles in the USA. By using the terminology in the new SSAR publication on both sides of the Atlantic, much

of this confusion can be removed. For example, the widely kept Red-eared Terrapin should now be referred to as the Red-eared Slider with the trinomial *Trachemys scripta elegans*. This is a new scientific name. In the past, the Red-eared Slider has been classified with the Redbelly Turtles (genus *Pseudemys*) and the Painted Turtles (genus *Chrysemys*).

In addition, some members of the Redbelly Turtle group are now referred to as Cooters. For example, the Hieroglyphic Terrapin (*Pseudemys concinna hieroglyphica*) should be called the Hieroglyphic River Cooter.

A copy of this invaluable booklet (which has been co-sponsored by thirteen other herpetological societies) can be obtained for the remarkably low cost of \$5 (in US funds only), from:
Dr Douglas H Taylor,
Department of Zoology,
Miami University,
Oxford,
Ohio 45056,
USA.

In a positive attempt to standardise nomenclature, I shall be using the common and scientific names from this SSAR booklet to describe the reptiles and amphibians from North America in future editions of *Herpetology Matters*, *Your Questions Answered* and *Spotlight* features. Hence, look out for "cooters", "sliders" and "turtles" as opposed to the more traditional, but less precise, "terrapin".

ALGAL CULTURE

During the development of amphibian larvae, the body of the tadpole grows downwards and spreads around the yolk of the egg. The growth and development of embryonic tissue in this way is called *epiboly*. For the first few days after the tadpole has 'hatched out' from its protective envelope of jelly, it is nourished by the remains of the yolk in its abdomen. When this yolk has been used up, the majority of frog and toad tadpoles are herbivorous for the first part of their life. Algae form an important component of this vegetarian diet.

During the months of March and April, when many species of frog and toad have spawned in captivity, it is not always easy to provide a regular supply of algae for tadpoles kept in indoor tanks.

Motile flagellates can be especially difficult to find. However, a very wide selection of algae and protozoa are available by mail order from the Culture Collection of Algae and Protozoa (CCAP) in the Lake District.

A copy of their catalogue, which gives details of the strains of algae (both freshwater and marine) and protozoa available, can be obtained from: Culture Collection of Algae and Protozoa,
Freshwater Biological Association,
The Ferry House,
Ambleside,
Cumbria LA22 0LP.
Telephone: Windermere (09662) 2468.

The cost of the catalogue is £6. This includes postage and packing. However, the catalogue is much more than just a taxonomic list of the 2000 strains maintained in the collection. Detailed information is also given about the preparation of a range of nutrient media for the culture of protozoa and freshwater and marine algae.

The CCAP also publish a number of reasonably priced booklets. A full list of publications can be obtained from the above address, including:

A beginner's guide to freshwater algae (85 pence).

An illustrated guide to river phytoplankton (£1.50).

A beginner's guide to the collection, isolation, cultivation and identification of freshwater protozoa (£4).

It is worth noting that, although the contact address of the CCAP for the information and orders is via The Freshwater Biological Association in the Lake District, the Culture Collection can also supply marine algae from their laboratories at the Scottish Marine Biological Association in Oban. Therefore, aquarists who require a supply of pure protozoa or algae (marine or freshwater) for culturing purposes might consider the CCAP as a potential source.



TROPICAL WATERS

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AQUARIUM CARE AND BREEDING OF *Xenodexia ctenolepis*

Co-collector of this fascinating livebearer, Jaap-Jan de Greef, describes his personal experiences with, and the challenges posed by, this little-known species.

(Photographs by the author)



Rio Ixcán from the air. This is where we found *Xenodexia* after fruitless searches elsewhere.

Guatemala is a paradise for those aquarists interested in Cichlids and Poeciliidae. One of these fish, a small Poeciliid, is called *Xenodexia ctenolepis*. As far as appearance is concerned, it is a rather non-descript fish without any bright colours.

UNIQUE FEATURES

To the layperson this dull appearance is really deceiving, for the fish happens to be most interesting. For example, the males have a very strangely formed pectoral fin. In all males that I have seen this is the right pectoral (see Footnote). There are two bends in the fin and the base is thickened as if it has some type of parasite lodged under it.

The male also has a tremendously long gonopodium, which in some specimens is almost as long as 45% of the total body length. The gonopodium looks a lot like we see in the possibly closely related genus *Poeciliopsis*. The caudal fin is also interesting in that it has an extension which culminates in a spike on the lower lobe, much like we see in *Xiphophorus xiphidium* (the Swordtail Platy).

The anal opening and the base of the right pectoral have a yellow blotch. Along the

lateral line there is a metallic blue row of scales, which, at times, depending on the angle, appears dark. The female only matches the basic body colours of the male, but lacks all the extra appendages.

External bilateral asymmetry is extremely rare in vertebrates. The fact that only one sex has this feature makes *Xenodexia* an exciting study subject for the ichthyologist and the advanced aquarium hobbyist.

BACKGROUND

Xenodexia ctenolepis had caught my eye a few years ago, when I obtained a copy of Rosen and Bailey's work, *The Poeciliid Fishes (Cyprinodontiformes), Their Structure, Zoogeography, and Systematics*, published in 1963. There is a nice line drawing of a male specimen (it lacks the spike, even though it is said to be an adult), and the description makes the fish all the more interesting since

on the highway or held up by politically motivated insurgents). These latter persons frequent this area and are very active as of lately again, since the escalation of the guerilla war in El Salvador. (For further information on the collecting trip itself refer to *Aquarist & Pondkeeper* November, 1989).

A REAL CHALLENGE

After bringing the fish safely back to Florida, with minimal losses, I presumed that the fish wasn't all that hard to keep and wasn't at all that demanding.

This turned out to be a mistake on my part. Two months after we had returned, I lost almost 70 specimens in the course of a week. Fortunately, I had spread the collected specimens around over several aquariums, each with slightly different conditions to see in which one they'd thrive best in.

Currently, I am keeping the fish in a tank



A young male. This specimen does not exhibit any elongated rays in the caudal (tail) fin.

it had hardly ever been collected. I visit Guatemala frequently and had attempted to collect this fish on several trips when I was in the vicinity of its range.

Finally, in February 1989, I made a serious attempt to go with Ross Socolof, who entertained a similar interest in the fish, to go right to its type locality and try to collect some specimens.

With Ross as a companion, we had a few more financial resources and we managed to collect this fish in the Rio Ixcán in northern Guatemala (we rented a plane and thus avoided running the risk of getting robbed

in which I am trying to mimic some characteristics of the Rio Ixcán. The water is kept very clean. (This is an absolute requirement if one is to keep this fish successfully since the Rio Ixcán is a very clean mountain river). An outside filter which returns the water to the tank in the form of a waterfall simulates the turbulence of the fast-flowing Ixcán.

The tank has live plants, though there were no live plants other than algae in the Ixcán River itself. The plants, however, take up part of the nutrients that come into the tank by way of feeding.



A fully mature male with a well-shaped 'sword'.

The temperature in the Ixcan was 66°F (c18.9°C) in February at noon. The temperature in my aquarium is about 76°F (c24.5°C). This higher temperature does not suit the fish well in captivity. I have kept the fish now for two straight summers and they don't do well during this period. No fry are thrown during the summer either, and my experience with these fish is that they only throw litters when the temperature is similar to that in which they occur in the wild. Therefore, I recommend this fish only for those who are able to keep it at the above mentioned temperature.

The fish readily accept flake food, but it is only a minor part of their diet. They get Brine Shrimp nauplii daily and *Daphnia* with mosquito larvae every other day. I have tried to feed them spinach and other vegetable matter, but they don't seem to have much interest in it.

The fish in the tank always seem a bit shy and, in order to observe them, one should approach the tank carefully and sit still for a while in order for them to come back to the front of the aquarium. *Xenodexia* is a very peaceful fish, unlike many other livebearers where males can be a real pest to all that swims in the tank. Even small fish can be kept together with adult specimens. I have not observed any predation by the parent fish on the newly-born fry.

MYSTERIOUS MATING

A major mystery of the fish is how exactly it uses the strangely adapted right pectoral fin. It is assumed that it uses it in copulation, but this act is a bit hard to observe. The male

usually sneaks up to a female from below when the latter is hovering over the bottom of the tank. He approaches her from behind, but almost invariably gets rejected.

I have not determined the gestation period yet, but the fish does not seem to throw very large litters at one time. Each litter varies from one to six juveniles. The adults do not bother the fry at all.

Adults tend to roam the lower reaches of the aquarium and the young swim close to the surface. This is consistent with behaviour we observed in the wild, where we found fry in shallow areas near the riverside and in places where the waterflow was slow or non-existent. The adults swam at about 1½ to 3 feet (45-90cm) deep among the round pebbles in the river.

In order for the fry to cope with the current in the tank, I have a large bunch of floating plants where they can forage and not burn up too much energy in fighting the turbulence. Another way to help the fry is simply to remove them from the tank, of course. However, one is not always watching the tank as the fry are being born and the plant bunch fills the role as guardian in the meantime.

SLOW GROWERS

The fry are rather slow-growing considering they are quite large when they are born (approximately 0.6in - 1½cm), reaching a size of about 1½ inches (3.8cm) in three months. It is interesting to watch young fish at different stadia of development occupying different levels, from the upper strata to the lower ones of the tank.



Some females will also exhibit a small sword, but not this specimen.

At any given time, there seem to be three levels of development: the fry below the surface, the half-grown fish halfway in the tank, and the adults on the bottom. (Incidentally, the water in the tank is 12 inches or 30cm deep).

As with other Poeciliids, young males tend to develop at different ages, with some showing the beginnings of a gonopodium after 3-4 months and others not until 8-9 months after birth. The caudal spike is not prominently present in all males either. Some females also show a hint of this spike. I have not yet determined if these spiked females are really young males (time will tell).

I assume that the clasping organ on the male may have something to do with the extreme turbidity of its natural habitat where a secure lockup with a female will ensure proper transfer of the male's sperm to the female. I believe this fish will remain a rarity in the fish hobby, but strongly recommend it to those who are interested in the study and observation of the different reproductive strategies that exist in the fish world.



Top view of a male, showing the characteristic — and unique — modifications on the right pectoral fin.

Footnote: In the article in the November 1989 issue of *Aquarist & Pondkeeper* by Ross Socolof, a photograph showing the strange pectoral fin of the male shows this on the left side of the fish. This happened because the transparency was accidentally inverted during the printing process.

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Letters

Trickle filter debate

I was appalled to read Graham Cox's reply to a reader's letter in January's *Aquarist & Pondkeeper* concerning trickle filtration. It demonstrates a level of ignorance of modern marine fishkeeping that is truly astounding. Forward-thinking retailers, such as ourselves, have our efforts to help customers keep marine life alive and thriving undermined when

detritus will become trapped in the sand. These will build up in time and lead to lower Redox Potential, a reduced oxygen level, a vigorous growth of unwanted red and brown algae and a total conviction on the aquarist's part that most corals have a lifespan of only two months at the most. I am aware that, occasionally, someone will 'fluke it' in the same way that I have seen thriving freshwater plants where the light source was a three year old Grolux tube! What I am trying to say is

Oxygen above 7 ppm. The tank has been running for four months now and, in addition to the inverts, contains a total of 17 in of fish, most of which were sick or injured when added to the tank. They are now in excellent health.

To quote a 1960s paper that proves the preference of nitrifying bacteria for a calcite substrate is a red herring. The prime requirements for an active biological filter are a solid surface for the bacteria to live on, a good water flow, and

TC1 Thermostat, I have eliminated the risk of toxic gases building up.

A four inches deep bed of sand will only be biologically active for the first inch or so, and then only in areas not clogged or covered by rocks! One would therefore not need a wardrobe-sized trickle filter to achieve the same nitrifying potential. The fact that nitrifying bacteria in a trickle filter draw their oxygen supply from the air was ignored! As a bonus, this creates a situation whereby the water returning to the tank contains more oxygen than it had when it entered the filter. It is accepted among marine aquarists who have researched these matters, that if using Bioballs or similar media, 10% of the tank volume is more than adequate.

Incidentally, during a prolonged power cut, biological activity on any submerged substrate will become anaerobic. In a trickle filter with a demersed substrate, the surrounding air will keep the nitrifying bacteria alive and prevent the development of toxic conditions.

To suggest a stocking level below that normally quoted for undergravel based systems is nothing short of mischievous and seems like a deliberate attempt to discredit recent technology.

So, file away the 1960s research papers and read up on the work of the likes of Martin Moe, Albert Thiel, George Smit, Bob Goemans and Julian Sprung. They don't agree with each other on every point, but we owe a debt of gratitude for their recent work, as indeed we do to Graham Cox for his pioneering work in the Sixties.

Incidentally, trickle filters are not a passing fancy; they have been used in water treatment plants since the 1930s. Their application to fishkeeping is, of course, a more recent innovation.

Finally, not all trickle filters are necessarily up to the job. The one in use at THE DEEP END certainly works, and can be seen to work. It is well-researched but simple, relatively inexpensive, and very efficient.

Ray Davies,
The Deep End,
Keighley.



CORAL WORLD/EI/AT

Hard corals. Are trickle filtration methods the best for optimal growth?

such anachronistic advice is given in a leading magazine.

Apart from the fact that trickle filters are normally sited below the aquarium, the points at issue are as follows:

Reverse flow filtration is certainly not "the most efficient form of filtration known to aquarium science." Trickle filters, if correctly designed with an efficient pre-filter and chemical filtration compartments, will far outperform any system that uses an undergravel filter, including system tanks incorporating reverse flow undergravel by-pass devices.

The fact is that particles of

that, sometimes, against all odds, everything can be wrong — but it somehow works. These cases are exceptional — not the rule.

I often talk to customers who claim that their undergravel based system is working perfectly. When I show them my Reef System (using trickle filtration) they invariably point to the hard corals such as the *Goniopora* which has increased in size by 20% in three months and say, "I can't keep them". The nitrate level in this tank is below the registering ability of the low range scale of the Seatest Kit, pH 8.3, KH 12 and Dissolved

an adequate supply of oxygen. A trickle filter provides this. Also, (again, provided that an effective prefilter is in use), Bioballs and the like will prove better than coral sand because the bacterial colony will not be disturbed by frequent cleaning.

Sometimes aquarists are nervous about dispensing with calcite media because of its supposed pH buffering capability. It is, of course, now known that this is a myth. In my tank there is merely a cosmetic scattering of sand, and, in any case, by utilising the convectional flow produced by an Ultra-therm Heating Mat and Rocon

Graham Cox replies

I would like to tackle the points in Mr Davies' letter in the order in which he raised them as follows:

① It makes no difference to the working of a trickle filter whether it is sited ABOVE, BELOW or BY THE SIDE of the show aquarium.

② Unfortunately, Mr Davies doesn't seem to understand how reverse-flow undergravel filtration actually works. I feel certain that, by the time this letter is published, many successful users of R/F, U/G filtration will have pointed out to Mr Davies that the whole point of this most advanced mode of filtration is that non-biodegradable fibre, shrimp exoskeleton, etc., which nitrifying bacteria CANNOT BREAK DOWN is continually blown out of the coral-sand layer covering the U/G filter plates and swirled up into the external canister powerfilter(s) where it is trapped, partly by the coral gravel layer and (mostly) by the 2-3in thick layer of nylon floss on top of the coral gravel. Once this material is safely trapped in the external filter(s) in this way, it can easily be cleaned out of the external filter at periodic intervals, determined by stocking levels, feeding expertise, etc.

③ GONIOPORA GROWTH.

I strongly suspect that Mr Davies is a relatively new marine aquarist. He must therefore be excused for not knowing that in the 1960s, I and several other marine aquarists around the world, were successfully growing *Goniopora* spp. and other living corals WITHOUT ANY FILTRATION SYSTEM WHATSOEVER, i.e. using the NATURAL SYSTEM.

The Natural System consists simply of a tank filled with artificial seawater and aerated by one or more wooden micro-diffusers which are run 24 hours per day. Lighting, for the 12 hours of 'daytime', must be strong and of a good colour temperature. I obtained equally good results using batteries of fluorescent tubes of different types, incandescent spot lights and quartz-halogen floodlights, although the last two light sources could cause some trouble

during hot weather by overheating the seawater.

If Mr Davies hasn't been a marine aquarist for very long, then he just wouldn't realise that all you need for success in growing *Goniopora* and many other living corals is very good lighting, water movement and very regular partial water changes to keep the nitrate level very low.

④ U/G FILTER EFFICIENCY. I am tired of the type of American pseudo-science which continually makes foolish statements such as, "A four inches deep bed of sand will only be biologically active for the first inch or so". There is only ONE factor which determines how deep in the filter bed nitrification continues to occur, and that is the LEVEL OF DISSOLVED OXYGEN in the seawater.

I could show Mr Davies a biochemical filtration bed which is nearly 10 feet DEEP and in which nitrification occurs throughout the full 10 FEET of the bed, owing to the high level of oxygen saturation of the incoming water and the relatively fast seawater throughput. Achieving full nitrification throughout only 4 inches depth of coral sand is easy.

⑤ MICRO - AERATION VERSUS "MAGIC BALLS" ETC. AS A MEANS OF ACHIEVING OXYGEN SATURATION OF SEAWATER.

Mr Davies seems to have totally missed the point that calcium carbonate (Ca Co) is the culture substrate preferred by the nitrifying bacteria themselves, NOT polyethylene, ABS, nylon, glass etc.

Both coral sand and coral gravel are over 90% calcium carbonate in composition.

I would also like Mr Davies to consider that the factors which determine the rate of oxygen uptake and carbon dioxide loss for water are:

- (i) Temperature — the higher the temperature, the less oxygen the seawater can dissolve, and vice versa.
- (ii) pH.
- (iii) Specific Gravity.
- (iv) Other minor factors, and
- (v) Surface area of contact between the gas (i.e. air) and seawater.

Item (v) above is of enormous

importance since it is variable, whereas items (i) to (iv) are largely predetermined for us. Please consider the following: A Ghost III twin piston vibrator pump produces 7,000 ccs of air per minute. If these 7 litres of air were to be pumped through two wooden Seamist microdiffusers immersed in the aquarium's seawater, it would produce approx. 106,000,000 microbubbles, each having an average diameter of 0.5 mm (N.B. Volume of a sphere is given by the formula $\frac{4}{3} TTr^3$. The total surface area of these 106 million bubbles (use formula $4TTr^2 = \text{Area}$) is equal to 82 sq. metres of seawater-to-air gas exchange interface area.

How many wardrobes full of 'magic balls' would you need to produce this 83 sq. metres of gas exchange area achieved with a simple vibrator air pump and two wooden diffusers?

Graham F. Cox,
Director,
Waterlife.

Help for Herptiles

I am chairlady of the Amphibian and Reptile Club and Rescue. Over the past months, I've noticed that all your letters are from aquarists. Yet, I know that there are lots of herpetologists out there. So, come on, let's have some of your views.

I agree with Dr Eastwood's comments on Positive Listing (Letters — Dec. '90). We should all be doing something to safeguard our hobbies of aquatics and herpetology. We should all write letters to our Euro MP's to complain (I have!).

If individuals are not able to write a letter themselves, then perhaps the secretaries or journal editors of aquatic and herpetological societies should write one instead, and publish it in the club's newsletters for interested members to sign and send off.

My society has 198 members who all wish to offer support to mount a concerted campaign to try to prevent the restrictive legislation that is being proposed in Germany. The attitude of German conservationists telling me (and others like me) that we cannot keep the animals we love is unforgivable. We not only provide essential information, but also play an important

role in conservation.

There are always some uncaring people who abuse and mistreat the animals in their care. Societies like ours are therefore always on the lookout for such cases. We also run a rescue service for unwanted reptiles — most of which are Red-eared Terrapins.

The conservationists should be aiming their energy towards uncaring reptile keepers, be they private collectors or traders, and leave the caring private keepers and breeders alone.

I'd be pleased to hear from anyone who might wish to take up any of the points I've raised, or who might have any problem concerning reptiles.

Shiralee Hughes,
Godalming,
Surrey.

Pat on the back for Rena

I have recently set up a tropical community aquarium consisting of a 24in tank with a Rena 225 internal filter. Soon after placing the fish in the tank, the water started to turn a yellowish colour. I carried out all the recommended tests for pH, Nitrite, Nitrate and Ammonia, but all seemed to be OK.

After trying all the advice from friends about cutting down on feeding and performing more frequent partial water changes, I still had yellowish water. In my desperation, I wrote to Rena UK Limited and asked for their suggestions.

To my surprise, Rena replied. I did not think that such a large company would be interested in my little problem. They gave me information on their carbon foam insert and even sent me one to try.

After fitting the carbon foam insert, the water soon became crystal clear. I hope this letter is useful to some of your readers with the same problem. I would also like to thank Rena UK Limited for all their kind help and fast service.

C. A. Leach,
Rugby,
Warwickshire.

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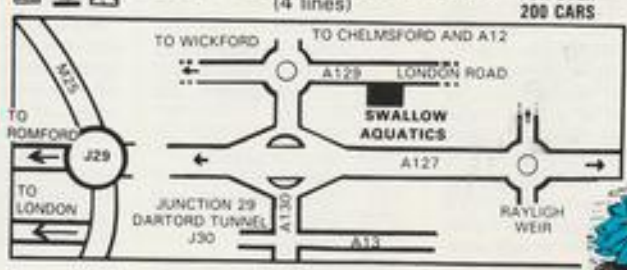
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GREAT RECEPTION

"Welcome back WYO?" writes Darren Sleep, of 28 Foxfield Road, North Scale, Walney Island, Barrow-in-Furness, Cumbria. "Yours was the first column I read every month from the day I started keeping fish. That was in 1978 when I was 12".

Darren goes on to say that, owing to lack of space in the bungalow, he and his wife have only one community aquarium at the moment. It has been going for about six months and is choked with *Vallisneria* — which Darren appears to be removing in bucketfuls at the moment. His lighting consists of 3 x 42in (106cm) Thorn Triton tubes over a 48 x 12 x 18in (120 x 30 x 45cm) aquarium. The gravel was pre-treated with Everite, which he describes as "... an excellent product from Everglades Aquatic Nurseries". The tank has Ultra-Therm undergravel heating. There is an external power filter.

One of Darren's favourite fishes is the small African Catfish, *Eutropiella debareuxi*, which he calls "a very attractive shoaling fish which lives in mid-water and takes flake from the surface". Darren says that they are attractive and reach their full 8cm (3.2in) length very quickly, making them a good and unusual community fish.

"I am glad to learn that WYO is back in Goldfish Monthly — *A & P*", writes Bill Bradbury, from 34 Paget Street, Loughborough, Leics. Bill, who has been an aquarist for over 40 years, remembers only one peculiar shop sign. It was seen in Glasgow and said "DOG-FISH". Bill wondered if

the shop also sold sharks. He goes on to tell us about amusing labels he has seen on sales tanks in shops. "Perma-back Mollies (not invertebrates); Runny-nose Tetras (been chilled perhaps); Stripped Gouramis (lost their shirts on the sea-horses); Golden Grammys (gold discs); Cheery Barbs (laughing fish?); Mickey Mouse Platies (not Donald Duck-billed Platy?); Koi cart".

Bill goes on to say that he feels water chemistry is very important in ornamental fish culture, and if he moves to a different locality, he asks the water board for a lab report on the portable water supply. If the water is hard he keeps only hard-water species; and vice-versa if the water is soft. He thinks it is a mistake not to change at least 25% of aquarium water each month, nor to have any filtration at all, and he rebukes me for it.

He would like to breed Discus but would not take the risk until he had a very substantial salary. He knows a dealer in Chicago who breeds Discus by the hundred, and Angels by the thousand, so he thinks the water in the Windy City must be good for them. (*I visited the splendid Shedd Aquarium in Chicago last summer and fell in love with Windy City; however, I can still recall not much liking the taste of the tapwater in my hotel bedroom. An account of my visit to Shedd, together with some photographs, should appear in a future article. The best tanks of breeding Discus I ever saw were at the Highgate Aquarist, in North London. I got lots of lovely pictures there, one of which appeared in the February *A & P* — B.W.*)

Bill ends by thanking me for introducing him to a Yugoslavian contributor to WYO some years ago. The chap now has his own aquarium business — Aquarium Marjam Vidic, Dobrska Blica 1, 64248 Lesce-Bled Slovenia, Yugoslavia.

REBUKE RESPONSE

I must just respond to Bill's rebuke at my not changing aquarium water in most of my tanks, and not having any filtration in a couple of them. I'm not sure why I'm being rebuked. The tanks in question

literally have the plants growing up out of the tanks, eg, Indian Fern and *Hygrophila polysperma*. I now know what their emerse leaves look like! The tanks are rather like underwater jungles with plants, but the fish are also thriving and breeding.

The only problem is that the surface vegetation often gets so dense that light is cut off from lower plants, and some of the latter tend to part from the gravel and seek the light at the surface. Smaller tanks are lit by one 40 watt light bulb — the cheapest I can find — larger ones by two such 40 watt bulbs. I can still buy packs of four 40 watt bulbs for about 99p, although the large chain-store that I occasionally mentioned in WYO in former days has now closed in my home town.

I do not use any plant fertilisers (my plants grow too vigorously as it is) or water treatments — although on rare occasions I may have to use a treatment for a fish disease. I am pleased to say I know rather little about fish diseases in my 40+ years as an aquarist because I have seldom had infected fishes. Yesterday I removed a basin full of Indian Fern from an 18 x 10 x 10in (49 x 25 x 25cm) tank housing three Golden Gouramis. The tank still contains many growing plants of several species.

KWIK WIT

Gordon Kay, who lives in Tipton and writes the *Seaview* column in *A & P*, kindly wrote: "How nice to see WYO in the pages of *A & P* again after all this time". Gordon kindly sent



'Kwik-witted' message photographed in Tipton.

me a photograph he took outside his local branch of Kwik Save. The local wit, pen-name Cat, had used an aerosol paint spray to make the sign which reads: "KWIK SAVE THE WHALES (signed) CAT". Nice one, Gordon! There must be green egg-heads in Tipton.

QUICK STIR

I shall stir up things a little more even by saying that I never float new fishes in a plastic bag in an aquarium because I think it simply stresses them more and for longer. I simply tip them in.

I am not advocating no water changes, or no filtration, or no water treatments, or not floating new fishes in polythene bags. I am saying that if tanks are kept spotless, most plants will die of starvation. Good plant growth will purify aquarium water. Fish must, however, be fed carefully so that all food is eaten within a few minutes. Of the four items listed above, the one I'd be happiest to install or retain is filtration — for about four hours per night, using an outside air-operated filter in small tanks, and possibly a power filter in tanks of 30in (45cm) and above. I don't normally do any water tests but will do a few to give more details of water quality in my aquaria. My tapwater is very soft with a pH of 7.4. Water in most of my tanks is very soft with a pH of 6.2-6.4; pH 7.2 in one tank where *Vallisneria* thrives with Indian Fern.

WATER CHEMISTRY

Jerzy B Gawor is one of the directors of AQUALITY, 9 Crookston Road, London, SE9 1YD. I have pleasant memories of a visit I made there quite a few years ago, resulting in an *A & P* article about Jerzy and his then-partner diagnosing fish diseases by post. "Nice to see you back in the pages, Billy", writes Jerzy. He goes on to say that water chemistry is a subject close to his heart and that he thoroughly agrees with Dr Neville Carrington, of Interpet, about UK drinking water standards being so poor that they fail EEC regulations on a routine basis. Jerzy also men-

tions disgusting beaches.

Writing about water quality be continues: "Pesticides, herbicides, heavy metals, nitrates, ammonia, chlorine, phenols, hydrocarbons, etc — a cocktail that, apart from causing the early demise of many aquarium/pond fish species, is hardly doing the average human being much good". Jerzy concludes by pointing out that he is currently writing a series about Water Chemistry for *A & P* and it should appear shortly. (*I look forward to reading it, Jerzy. I'm lucky in that tapwater in Northern Ireland is probably a lot better than in many parts of mainland UK. It certainly tastes like champagne when compared to what comes out of London taps!*)

Dr Neville Carrington, of Interpet Ltd, Dorking, Surrey, writes: "It is really nice to see your column back in the *Aquarist*... I believe that water chemistry is one of the most important, if not the most important, one of the most neglected and one of the least understood branches of fish-keeping. Admittedly, it is a very complex subject if you want it to be, but in simple form it is readily understood by all fish-keepers.

1 Type of water required. Some fish thrive only in soft water, some in hard water, some are tolerant of virtually any fresh water and some fish, eg. Mollies and Guppies, will survive right from relatively soft water to sea water.

2 Maturing the system. Raw tapwater is not suitable for keeping fish. Regardless of whether the tapwater, or other water supply, has been hardened, softened or turned into sea water, it is necessary for the water to be matured, both by removing harmful chemicals, such as chlorine, and by allowing a population of micro-organisms and their by-products to build up before the fish can be added with minimal stress.

3 Build-up of toxic wastes in the aquarium or pond. The metabolism of the fish inevitably builds up a level of toxic waste in the tank. This is easily measured with various test kits available and can be disposed of by various means, eg. either by changing the water, installing a biological filter or by the use of resins, depending on circumstances. If any of these (3) areas

is not properly dealt with, then the resultant stress on the fish inevitably leads to greater susceptibility to disease".

Neville goes on to say that his interest in these topics is reflected in some of the newer products being produced by Interpet Ltd. He continues: "Regarding lighting, this has been another topic which has exercised us considerably. About two years ago we launched the new Triton fluorescent lamps which have been spectacularly successful. We have recently been experimenting with reflectors and find that by using the right shaped reflector you can, in fact, double the amount of light output which is obtained from a fluorescent lamp".

INTRODUCTION PROBLEMS

Ray Love lives at 16 Rofords, Goldsworth Park, Woking, Surrey. He wrote: "It was very pleasing to read of the return of WYO? as I believe that the format provides a much more interesting forum for debate than a straight-forward letters' page. Welcome back! I will remember your views on water changes and the fact that the only time you add water to your aquaria is when you replace water lost through evaporation. I'd be interested to know if you live in a soft-water area, as this seems to suggest. (Yes.)

I live in a hard-water area and when I first started keeping fish 20 years ago, I, too, simply replaced water lost through evaporation. Ultimately, I reached the classic situation where existing fishes survived quite happily, but I found introducing new fish to the polluted water very difficult. Clearly the build-up of mineral salts occurs faster when more are present in the water being added, ie, hard water".

Ray continues: "On the subject of plants and the almost universal agreement that their presence in the aquarium is beneficial due to their water-purifying properties as they absorb minerals and fish waste, my experience is that this is not always the case. Unless the plants establish themselves and produce vigorous growth, they surely can have little effect.

"Finally, have other readers suffered problems with overheating during the last few hot

summers? I found it impossible to keep temperatures below 88°F (31°C) sometimes for weeks on end, although fish losses, even at those temperatures, have been restricted to very old and, presumably, weakened specimens. The worst problems again concern plants, as even those few which survive in my tanks disappear rapidly in such warm water, including even species which are reported to grow in that temperature range".

SURPRISING CONFIRMATION

Alan O'Brien resides at 86 Blumfield Crescent, Slough, Berks. He writes: "I can't help feeling that every aquarist of scientific bent the length and breadth of the country must have been squirming while reading your article on water changes, ie, no de-chlorinator/heavy metal remover, no filtration, no plant fertiliser, no water changes! Yet, the fish spawn and the plants grow. How?? According to all the books I have read there should be nothing living in your tank.



Vigorous (over-vigorous?) growth of *Salvinia*, *Ceratopteris* and *Echinodorus*, in one of my aquaria.

More surprisingly, my own experience bears out your method of fishkeeping. My first aquarium was a tropical freshwater community tank stocked to 75% capacity. The normal water quality checks were made weekly, with 25% water changes every two weeks. The fish thrived but I could not get the plants to live for more than five days. I even tried CO₂ injection and two Triton and one Grolux tube without success".

Alan goes on to say that he decided not to change the water for two months, after which he planted *Cryptocoryne* which actually started to grow. He still adds plant fertiliser but limits his water changes to 20% at two-monthly intervals — and his plants are thriving. He continues: "It appears that there is still a lot for us to learn

regarding plant/fish interaction as no one — even the helpful Barry James — could give me a satisfactory explanation as to why plants do not grow when you have done everything by the book". (*Many books are biased towards the cultivation of fish, not plants. It's quite simple, Alan: the plants and fishes have not read the books and do not always respond as some authors say they should. Sometimes authors are wrong — and those who subsequently write books and repeat wrong ideas sustain the myths.*)

I strongly hold to the possible out-dated idea of the balanced aquarium — and of leaving well alone. That does not mean that those with other ideas are wrong. There are various ways to get plants and fishes to thrive together. With strong filtration and frequent water changes one has to add plant fertiliser to feed the plants. I still prefer cheap light bulbs if I want to grow strong plants. Others may grow then equally well with expensive fluorescent tubes.

My photograph shows *Ceratopteris thalictroides* (Indian Fern), *Salvinia* and Amazon Swordplants climbing out of

one of my two 30 x 12 x 15in (75 x 30 x 38cm) tanks — no water changes or filtration. Lighting is two x 40 watt bulbs for about six hours daily. The pH is 7.2, no nitrites and 2° carbonate hardness. The Angels, *Corydoras*, Cardinals, Gouramis, Clown Loaches and Mollies are all thriving in the tank. Make of that what you will!

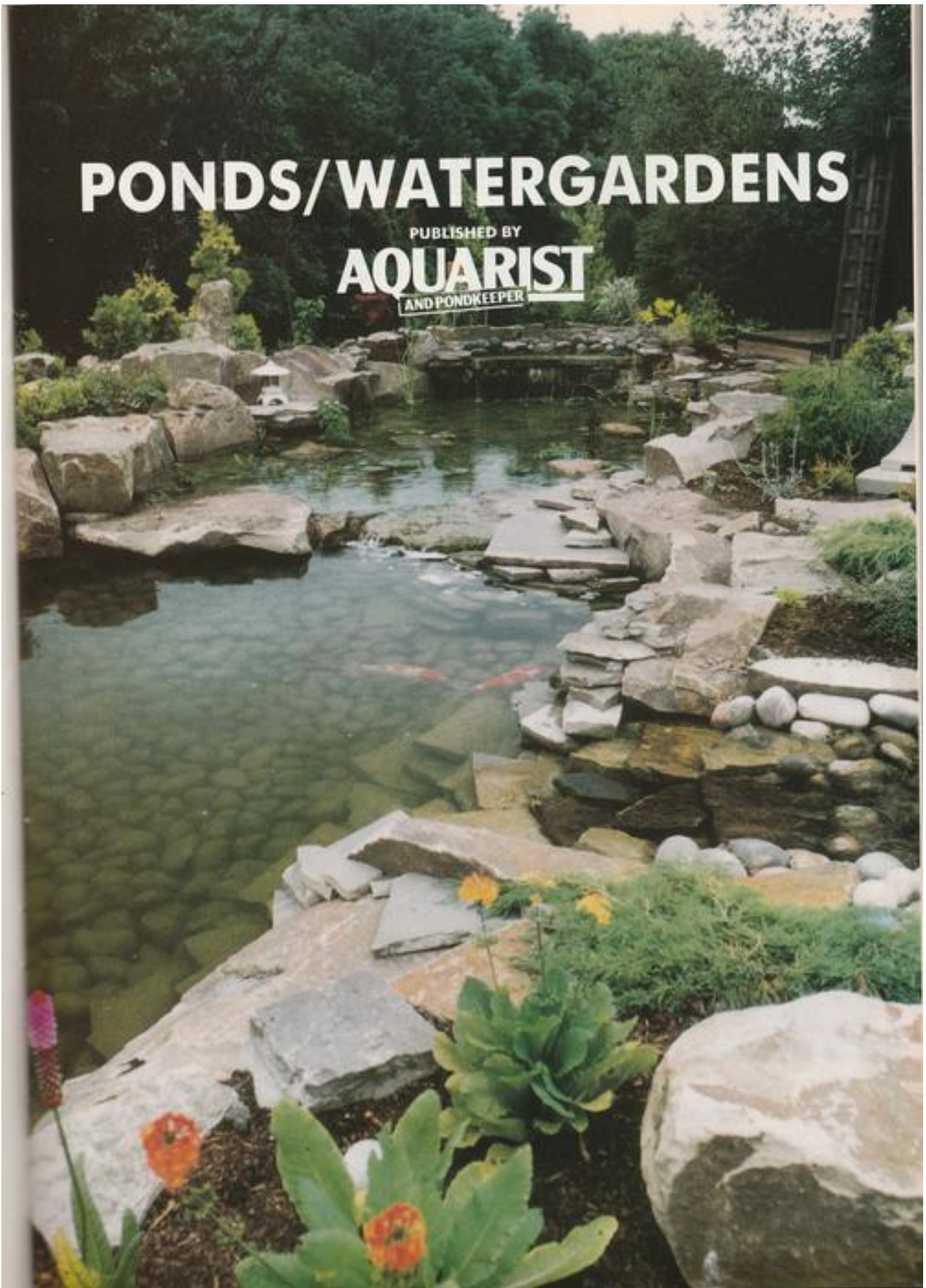
FUTURE OPINIONS

For next time send me your opinions on aquarium lighting, flake foods, plants for garden ponds, and starting with marines. I hope you'll send me your opinion, c/o our Editor. I'll be particularly pleased to hear from young readers. Remember, you don't have to be old or an expert to have an interesting and valid opinion!

PONDS/WATERGARDENS

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AQUARIST
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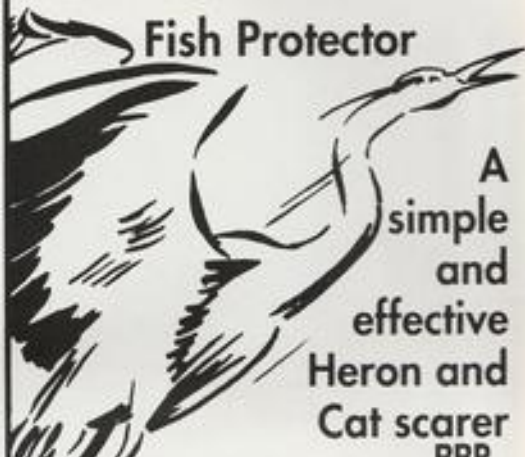
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BASIC GOLDEN RULES OF PONDKEEPING AND WATERGARDENING

(Questions and Answers)

A & P editor John Dawes goes through some of the more important do's and don't's of starting in pondkeeping and watergardening. See the other four articles in this Supplement for fuller discussion of these and other Golden Rules.



LAURENCE E. PERKINS

Someone who has an arrangement such as this as part of his/her aquatic display is more likely to be a watergardener than a pondkeeper.

Pondkeeping and watergardening are the growth areas in aquatics. More and more people are becoming interested in these outdoor aspects of our hobby, no doubt partly as a result of the wider availability of some previously always-expensive types of fish, such as Koi, at more attainable prices. Other factors include an ever-more-extensive range of products — often considerably better than their 'old-time' counterparts, better pondfish foods, greater knowledge of the requirements of both fish

and plants, greater choice of pond plants, higher levels of environmental 'awareness', and so on.

The reasons for the increased popularity are many, and likely to become even more numerous with the passage of time. As both knowledge and availability expand, so do the opportunities for creating better and more exciting displays. The downside is that, as these opportunities increase, so do the chances of getting things wrong, as new pondkeepers and watergardeners begin to feel the pressure of having to learn what

appears to be an escalating proliferation of new 'rules'.

In reality, though, the number of basic rules remains relatively constant. In most 'new' cases, in fact, what is needed is not another rule, but a new or refined application of an old, tried and tested one. Here, then, is a selection of some of the more important Golden Rules, plus a few other questions, which might be found useful by anyone contemplating taking up pondkeeping and/or watergardening.

PONDKEEPING v WATERGARDENING

Q Is there a difference between pondkeeping and watergardening?

A In some cases, there is — in others there isn't. For instance, if your idea of something aquatic in your garden is a pond (of any shape) that is solely dedicated to fish and bears little or no relationship to the rest of the garden, then your activities could be regarded largely, or exclusively, as belonging in the pondkeeping category.

If, on the other hand, you design your pond as an integral part of your overall garden layout, and if it incorporates plants under, on, and around the water, gradually merging with typical terrestrial arrangements, and if fish represent just one of several equally important components of the overall system, then you could definitely be said to be involved in watergardening.

Most of us fall somewhere in between, so the dividing line becomes somewhat hazy. That is why we often refer to pondkeeping and watergardening virtually in the same breath.

EARLY QUESTIONS

Q Are pondkeeping and watergardening difficult areas of activity?

A The basics of both are not complicated. However, if we demand from our set-ups something that they can't deliver, then life will become difficult for all concerned.

You cannot, for example, expect to enjoy success with a large, deep-water lily such as

Nymphaea carnea if your pond has a maximum water depth of only 18in (45cm).

Neither can you expect your fish to survive over winter, particularly in the north of the UK, if you've chosen delicate Fancy Goldfish varieties like Bubble-eyes.

It is in such areas of choice and planning that the Golden Rules really come into their own. Follow them, and success will come your way. Disregard them, and you can bet that both pondkeeping and watergardening will become difficult, depressing . . . and expensive.

Q What are the first questions which I should consider?

A It's very difficult to pinpoint the exact first question that we should ask ourselves. However, if we start by considering whether we really want to go into pondkeeping or watergardening, we wouldn't be going far wrong. Unless the commitment is there in the first place . . . think again!

Other early questions should include those dealing with the appropriateness of your vision of your ideal pond in the context of the space, time and facilities that you can make available.

You also need to have a clear idea in your mind as to what fish, plants and other organisms you'd like to have in your pond. If, for instance, you think that you might want to keep Koi, then this question must be resolved at a very early stage, since a pond designed, say, for wildlife, will be totally unsuitable, both in shape and size, for Koi.

The Golden Rule here is to work out exactly what you would like — and what the fish, plants and other organisms you envisage require, and whether you can provide for these or not, before diving in (as it were) and living to regret your lack of fore-planning.

Our fish and plants, after all, deserve to receive the best treatment we can offer, so, if we don't cater for their needs, we should ensure that we do not endanger their wellbeing in any way whatsoever, and alter our plans accordingly.

Q How do I decide what type of pond to go for?

A Again, this is something that needs to be decided early on.

There are various products and types of pond available, and these are dealt with elsewhere in this Supplement (see, for



An obvious example of mis-matching — an over-large lily.



A delightful arrangement which would be perfectly suitable for an informal set-up, but totally out-of-place in a formal arrangement.

example, Dick Mills' article). Some Golden Rules to consider when making your decision include:

1. Sensible matching of the pond with its surroundings, e.g. formal ponds in informal garden layouts don't often look good. The opposite, obviously, also applies.
2. Choosing an appropriately sized pond, e.g. over-large ponds in small gardens, will tend to look out of balance.
3. Avoiding intricately shaped designs; these will present considerable maintenance problems later on.
4. An awareness that steep-sided ponds, either with no shelves at all, or very deep ones, will — at best — restrict the range of marginal plants that can be grown.
5. Matching fish and pond, e.g.
(a) 'Formal' fish, like Koi, tend to look better in formal ponds;
(b) 'Informal' fish, like Orfe, Rudd, etc., tend to look better in informal designs.
6. Accurate matching of the type and size of a system, to the size of your pocket. Over-ambitious dreams can result in nightmares later on. To take an extreme example, what's the point of investing all the available funds in a large, expensive pond if, as a result, there won't be sufficient left over either for an efficient filtration system, or a stock of plants or, perhaps, even a decent initial stock of fish? Few things

look more sorry for themselves than a large pea-soup-green lake devoid of life, or within which the life that does exist stands no chance of being seen because one can't afford the means to render it visible.

SECOND-STAGE QUESTIONS

Q Having determined what type of pond I want, what's my next step?

A Presumably, the early decisions will have been made having consulted at least some relevant literature and having seen some of the available products at specialist retail centres.

It is well worth making a preliminary



An excellent subject for an informal pond — the Golden Orfe (*Leuciscus idus*).

shopping list at this stage in which you include all the things which you think you will need. A plan of your existing garden (drawn to scale), and one showing your proposed pond or watergarden layout, will also prove most helpful.

I would then suggest that you take the list and plans to your chosen watergarden centre or other aquatic outlet, and discuss both in detail with an appropriate member of staff. You will almost certainly find that both your list and plan will require modification as a result.

This is, of course, a good thing, because you are likely to end up with a more balanced, sensible set-up than you originally envisaged.

Ask about anything and everything, from the size of the pump you will need, to the desirability of installing an Ultra-Violet steriliser from the outset, to the installation of underwater lights. The important thing is to **ask and discuss**.

In my book (metaphorically speaking), one very important Golden Rule is to do all this *before* buying anything. A pond can be either a thing of great beauty or one that causes great distress to all concerned, so getting it right the first time is, in my opinion, absolutely essential.

Q Are there any other sources of information besides shops or watergarden centres?

A Yes, there are.

1. Societies

In every branch of aquatics there are specialist societies which are invaluable sources of information and advice.

When it comes to pondkeeping and water-



The Common Minnow (*Phoxinus phoxinus*) is a great little fish, but only if kept in a wildlife or 'highly informal' pond.

gardening, the UK does not fare too brilliantly. As far as I can ascertain, there are no societies dedicated specifically to these subjects. However, many societies, particularly 'coldwater' ones, do deal with ponds and watergardens as part of their normal range of activities. I would therefore strongly advise any newcomer to outdoor aquatics to join such a society.

The Americans appear to fare a little better in that there is a society dedicated solely to pondkeeping and watergardening. I must thank Dr. David Ford of 'Aquarian' for bringing this useful little gem to my notice and for supplying me with the following details:

The Pond Society,
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If you plan to go into Koi-keeping, then there is no shortage of information, with both regional and national societies regularly publishing guidelines and general and specific advice in their respective journals.

2. Literature

There are also numerous books on pondkeeping and watergardening currently available. If you have a problem, it will be in deciding which to buy... so the one thing you won't be short of is choice.

Then, of course, there's *Aquarist & Pondkeeper*, in which we feature ponds and watergardens, not just in **Supplements** such as this one, but in most issues throughout the year.

Some of the large manufacturers also produce booklets and other forms of advisory material, so it's well worth contacting them.

3. Videos

Some companies are now producing videos dealing with the setting up and maintenance of ponds. It's therefore worth searching these out. Your local dealer or society should be able to supply you with the details.

4. Other pondkeepers and watergardeners

Ask around at your local shop or society and find someone who is experienced in one or other of these pursuits. Once you do, it's a good idea asking this person to accompany you when you make your first real shopping trip.

CLOSING GOLDEN RULE

I strongly maintain that there's very little point getting involved in an activity if it's going to end up being more hassle than it's worth.

As long as some of the Golden Rules which I have outlined above, plus those that are dealt with in greater detail in the articles that follow, are adhered to, there's every chance that the balance will be firmly tipped in favour of the enjoyment end of the scale.

So, if there is a final Golden Rule, it's got to be: **DO IT ONCE... BUT DO IT RIGHT.**



A formal layout ideal for Koi.



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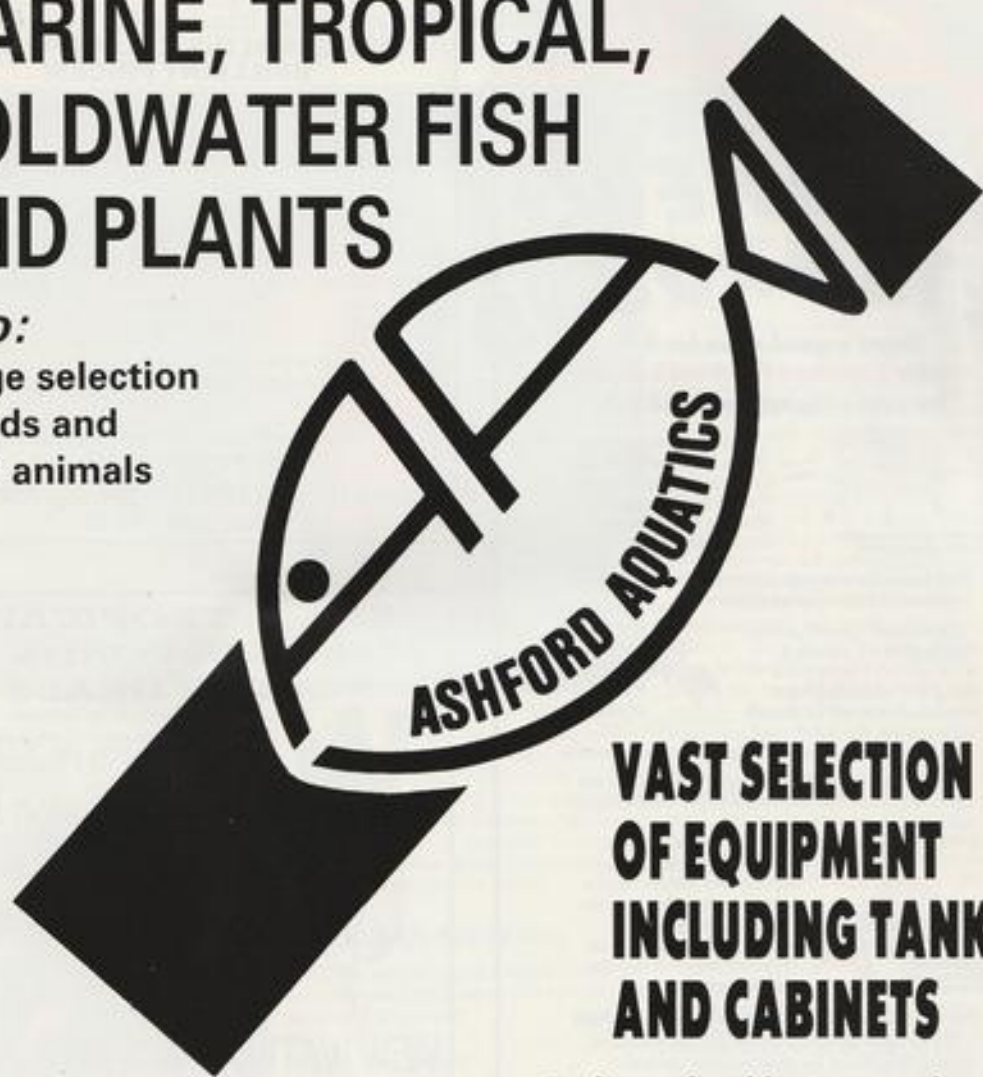
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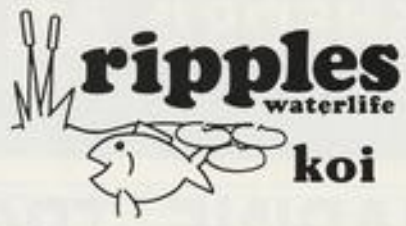
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STOCKING AND MAINTAINING A POND

Dr David Ford of the 'Aquarian' Advisory Service, reviews the golden rules of successful pond stocking and year-round maintenance.



JOHN DAVIES

Long-finned varieties of Goldfish, such as Orandas, are poor choices for an outdoor pond. Only short-finned (with the exception of Comets), hardy varieties should be selected.



JOHN DAVIES

Medium-sized Koi such as these are ideal for the larger, deeper pond

What is the first question any owner of a new garden pond asks? It is: how many fish can I put in it? The answer to this question in any of the many books, booklets or guides on pondkeeping is... it depends! Some even ignore the question or make comments such as "never overstock your pond".

SUCCESSFUL STOCKING

So let's set the record straight with a few examples of stocking levels that have proved successful in practice.

Aging the water

The first point is that you don't add any fish to a new pond. They will die from things like chlorine poisoning, ammonia build-up, alkali damage from the cement, or even the cold.

Whether the pond is a complex, super-filtered, clear-water system, or a simple prefabricated pool, the water must be left to age. This may take a few days or a few weeks depending on the size of the pond, the season and the weather.

A few days may be enough to remove chlorine (or even chloramine) from the

water, especially if it is moving via a filter, fountain or waterfall. Thereafter, the system will pass through a nitrite crisis just as occurs in the aquarium, as nitrifying bacteria build up in the system. To help this process, a few fish can be added after the chlorine has gone. The ammonia excreted by the fishes will start the biological processes, but the very low stocking level means the dilution factor is great enough to prevent ammonia poisoning.

The ammonia and/or nitrite kits sold for aquarium use can be used to check the progress of the water quality changes. This may not be necessary for a few hardy Goldfish in a small pool, but is certainly essential if you want to install expensive pedigree Koi.

A pH kit is also useful. The new cement pond may be leaking alkali into the water and the pH test will reveal if this is a problem. Modern plastic sealer paints should prevent this happening, but it needs checking. Alkali (pH 8 or more) in the water will obviously kill fish, but traces have longterm effects not seen by the owner. For example, the gills are 'burnt', giving poor oxygen take-up and the batch of fish will always be in poor health and show slow growth, even after the pond has aged and stabilised.

The comment in the introduction about the cold needs explanation. Fish such as Goldfish and Koi that have been kept in an indoor aquarium for a few years may grow so much that they are moved out to a garden pond. If this is done in the winter, the fish will actually die in water of 10°C (50°F) or below, because it is outside their life's experience, which has probably been 20°C (68°F) or more. Move such fish in late spring, summer or early autumn. In this way, they will have several months to acclimatise before the onset of really cold weather.

Once the water has aged, or the nitrite (and ammonia, to be doubly sure) test shows a maximum level has passed and the water gives a zero reading, the full complement of fish may be added. Again, it is wise to add these fish in lots over several days or weeks, rather than all at once. It takes time for the bacteria to build to a balanced level with the fish's soluble excreta.

Estimating pond capacity

What this stocking level should be depends on both the water volume and the water surface area. Know your pond's total water volume... it is very important, not

only for stocking, but for any treatment. The ideal method of determining the value is to use a flow meter when first filling. A DIY version is to measure a bucket's volume with a kitchen measuring jug and then count the number of buckets required to fill the pond. This works best with small ponds!

For larger ponds, another method is to set the hosepipe running at a fixed rate and measure the time this takes to fill a known volume container. Then, without changing the tapwater pressure (e.g. stop other members of the family using another tap) measure the time it takes to fill the pond. A simple calculation will give a good estimate of the pond's total capacity.

To find the volume from the dimensions of the pond, measure length, width, depth and multiply all together. If in feet, the value x 6.24 gives Imperial gallons. To convert this to US gallons (and many books on garden ponds originate in the USA) multiply the Imperial gallons by 1.2.

In metric, the dimensions in centimetres divided by 1000 gives litres; in metres the result is multiplied by 1000 to give litres.

For circular pools measure the radius (half the diameter), multiply the result by itself (i.e. squared) and times 3.14 to give the surface area in sq.metres, sq.cms, sq.inches or sq.feet. Then times the depth (in the same units) and times 6.24 for Imperial gallons if in feet, or times 0.036 for Imperial gallons if in inches. For litres, again divide by 1000 if in cms, or multiply by 1000 if in metres.

If the depth varies, take as many readings as possible with a dip stick and divide the total by the number taken to give an average depth. If the pool is a complicated shape make a scale drawing on graph paper and divide it up into manageable sections, calculating each section as a box or circle as required, then simply adding them up for a grand total.

Stocking levels

Based on total volume, the maximum stocking levels are 200cm of fish (these measurements refer to body length only, always exclude the tail no matter how long) per 5000 litres of water. Or, 100 inches per 1000 gallons. These values relate to a pond of normal depths 18 or 24in (45 to 60cm). Very deep ponds will not necessarily support more fish because the oxygen content depends largely on the water surface. This infers that the shallow pond may be over-

stocked because of the greater surface area, but then factors such as ammonia build-up, icing-up in winter and threat from cats or birds become more important.

The level based on water surface area is often quoted as 2in (5 cm) of fish per square foot. This is a maximum, so an average of 1in per square foot is better. Levels recommended in some books (e.g. *John Davies's Book of Water Gardens*) is 1in of fish per 24 sq.ins derived from the aquarium levels of 1in per 12 sq.ins by doubling the potential life support for ponds. This relates to 6in of fish per square foot and must be the absolute maximum where bio-filters are in operation.



Rudd (whether wild-type, like this one, or golden) are good pondfish.

In metric: 50cm x 50cm square (2,500 sq.cms), taking 10cm of fish, is a safe guide.

My current pond is a complex triple structure on a slope with the highest pond totally dedicated to filtration (filled with ceramic pieces) and size 42 x 44 x (deep) 11in, hence, of capacity 125 litres or 33 Imperial gallons, 40 US gallons. The second pond, fed via a waterfall, is 66 x 24 x (deep) 27in, giving 700 litres, 150 Imp.galls, 180 US galls. The main pond is 96 x 89 x (deep) 43 in, giving 3738 litres, 820 Imp.galls, 990 US galls. Therefore, the grand total (even though fish are not in the filter ponds, the life support is always the total water volume) is 4,600 litres, 1000 Imp.galls or 1200 US galls.

In this system were 15 x 3in (8cm) Koi, that have become, at the time of writing, 15 x 6 (15cm) of fish per total surface area of 1,345 sq.ft, hence it is understocked by about 50in (127cm) or another 8 large fish.

If the pond housing the fish is taken (the bottom or third one) on its own, the surface area is 60 sq.ft (96x89in), the stocking level is over the average of 60in (150cm) by 30in

(75cm) (i.e. 5 fish too many) but under the maximum level of 120 — 305 cm (based on the 2in per sq.ft. rule). There is also no water quality problem because the back-up ponds and filters means the fish are housed in 1000 gallons which allows 100in (254cm) of fish.

Specialised Koi-keepers who want a display of colours in their home pools stock their fish at higher rates than above, but have large and complex filter systems to prevent any ammonia or nitrite build-up. In Japan, I asked what was the secret of success with their beautiful clearwater ponds filled with giant Koi. They said, having a filter the same size as the pond. Now you know.

Koi-keepers who wish for maximum growth of pedigree specimens stock at much lower levels, and experience has shown that one fish for every 2.5sq.m or 27 sq.ft is the optimum level. Note that this relates to only 1 fish in the 6 x 4 ft pond in the table!

MAINTENANCE

Once the stocking level has been achieved, routine checks on the pH, nitrite and Nitrate levels are well worth doing. Aquarists, especially marinists, do routine tests as part of the fun of the hobby. It does not always occur to pondkeepers to do the same. Too often, these tests are used only as an investigation after problems have occurred. If the problem is sudden fish deaths... it's too late!

pH

The ideal pH of the pond is the neutral 7, but the range 6.8 to 7.6 is acceptable. This is not because the local tapwater (or rainwater)

STOCKING LEVELS OF SOME ACTUAL PONDS*

Pond Surface	Depth	Small (3in-8cm) Fish	Large (6in-15cm) Fish
6 x 4ft	18in	10	6
10 x 6ft	24in	18	10
20 x 12ft	12in to 36in	30	20
20 x 12ft	48in	40	25

*These are ponds I know (and the fish therein) where there are no problems

will show this variation, but because the pond itself will vary according to the time the reading is taken. A mature pond has some algae (and some are like pea soup) and this will produce carbon dioxide overnight, acidifying the water to give a low pH early in the morning, which recovers by evening. Take a note of this effect, or choose one particular time of day to take routine measurements.

Once a normal pattern is noted, it is sudden changes that should alert the owner of a problem. Drop the water level a few inches and top-up with fresh tapwater to dilute the effect of sudden changes in pH. Where slower, controlled changes in pH are needed, add chemicals such as dolomite (for more alkaline pH) or peat (for acid pH) to the filter system.

Nitrites

Nitrites should be zero; any increasing nitrite reading indicates problems. This could be a decaying dead fish, excess matter at the base, such as rotting leaves, clogged filters, or overstocking as the fish outgrow their pond. Take appropriate action before the consequences develop.

Nitrates

Nitrate values are usually ignored in aquaria, let alone ponds... but the chemical is the end result of the biological changes that occur as the pond ages. At 500ppm or more the pond needs an influx of fresh water to dilute the water-soluble matter.

Remember, the solution to pollution is dilution!

The EC limit for nitrates in drinking water is only 50ppm (the Waterboards call it 50 microgrammes per litre, which is exactly the same as parts per million, ppm) so dilution is possible from tapwater.

Continuous dilution

A good tip for continuous dilution with tapwater is to rig up a tiny hosepipe made from a long length of airline tubing from the aquarium shop. Fix it into a cork bored to fit a garden or garage tap and leave it slightly turned on so just a trickle of water flows from the tubing.

Snake the tubing all the way to the pond. It can be buried so it is not visible; this will also prevent freezing in winter. The slight trickle builds to a surprising amount of water in 24 hours, but is slow enough for the chlorine content not to be a problem for the fish. Provision must be made for the overflow to run away to waste, of course, and the tap has to be stopped when there is a hosepipe ban.

Feeding

Feed the fish daily at a specific time. I make it a regular morning ritual (along with the cat, rabbit, etc.) and the fish soon know when to expect you, rising to the surface for hand feeding. This allows inspection of the stock too... and the pleasure of the fish greeting you.



My pond in summer (see text for stocking details). Flowers around the pond help supply insect food.



My pond in winter. My fish hibernate under these conditions (note the fountain and waterfall — both still running).

Owners of pedigree Koi requiring rapid growth will feed up to five times a day, especially in summer, and even use bread ponds to feed throughout the winter. For the average pet fish, I find a once-a-day feed is adequate, varying the amount per feed as the seasons progress.

The books say do not feed from October to March, or do not feed at 10°C (50°F) or below. However, Goldfish and Koi are Carp and any Carp farmer will inform you that they feed throughout the winter. They only stop feeding when the fish (not the calendar!) stop accepting the feed. This is usually at 5°C (41°F) or below. My fish get a few flakes (for easier digestion — I use the 'Aquarian' Carnivore Flake) in winter, except when the frost is severe.

In spring this changes to pellet food, and, in summer, addition of fresh foods such as worms, maggots, brown bread, scalded lettuce etc, changing back to pellets (I feed the new 'Aquarian' Floating Pond Food) in late autumn. This ensures the fish retain their protective fat through the worst of the winter and are not subject to springtime problems such as Carp Pox, White Spot, etc. which it is claimed attack the fish "in their weakened state from the winter".

SEASONAL MAINTENANCE

Spring

Increase feeding amount and check the fish visually for any parasites. Plants need attention in the spring... dividing good growth and removing any that have not survived the winter.

As the temperature rises, mature fish will

come into breeding condition. You can ignore the spawning behaviour — the fish will just eat the eggs and any fry, but if you want to save the young, aquaria must be prepared and infusoria cultures developed. A few spare ponds help! Mats to collect the eggs must be supplied, so they can be removed as soon as spawning is complete. Bunches of real plants or nylon wool mops can also be used, anchored to one end of the pond.

Breeding Goldfish is best with 2-year-old fish and a rise in water temperature to 60 to 63°F (16° to 17°C) triggers spawning. This can occur quite early in a good spring. Koi spawn later because they need a little higher temperature. When the water temperature reaches 65°F (18°C) with no sign of spawning, a trick Koi-keepers use is to feed little bits of fresh brown bread, such that the fish rise and fight over the few bits of food. This means they rub bodies and this stimulates the breeding response.

Golden Orfe breed in July or later and are best as mature fish (12in -30cm- or more), but the water must be well oxygenated (waterfalls, venturi etc).

Summer

The British summer may be one day, of course, so the fish assume summer has arrived when the water temperature reaches 55°F (13°C), but the most active temperature and best for growth is 66°F (19°C). At 75°F (24°C) the fish begin to lose interest in food and growth slows down again.

Protection from the sun is necessary if the temperatures rise above 77°F (25°C). In fact, fish kept in shallow waters in full sun can get



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sunburnt skin. Planks laid across a corner can give useful shade. Make sure fountains and waterfalls etc. are running continuously to aerate the water. This is especially important when thunderstorms occur. It is not the storm that can kill fish, but the heavy, still air that is associated with the onset of storms, giving poor oxygen levels at the air/water interface.

The main problem in summer is caused by algae. Which of the many varieties strikes in a given pond is a matter of pure chance, but a high nitrate water favours the blanket weed type. This has to be removed physically by gathering on a cleft stick... but it makes good fertiliser for the roses!

The green water varieties are best dealt with by adding an Ultra-Violet light unit. They are expensive to buy, but cheap to run (15 watts is sufficient for a 1000 gallon - 4500 litre - pool). Make sure the unit is sited after the intake from the pool but before the filter. In fact, add an extra filter such as a layer of foam, to catch the dead algae. If the UV unit is sited after the filter, the dead and dying algae from the sterilising effect of the UV pour straight back into the pond, giving nitrite problems and potential food for more algae to grow.

Autumn

Prepare for winter by cleaning the pond. It is better to 'autumn-clean' than 'spring-clean'. Remove all leaves by sweeping a pond net over the surface and base. Rotting leaves are deadly in the wintertime. Make sure all the mulm from the base is removed. Koi-keepers and their suppliers have special vacuum devices for this chore; very useful for the larger pond.

Continue feeding, only cutting back when the first frosts occur. Some pond food manufacturers claim special ingredients for easier digestion at lower temperatures, and so have summer and winter feeds.

Trim fading marginals and remove dead plants.

It is best to have clean filters as winter

approaches, so this chore needs attending to before the frosts. How this is done depends on the type of filter used, but if it is large and requires lifting, digging, partial renewal etc. do wear good Wellington boots and rubber gloves. The filter which has been run all summer will be a soup of bacteria, not all good nitrifying ones. Bacteria-laden water in the smallest of cuts can lead to illness, but simple precautions remove any risk.

Winter

Feed lightly and stop at about 5°C (40°F), when the fish should sink to the bottom anyway. Keep the water clear of ice by running the fountain, waterfall, or filter system, because moving water doesn't freeze easily. Some authorities advocate shutting down filters in the winter because the bio-filter isn't effective at low temperatures. However, the advantages of moving, and so aerating and mechanically filtering the water, outweigh this loss of bacterial activity.

If it is a small pond that freezes over, clear a section so that air can circulate. Some ideas on how to do this include adding a watering can filled with boiling water (it melts through the ice but the spout and handle stops it disappearing from view!), or adding a soft football that can be lifted out (by squeezing it!) leaving a clear section. A sweeping brush can be left overnight with



Despite severe conditions, a waterfall will help maintain an ice-free 'hole' on the surface of the pond.



Small garden pond in spring. This type of pond is best regarded (and treated) like an aquarium (lots of partial water changes, etc).

the head dipping into the water, a twist and pull next day will clear a section. A small wooden box on bricks or weighted float will give a clear area within itself. Pond heaters are also available, of course. These are of a low wattage floating type and so not expensive to run.

A nice idea is to make a small hole in the ice and draw off an inch or so of water, leaving an ice roof for a natural greenhouse effect. There are even plastic igloos that can be bought for the pond at Watergarden Centres.

Koi-keepers sometimes build a greenhouse over their ponds. They may be a simple sheet of plastic propped up over the water, or complex framed units with hinged lids for access. The limit of method is only the ingenuity of the fishkeeper.

Further Information

If you are an absolute beginner, or are thinking of installing a pond for the first time, a free booklet on the subject is available from the author by sending your name and address and request for 'Aquarian's Ponds for Leisure' to the 'Aquarian' Advisory Service, PO Box 67, Elland, W. Yorks., HX5 0SJ.

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Common Name	Scientific Name	Comments
Common Goldfish	<i>Carassius auratus auratus</i>	Best fish for any pond. Hardy and can live 20 years.
Comet	<i>Carassius auratus auratus</i>	Goldfish with a long tail for good swimming ability.
Shubunkin	<i>Carassius auratus auratus</i>	Coloured goldfish; decorative
Fancy Goldfish	<i>Carassius auratus auratus</i>	Round-bodied varieties are not suitable for ponds.
Koi	<i>Cyprinus carpio</i>	Next best choice: may grow too large for small ponds, hence better for special Koi ponds.
Orfe	<i>Leuciscus idus</i>	More active than the above Carp. Can grow to over 12in (30cm).
Golden Rudd	<i>Scardinius erythrophthalmus</i>	Also active and can reach 18in (45cm) and 2kg (4.4lb) in large pools.

Note: Tench, Bream, Gudgeon and Black Catfish are often listed as suitable pond specimens. However, once installed, they are rarely, if ever, seen again — mainly with the exception of Golden Tench — and, in my view, just take up valuable stocking levels. Never install wild fish; all carry parasites.

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A magnificent 'integrated' water garden owned by Koi-keepers Danny and Jean Doherty. (For a full write-up on this layout, see *UK Koi and Ponds* in next month's issue of *A&P*)

POND PLANNING AND DESIGN

Getting things right at the outset is crucial if you are going to get the best out of your pond. Dick Mills offers some essential guidelines.

Despite what all the books say, when it comes down to planning and designing a pond, any decisions taken usually come down on the side of what suits the hobbyist's tastes the best. However, within this selfish limitation, there are a few Golden Rules to be observed which will benefit you, your fishes and the ponds' overall effect to advantage. Things I will be casting my eye over will include Type of Pond, Size, Design, Siting and Materials. Subsequent subjects, such as maintenance and stocking, will have been covered elsewhere in this issue's special Supplement.

CHOOSE YOUR TYPE OF POND

First things first — what type of pond do you want? Perhaps you hadn't really thought too much about this; just that a pond in the garden seemed a good idea (it certainly cuts down the area of lawn to be mown!). The answer to this question is quite important, for you could go ahead and build quite the wrong type of pond for the purpose you eventually want it to fulfil.

If you are looking for a 'natural' pond into and around which insect and amphibious life is to be attracted, then a multi-thousand

gallon steep-sided formal pond is a waste of time (and money); conversely, even the most modestly-sized Koi will look out-of-place in a kidney-shaped, 'instant' fibre-glass pool of

some 80 gallons (360 litres)! Perhaps the foregoing two examples could be taken as representing the extremes of scale, with something 'in-between' being most



A charming raised pond with a distinct Japanese touch. (See *Product Round-up* in this issue of *A&P* for details of this and other pond add-ons)

beginners' initial objective, containing both fishes and water plants, with a rockery or marsh area alongside.

SIZING THE POND

A pond's size is not merely its visible area, or even its total water capacity (two parameters which you might feel are important in your quest to impress the neighbours!). Just as critical, especially as far as fish are concerned, is how stable the water conditions can be made.

You will notice I have said 'conditions' (plural). In addition to providing adequate dissolved oxygen content throughout the year (a need for a large surface area), attention must be paid to temperature regulation. Shallow ponds will not only heat up

you're a specialist (someone who's convinced his or her partner, and got away with it!) it really comes down to a compromise between what will look right for your garden and your fishkeeping needs. Fortunately, fishkeeping needs can generally be accommodated into the finished pond without too much trouble.

A brick-built raised pond may be reasonably labour-effective to construct, but you wouldn't want it smack bang in the centre of your lawn would you? On the other hand, a prefabricated fibre-glass pool would look equally incongruous in a formal, walled or sunken garden. Happily, modern pond-lining materials make it possible to create just the size and shape of pond you want, provided you've still got the strength and stamina to dig the hole in the first place, but

area, it would be very easy for toddlers to walk into the water; deeper Koi ponds having paved surrounds often projecting over the water surface (for better fish-viewing) are clearly another potential hazard. Lawns running up to pond edges are no less safe, and there is the added danger of garden fertilisers, weedkiller (and even lawn-clippings) entering the pond.

SITING THE POND

So far, things have been theoretical, but once the physical work begins, there is no going back. It really does pay to have everything planned, a good rule being "Think about it twice, do it once." No statement could be more pertinent than this when planning where to put the pond. Indoor fishkeepers are often encouraged to use an aquarium to brighten up that dark corner of the lounge; be warned, this advice won't work for ponds.

Many an artist's painting features the waterside scene, with trees overhanging the flowing waters, but this cannot (and should not) be duplicated in the garden.

Firstly, any leaves falling in the water (even if they're not poisonous, and some garden trees are) will not be swept away by water currents; decaying leaves will soon pollute or deplete oxygen levels in the water and, in winter, produce dangerous gases under any ice which is allowed to form unchecked.

Secondly, those picturesque trees will prevent the pond getting their share of the necessary sunshine, very important if you are wanting to have a good display of water-lilies.

Thirdly, tree roots have a happy knack of finding pondliners or cracking cement. **STEER WELL AWAY FROM TREES.** A good rule is not to allow the pond any nearer to a tree than a distance equal to the maximum of the tree.

Very often, a pond is installed with only half an idea. It may look splendid from a deckchair's vantage point on the surround-



Formal pool surrounds can enhance any water feature in a suitably laid out garden (Further details of these surrounds can be found in this month's *Product Round-up*).

very quickly on summer days, but also be prone to rapid algal growth (green water and blanketweed); in severe winters, such ponds' lack of water depth may result in the pond freezing solid. Conditions in larger ponds tend to remain more stable and, in those having a good depth of water (over 3-5 ft — 90-150 cm), there will always be a warmer layer of unfrozen water at the bottom where fish can safely overwinter. This is vitally important where Koi-keeping is concerned.

The size of ponds should also be taken into aesthetic consideration. There is not much point in building replicas of Chatsworth or Versailles in a modest suburban home; not too many newcomers to pondkeeping will want 'wall-to-wall' water in their garden. Neither will they want to prod about in overgrown thickets to locate that "I'm sure it was bigger than that in the shop" pool. By all means make the pond a feature of the garden (and what pond keeper wouldn't?) but do try to keep things in perspective.

POND DESIGN

Once you have chosen your pond type and calculated how big it needs to be to fit in with your overall garden scheme, you can progress on to its Design. Here, again, unless

this chore can be lessened by the use of a mini-mechanical digger.

Safety must also be covered, especially where there is the likelihood of small children having access to the pondside. With 'nature ponds' having a very shallow 'beach'



Where space is a limiting factor, tub ponds will provide an excellent way of creating a small attractive aquatic display.

ing lawn, but what a pity if you can't see it from the lounge window on those cold autumn days too. Similarly, it might be prudent to look ahead, even to some expansionist plans. Keep in mind the availability of necessary services (especially electricity) if you are likely to add extra higher-level ponds, waterfalls, fountains and filters in the years to come. A practical idea is to draw out a scale plan of your garden and then you can see where everything will (or won't) fit in. Take care to mark trees, existing water supply pipes, drains etc.

If you are starting from scratch, then a really good practice is to install pond drainage facilities and pipework for filters, fountains and waterfalls. There is now a growing tendency to use external pond filtration equipment; these can range from small cistern-size, filter medium-filled boxes (hidden in rockeries) fed by the pond pump, right up to sunken, gravity-fed multi-compartment filters almost the equivalent size of the pond. Obviously, the latter type is best planned, and installed, at the same time as the pond — otherwise you may be forced to reconsider re-siting the pond at a later date.

Some would-be pondkeepers aren't always blessed with a garden space that is level, but a steeply-sloping garden needn't be an obstacle to installing a pond. In fact, you can take advantage of the existing site's natural characteristics by making terraces and having a series of ponds at different levels, perhaps all fed by cascades — a sight most level-garden owners would dearly love.

A pond doesn't always need to be a hole in the ground either. Thanks to modern materials, prefabricated, semi-circular ponds, complete with surrounding fibreglass 'rockery' and cascades can be placed back against a wall on a patio and, with some clever planning, small ponds can even be mounted halfway up the wall itself. For those unwilling, or regrettably unable, to get out into the garden, there is no reason why the pond cannot 'come' into a conservatory or any other desired enclosed space. Here, raised brick-built ponds really come into their own. Being indoors, they are easy to maintain and view and are less prone to frost damage than they would have been when sited outside.

POND MATERIALS

Concrete

Let's get the hardest to use — concrete — out of the way first. While it can be used for almost any size of pond, it is mostly (and best) used for very large, formal ponds whose straight-edged designs are easily constructed with shuttering. Concrete also needs to be waterproofed and sealed before the pond is filled with water, to stop water seepage outwards and chemical seepage (from the concrete) inwards.

Some attention to construction detail should also be paid to the steepness of the pond's sides, so that any ice forming can easily slide upwards and not exert outward cracking pressure on the pond walls

(although the importance of this may well be over-stated). For the garden pond of average dimension, working with concrete simply isn't worth the physical effort when the alternative materials are considered.

Pre-fabricated ponds

For quickness, pre-fabricated ponds solve many an instant desire for a water feature, but some are too small, unless their limitations are recognised. Larger, ready-made ponds are available, but come more expensive. Needless to say, you're stuck with whatever designs are available.

Liners

The best all-round answer is the liner. You can excavate the hole to your precise requirements of depth and shape, confident



An attractive informal corner in a butyl-lined pond.



Always allow sufficient space between a pond and the nearest trees or buildings if at all possible.

in the knowledge that the liner will follow the contours exactly as it fills with water. However, you only get what you pay for, as some materials are longer-lasting than others.

At the cheapest end, plastic and PVC materials will deteriorate (after a time) through exposure to frost and also the Ultra-Violet rays of sunlight, especially the exposed portions of liner above the water surface. Butyl rubber is by far the best material, and usually carries a long-term guarantee. So does rubber-modified polythene. However, no guarantee will protect a badly-installed liner, so always follow the liner manufacturer's instructions to the letter.

Other materials

On a smaller scale, especially for indoors, or for conservatory-sited ponds (or perhaps more correctly, water features) other containers can be used, as long as they fulfil the two most important criteria — they look nice, and hold water.

Here, old sinks, baths, barrels etc can be pressed into service. It might be pertinent to add that many of these designs might not be altogether suitable for fishes because of their small proportions.

CONCLUSIONS

- 1 Make your mind up before you start what type of pond you want.
- 2 Don't let the pond dominate the rest of the garden unless: (a) you're a specialist; or (b) you can afford it!
- 3 Understand the need for the correct size and depth of pond.
- 4 Choose the best site in the garden — in sun, away from trees and where you can see the pond from the house.
- 5 Do incorporate drainage (if you opt for this) and filter systems right from the start; they can be very difficult to add later.
- 6 Pay attention to safety factors, especially where the elderly, infirm and children are likely to be around.

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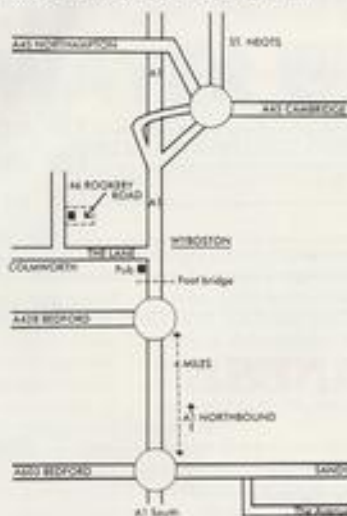
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Water Hawthorn (*Aponogeton dystachyus*) is a good dependable Deep Marginal.

TEN GOLDEN RULES OF WATER GARDENING

Barry James, of Everglades Nurseries, sets out his ten top tips for successful watergardening.

The majority of people who are garden owners have a reasonable knowledge of normal terrestrial plants. However, most of them find it a daunting prospect when faced with the problem of planting a garden pool. It is at this point that they turn to their local garden centre for help and advice. If they manage to find someone who 'knows his onions', all should be well, but, too often, the advice is sketchy, or in many cases, positively misleading. There are certain ground rules which, if not followed, will lead to trouble, if not outright disaster.

POND 'ZONES'

In the natural world, ponds and lakes form naturally where water collects in depressions with an impervious base of clay or rock. The deepest areas normally lie towards the centre, gradually becoming shallower as one approaches the shoreline, before the land

emerges into a marshy area. For a few feet from the water's edge the soil is, for most of the year, quite damp, until the influence of the water is lost and dry land begins.

Each of these areas of the pond bottom is colonised by its own group of plants, which are adapted to the conditions pertaining there, such as depth, temperature and light intensity.

In the damp areas surrounding the pool grow plants which need plenty of water but are intolerant of stagnation. These are generally referred to as **Moisture-loving Plants**. Such well-known plants as Astilbes and Hostas fall into this category. In the marshy area of the edge, where the water is either just below or just above the surface of the soil, will be found a group of plants collectively known as **Marginal or Bog Plants**. Where the water becomes deeper, grow plants which are either adapted to survive completely submerged or have long stems to their leaves and flowers, which float on the sur-

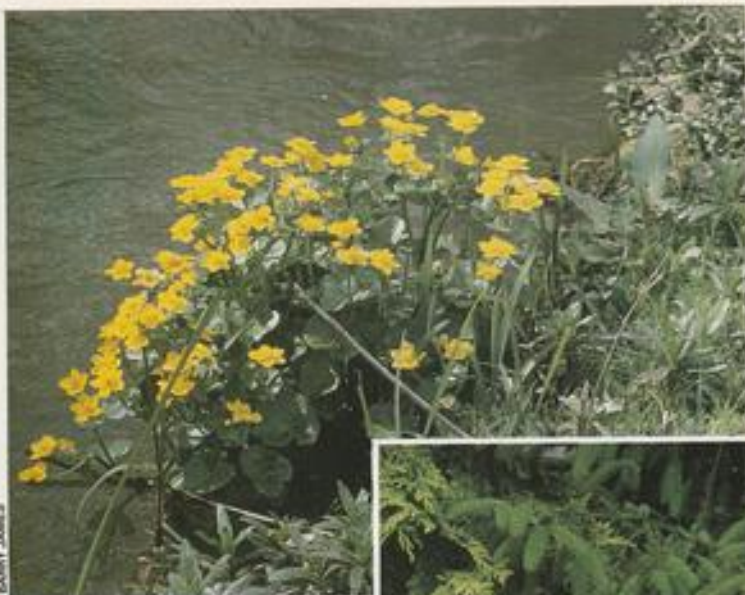
face. These are known respectively as **Submersed or Oxygenating Plants** and **Deep Marginals**.

SHELVES AND CONTAINERS

Rule No. 1 therefore begins at the construction stage of the pond which must be designed with varying depths. The central portion should be between 2-3 feet (60-90cm) in depth, with shelves about 12in (30cm) wide at 18in (45cm) and 9in (23cm) deep as one approaches the edge. These will accommodate the planting baskets in which the plants are contained.

This brings in **Rule No. 2**. Always containerise aquatic plants in artificially constructed pools. Being permanently bathed in water, the only check on the growth of water plants is temperature.

In the warmer months therefore, these plants can colonise large areas of the pool bottom and margins very quickly. By potting



This is *Caltha palustris*, the ever-popular Marsh Marigold.

together at the same time. Intermittent planting can lead to problems. So can failure to stock at the recommended density, which will result in an epidemic of algal organisms. These, in turn, will choke the plants which have been installed, and can lead to their death.

Aquatic plants grow in sand or silt derived from the underlying clay substrate of the pond, and so need a heavy soil for optimum growth.

Aquatics used in garden pools almost never grow naturally in peaty soils, which render the overlying water extremely acid. Therefore do not incorporate peat into any compost used in your containers. Always use a heavy soil which incorporates some clay and sand or gravel. Use of peat may lead to poor performance and, worse still, possible death of the plants. This is Rule No 4.

FERTILISERS AND BUYING PLANTS

Rule No. 5 is always to use a slow-release, full-spectrum fertiliser when installing your plants. If this release rate is related to the temperature of the water, all the better. Use of fertilisers initially will lead to stronger, more vigorous plants.

Rule No 6 is always buy quality plants. Those which have been hanging around the nursery for some time are often weak and under-nourished. It is not easy to bring a sick plant back to health.

Cheaper plants are not always a good buy. They are often native species which are inclined to be weedy and quickly choke up the pond with a lot of non-descript foliage and insignificant blooms.

Rule No 7 is always have a good reference book with you when you go to buy. More expensive, but slower-growing, plants are

often a better bet in the long run because your surplus plants can often be sold back to your dealer for a good price. This is particularly true of Water Lilies and quality Marginals.

On the subject of choosing varieties, it is important to be aware of the vast differences of size and performance between different varieties and species of plants. Pygmy or 'tub' varieties of Water Lilies have leaves and flowers only an inch or two (2.5-5cm) in diameter and will only grow in a water up to 12in (30cm) in depth. Large or vigorous varieties, on the other hand, can grow in up to 3 ft (90cm) of water, have leaves the size of dinner plates and can occupy an area of several square yards (or metres) in a remarkably short space of time. So Rule No 7 therefore also includes: always buy plants suitable for your size of pond.



Astilbes make excellent 'water-side' subjects.

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PLANT CARE

All aquatic plants are herbaceous, so that, at the first sign of frost, the foliage withers and blackens. **Rule No 8** is to remove as much of the dead materials as possible. At the same time any dead leaves from deciduous trees should be removed. This is not only good housekeeping, but also delays the build-up of mulm on the bottom and is of great benefit to the wellbeing of the fishes. Wherever possible, never move aquatic plants while they are dormant. Certain

plants, especially Water Lilies, can react badly to disturbance and damage to their rootstock at this time and can die from rootstock infections which gain entrance to the plant via the exposed ends of damaged roots. This is **Rule No 9**.

Finally, **Rule No 10** concerns the treatment of plants in the time between purchase and installation in the pool.

Aquatic plants, especially Oxygenators, are totally dependent on the water in which they grow. Once removed from the water,

they transpire rapidly and desiccation can occur at an alarming rate. Every year, people return to nurseries with pathetic examples of dried-up aquatics wondering what has happened to them. The truth is that half an hour, or even a few minutes, of unprotected exposure to bright sunshine or strong winds can damage these plants beyond recovery. Therefore, always keep plants in their protective polythene bags and in the shade until the last minute before planting, and you will not have broken **Rule No 10**.

LIST OF RECOMMENDED AQUATIC AND MOISTURE-LOVING PLANTS

1 WATER LILIES

Variety	Colour	Classification	Depth (cms)	Spread (sq m)
Escarboucle	Crimson	Large	80 - 120	1.75
Attraction	Red	Medium	30 - 100	0.75 - 1.25
Froebeli	Deep Red	Small	30 - 60	0.50 - 0.70
Alba	White	Large	30 - 100	1.50 - 2.00
Tuberosa Richardsonii	White	Medium	30 - 90	1.00 - 1.25
Pygmaea alba	White	Pygmy	15 - 30	0.40 - 0.60
Mooreii	Yellow	Medium	40 - 60	0.75 - 1.00
Odorata Sulphurea	Yellow	Small	20 - 50	0.50 - 0.75
Pygmaea Helvola	Yellow	Pygmy	10 - 25	0.24 - 0.40
Mrs Richmond	Pink	Medium	30 - 100	1.00 - 1.25
Tuberosa Rosea	Pink	Small	30 - 60	0.50 - 0.80
Pygmaea Rubra	Pink	Pygmy	10 - 30	0.30 - 0.40

2 MARGINALS

Variety	Flowering Period	Classification	Height (cms)	Colour
<i>Caltha palustris plena</i>	Early Spring	Small	25 - 50	Yellow
<i>Caltha palustris</i>	Summer	Small	15 - 25	White
<i>Myosotis palustris</i>	Late Spring	Small	20 - 30	Blue
<i>Butomus umbellatus</i>	Summer	Medium	60 - 100	Pink
<i>Iris laevigata</i>	Early Summer	Medium	60 - 90	Blue
<i>Lobelia cardinalis</i>	Late Summer	Medium	80 - 100	Scarlet
<i>Scirpus zebrius</i>	Foliage Plant	Medium	75 - 110	Leaves Variegated
<i>Scirpus lac</i> Var: <i>Albescens</i>	Foliage Plant	Large	90 - 120	Leaves Variegated
<i>Typha angustifolia</i>	Summer	Large	90 - 150	Brown

3 DEEP MARGINALS

<i>Aponogeton dystachyus</i>	March-July	Medium	50 - 100	White
<i>Nuphar lutea</i>	Summer	Large	50 - 300	Yellow

4 SUBMERGED AQUATICS

Variety	Flowering Period	Suitability
<i>Elodea canadensis</i>	Summer	Only for large pools; very rampant.
<i>Crassula helmsii</i>	Summer	Can be used submerged or emersed.
<i>Hottonia palustris</i>	Late Spring	Beautiful lilac-coloured flowers.
<i>Lagarosiphon major</i>	Summer	The most reliable species.

5 FLOATING AQUATICS

<i>Azolla fillicoides</i>	Non-Flowering	Leaves change from green to red in autumn and winter.
<i>Stratiotes aloides</i>	Spring	Large imposing plant which resembles a pineapple top in general appearance.
<i>Hydrocharis morsus ranae</i>	Summer	Tiny round leaves and paper-white flowers.

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Variety	Mature Height (cms)	Flowering Period
<i>Primula various</i>	40 - 90	May to August
<i>Hosta various</i>	30 - 90	June to September
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<i>Rodgersia various</i>	100 - 150	July
<i>Gunnera manicata</i>	180 - 300	April to May

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PONDKEEPING INTO THE NINETIES

Peter Skinner, of Koi Kraft, reviews some of the major recent trends in pondkeeping and picks out a few others which he feels are just round the corner.

In the early seventies, Koi-keeping technology consisted of a pond with some plants and a fingers-crossed reliance on Mother Nature as caretaker. The hobby was in its infancy and there was scant information of any kind available. In fact, every keeper was a pioneer, and the only way to learn was to 'do'.

'BIRTH' OF THE FILTER

As the seventies gave way to the eighties, it was well known that if you constantly pumped the pond water through some gravel, after a while the clarity of the pond would improve and the fish stocking level could be increased. The gravel would occupy a portion of the pond and the system was considered to be a great improvement on having no filter at all.

During the eighties there was a revolution in filter design. The main innovation was to have a filter separate from the pond, which would be easier to set up and maintain. Also, these units could easily be fitted to existing ponds without great upheaval. The main problem with these filters was that they were prone to being blocked by the silt from the pond and, consequently, their efficiency was impaired.

The next technological breakthrough was to site the filter next to the pond but sunk into the ground, with a pipe connected to the pond so that the two could share a common

water level. With this arrangement, the water would gravity-feed into the filter and then be returned to the pond by pump.

Using this system, it is possible to make all the silt, droppings, etc, collect in one area of the filter, thus preventing it from clogging the biological section (gravel, matting, plastic rings, etc) and, inevitably, the inlet of the pump.

RECENT TRENDS

In the past two years, we have seen a spate of filtration systems offered for sale by the garden centres and specialist Koi dealers. The filtration principles have remained the same for some time, although there is now a wide diversity of interpretations of these principles, something which can be mind-boggling to any newcomer to the hobby.

Filter brushes

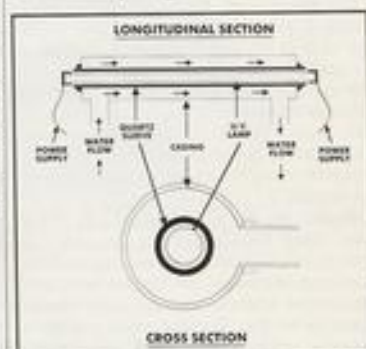
In my view, the most useful addition to our array of equipment and materials in the last few years is the filter brush. These are normally made from stainless steel and polypropylene and resemble overgrown bottle brushes. Their purpose is to trap suspended particles in the water and prevent them from returning to the pond. Not only do they have a 'talent' for this, but they also contribute to the effective biological capacity of the filter. If the brushes get clogged,

they can simply be hosed down and re-used over and over again.

Since, in 'industrial' terms, ornamental fishkeeping is a tiny business, we have not had the benefit of really large companies embarking on research projects to advance our hobby. For this reason it has been up to the hobbyists, the fishkeeping societies and the dealers to pool (excuse the pun) their information and, with any luck, new techniques and products will emerge. It is this 'suck it and see' approach that has spawned a new batch of gadgets which are helping us to achieve water quality which could only be dreamed of ten years ago.

U-V Sterilisers

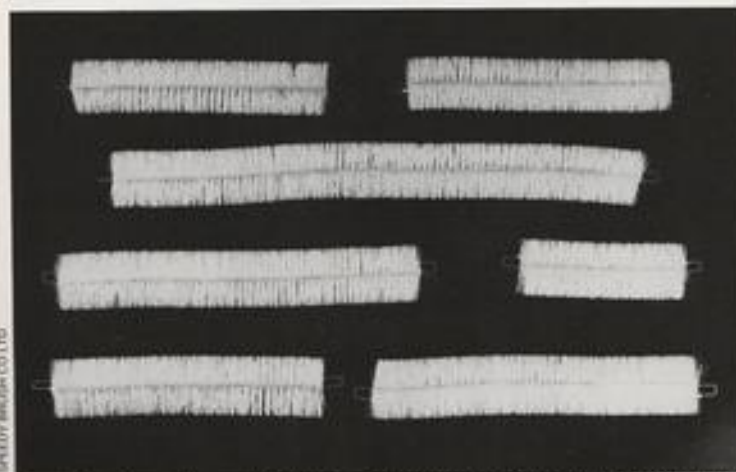
Perhaps the most exciting discovery in recent years was that, if you bombarded the pond water with intense Ultra Violet light, you could virtually eliminate unicellular algae, thereby preventing the water turning green and cutting down the amount of water-borne pathogens.



U-V sterilisers are very much 'in' these days. They must not, however, be used to hide an underlying problem.

I don't know who made this discovery, but someone obviously must have connected a standard Ultra Violet steriliser to a pond to see what happened. At that time, the principal use of these units was to improve the quality of domestic tapwater. In fact, the only difference between those and pond units are the connection sizes. Some of these connections have also been waterproofed for outdoor use.

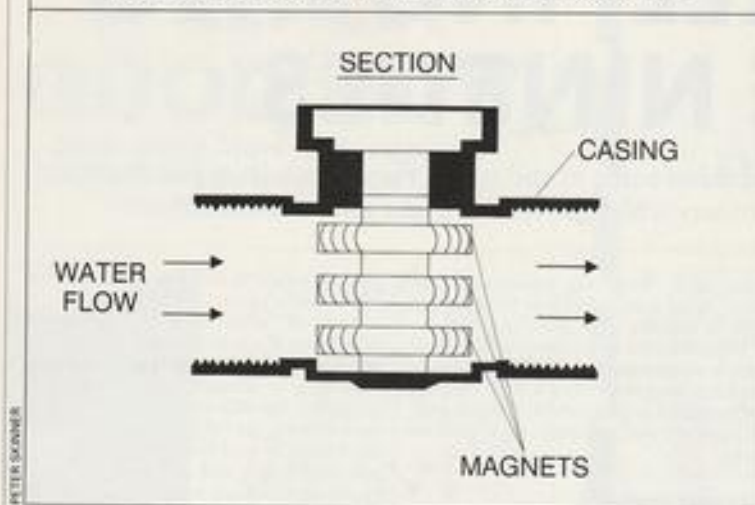
The use of sterilisers has become commonplace now which, bearing in mind the cost of these units, just goes to show how



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MAGNETIC WATER CONDITIONER



Magnetic algae conditioners can be used to control algae — but not to eradicate the conditions that caused the algal bloom in the first place.

determined modern pondkeepers are to give their fish the best conditions.

Magnetic water conditioners

Lately, another product is being tested for its efficiency. This is a magnetic water conditioner which is, basically, a metal or plastic casing with a series of special permanent magnets inside.

The water from the recirculating filter system is pumped through the unit on its way back to the pond. The unit itself does not use any electricity, nor does it have any moving parts; it simply exerts magnetic forces on the water, with a variety of effects. The main effect is to alter the calcium carbonate (hardness) molecules in the water, thus preventing them from accumulating on any surface.

Blanket weed is a filamentous alga which must 'root' into something in order to survive, but, since the main rooting medium is calcium carbonate, the blanket weed will not survive where a magnetic water conditioner is in use. Blanket weed can be a nuisance, especially in hard water areas, because it is unsightly and will block drains and pumps, so it seems that magnetic water conditioners are the solution to the problem.

I have one reservation about their use, though. If you get prolific growths of blanket weed, it is an indication that there are plenty of available nutrients. Although the pond will look better without the weed, you must remember that the absorption of the nutrients will have ceased and they will therefore be accumulating. If you had only minor growths of the weed, then the use of the conditioner would be beneficial, but if the growths are prolific, then I would advise other adjustments to your system before you fit the water conditioner.

It is a common belief that blanket weed is

an indication of good water quality. Unfortunately this is not necessarily true. The two basic necessities for the formation of blanket weed are sunlight and nutrients. Blanket weed thrives best in clear water because this allows the penetration of sunlight, but you can have water that is clear and yet still contain high levels of ammonia, nitrite and nitrate. This would allow the blanket weed to have a field day, but I wouldn't consider these to be good water conditions.

Water purifiers

It seems that, as time goes on, our mains water supply becomes more and more unsuitable for fishkeeping. The water com-

panies add chlorine, chloramine, and, occasionally, other 'nasties' to our water in an effort to keep it safe for drinking. Although these substances are supposedly harmless to humans, they can have catastrophic consequences if allowed into a fish pond.

Traditionally you could remove most of the chlorine from the water by letting it stand, or by spraying it into the pond, thus rendering the water safe. Unfortunately, chloramine is a more stable substance than chlorine and will remain for much longer. This problem can be overcome with the use of water conditioners, but if you use quantities of water, this method will be very expensive. The alternative is to use a purification device on the mains supply. Purifiers are usually tall thin canisters containing a variety of special resins, powders or granules which absorb the toxins as the water passes through.

The life expectancy of these units is in direct relation to the amount of water passed through them, and also the toxin concentration in the water. When exhausted, the contents are either re-charged or replaced. These units may appear to be quite expensive to buy, but many Koi-keepers with expensive fish in their ponds feel that the extra expense is fully justified.

Pond heaters

Many people are realising the benefits of heating their pond during the winter. Although, at first, this notion would seem to be a crazy idea, it is becoming very popular. The problem in Britain is that we have low temperatures for a large part of the year, which means that your fish could be fasting (or nearly so) for up to six months at a time. The consequences will be that they will be considerably weakened and, in the spring, will be susceptible to infection.

With a heating system installed, you can extend the feeding period in the autumn and begin earlier in the spring. I would not



Heating ponds is becoming increasingly popular and is likely to become even more so in the future.

JOHN DAWES'S BOOK OF WATER GARDENS

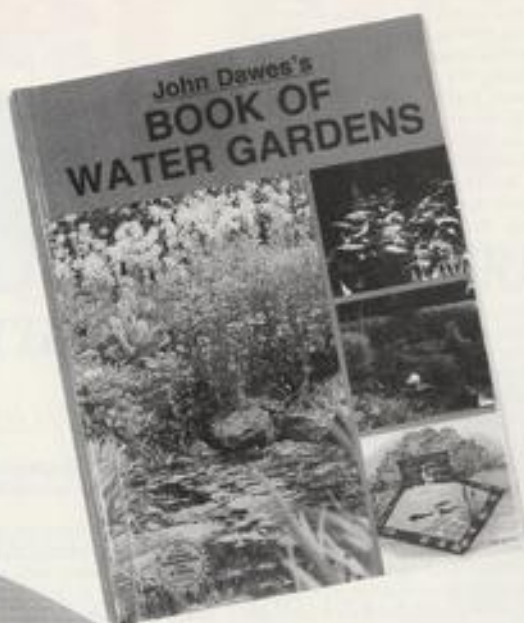
John Dawes is one of those rare people, an expert who can communicate. In his new Book of Water Gardens he takes us simply through all aspects of making and keeping a pond from initial planning to the finished and established feature, whether it be a natural wildlife pond, a formal pool or even an old kitchen sink. He covers all construction materials from a liner through preformed ponds, concrete, blocks and even wood. He also deals with all that is needed to select both plants and fish and ensure that they thrive.

Perhaps the most important thing about John's writing is that he always explains in simple terms the reasons behind the advice he gives. One of the most helpful things for anyone tackling a project is to understand why things should be done in this or that way.

John Dawes's Book of Water Gardens is a big book — 11½" × 8½" — and it is beautifully illustrated throughout with full colour photographs, drawings and diagrams. Quite apart from its value to all of those interested in water in the garden it is a beautiful book in its own right and will be enjoyed by all who look at it.

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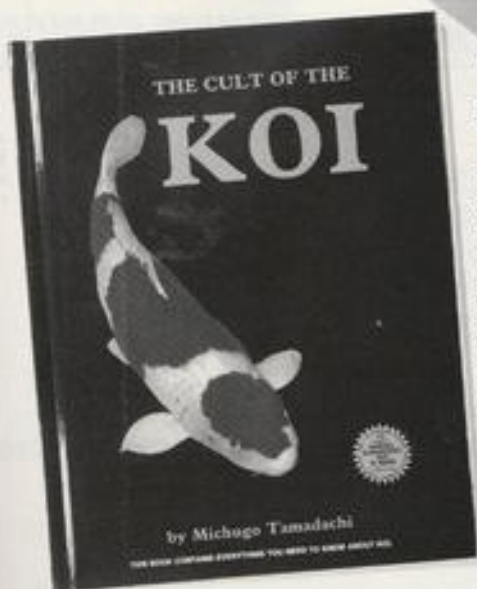


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recommend trying to maintain high temperatures during the whole of the winter because, should you have a breakdown with the heating system, the temperature could plummet, with disastrous results.

In any case, there is little to be gained by this, because healthy fish will come to no harm at all by not eating for two or three months. In fact, nature designed them to cope with this. A far better policy would be to use the heating to extend the feeding seasons, and during the coldest months of the winter, with the heating being used primarily to prevent the temperatures from getting dangerously low.

There are four main ways of heating a pond: electricity, gas boiler, heat pump, and heat exchanger utilising your domestic central heating system. For most people, the electric heaters are the only realistic option, but you may be surprised how affordable a little heating can be, especially if you have Economy 7 electricity.

Future trends

I have mentioned the most significant advances in fishkeeping technology over the past few years, but I have no doubt that, during the nineties, we shall see a revolution in construction materials. I anticipate the development of new types of liners, pond sealants, filter materials and structural aids.

There is a whisper on the grapevine that 1992 could see a major review of the chemicals and treatments available to us. We have



LAURENCE F. PERKINS

A major review regarding the use of chemical treatments, including those currently in use for common diseases such as White Spot, appears to be just round the corner.

precious few at the moment against certain parasites and bacteria, and I hate to think what will happen if these are withdrawn.

All we can do is buy healthy fish and make an extra effort to keep them under good conditions so that our dependence on chemicals is reduced. We have seen, in the last year, a major change in the rules regarding the dispensing of antibiotics. Now, veterinary surgeons must ask to see the

'patient' before prescribing antibiotics. Although this is a responsible procedure, it has presented extra problems for fishkeepers.

Whatever happens in the next decade, we now at least, have sufficient technology to provide almost ideal conditions for our beloved fish. We can look forward to the development of an even more comprehensive range of products to assist us in this highly enjoyable hobby.

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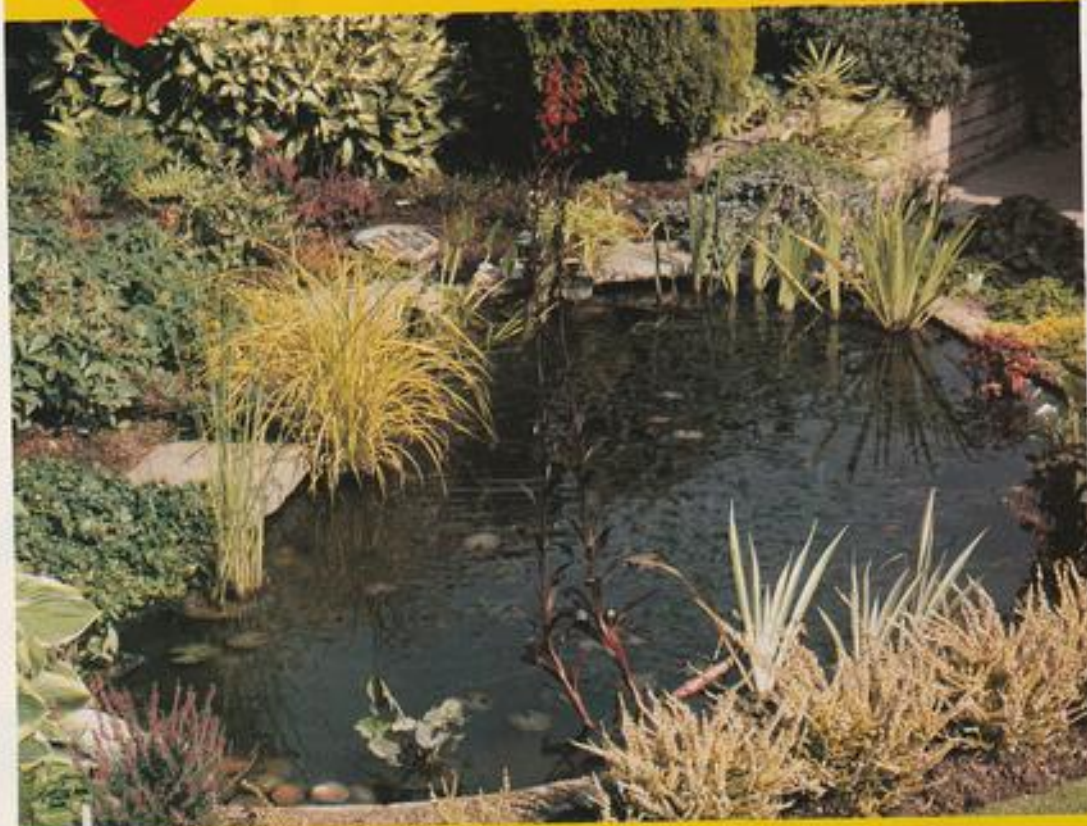
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Koi Calendar



By David Twigg

Hello! I'd like to introduce myself. I am a member of the British Koi Keepers' Society, the Northampton Section of the BKKS and the Midland Koi Association.

My wife Lyn and I have kept a coldwater aquarium ever since our eldest son brought home a goldfish which he had won at the fair about 17 years ago. A very small garden at the time precluded the opportunity to dig a pond, but when we moved to our current home eleven years ago, one of the first jobs was to "get digging". Our collection of fish grew in this pond and included a selection of Koi, of which we were very proud.

In the summer of 1985, we attended the annual Open Show of the Midland Koi Association, were instantly converted, and joined the Association there and then. Since that day, our pond has grown to 6600 gallons, been heated, and seen its population grow (literally) to 36 mature Koi and an uncountable number of last summer's fry (which vary from 1in to 3 in) in my header pool. Finally, as some of you may have seen, I have had several articles published in *A & P* over the past couple of years.

Now to the column! *Koi Calendar* is a new monthly item of news, events, new products and topical tips. If you are a manufacturer, dealer or Koi-keeper with a new product or idea, please write to me with details and I will do my best to give it an 'airing'. If you are a secretary, organiser or similar of a club, show, lecture or auction, again, please get in touch. Let

me know when and where you meet, the events you hold and a contact name and telephone number.

I intend to preview shows, lectures, auctions etc., in the issue of the month in which they take place and give advance notice of other 'goodies' to come. All entries in the calendar are open to the public, and further details can be obtained from the contact telephone number, or address, quoted alongside the event.

PRODUCT OF THE MONTH

I make a start this month with a mention of a new food from 'Aquarian' just on the market. It is called **Floating Pond Food** and has been specially formulated to provide for the nutritional requirements of coldwater fish. This food, manufactured in elongated pellet form, is suitable for feeding down to 5°C (41°F) and is easily and fully digestible by the fish.

'Aquarian', also provide a free Advisory Service. Write to **PO Box 67, Elland, Halifax HX5 0SJ**. (See also **Product Round-up** in last month's issue of *A & P*).

JOBS OF THE MONTH

April is a month in which daytime air temperatures can vary widely, and the chance of a night-time frost still exists. Water temperatures of smaller unheated ponds can fluctuate by several degrees and, depending upon which part of the country you are in, your fish will be looking for food.



Nishikigoi '91. Will the 1991 'edition' of this dealer-organised show be going ahead? At the time of going to press, the signs are not optimistic.

APRIL 1991

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				



Feed with caution and with one eye on the coming weather forecast. I have found boiled wheat (obtainable from the supermarket) to be an acceptable early spring food. It sinks and my Koi love it.

Bacterial activity in the filter will be at a minimum and feeding should be gradually increased over several weeks to avoid an 'overload' and subsequent deterioration of water quality. Keep your test kit to hand and use it regularly at this crucial time.

Don't be tempted to take winter covers off too soon. Consultation of my records show my cover was removed on 29 April in 1990, and 4 May in 1989.

A check over your complete system would be advantageous about now. Cleaning filter media (as explained by John Cuvelier in *Koi Talk* last month), checking pipework for cracks brought about by this deep winter we have just experienced, and a bucket and stopwatch exercise on the flow rates are just a few of the tasks to undertake.

APRIL EVENTS

11 APRIL

East Pennine Section (BKKS). Lecture "The amusing side of Koi-keeping" by Peter Dobson (former Chairman BKKS). Peter's talk, which will include a Video showing, will take place

in the Fitzwilliam Suite, The Rockingham Arms, Wentworth, South Yorkshire. Contact Dennis on 0532 795134.

FORTHCOMING EVENTS

MAY

19 — South Kent Section (BKKS) Lecture on Treatment of Koi by Tony Clear. Contact John on 0304 363603.

26 — Yorkshire Koi Society. Closed Spring Show. Contact Rita Thompson on 0484 851433/850422.

JUNE

1/2 — Yorkshire Section (BKKS) Open Show.

2 — Lower Thames-side Section (BKKS) Open Show.

9 — Middlesex & Surrey Borders Section (BKKS) Open Show.

15/16 — East Pennine Section (BKKS) Open Show.

22/23 — Lea Valley & Harlow Section (BKKS) Closed Show.

29/30 — Northern Section (BKKS) Open Show.

JULY

6/7 — Midland Koi Association Open Show.

14 — Mid-Staffs Section (BKKS) Closed Show.

21 — Essex Section (BKKS) Open Show.

28 — Norwich Koi Section (BKKS) Closed Show. Contact Doug on 0603 32654.

AUGUST

11 — YKS Summer Open Show.

17/18 — BKKS Open Show 'Koi 91'.

25/26 — South Eastern Section (BKKS) Open Show.

SEPTEMBER

1 — Crouch Valley Section (BKKS) Open Show.

7/8 — Mid Somerset Section (BKKS) Closed Show.

As the season progresses, I will bring you reports of shows, with photos of winning fish, etc. If an event of yours is missing from this calendar, or quoted details are incorrect, then please write to me c/o the editor at *Aquarist & Pondkeeper*. See you next month.

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News

Horniman receives funds for new aquarium

The Horniman Museum has received £25,000 from the Museums and Galleries Improvement Fund for a new aquarium, Living Waters, due to open at the Museum in summer this year.

The Museum launched its appeal for funds for the new gallery last year and has already received £5,000 from the Worshipful Company of Fishmongers. A further £12,000 has been contributed by the Friends of the Horniman and other supporters. The project also has the backing of the World Wide Fund for Nature.

The Museums and Galleries Improvement Fund was set up as a joint initiative between the Government and the Wolfson Foundation and Family Charitable Trust.

"We are absolutely delighted", said David Boston, Director of the Horniman Museum and Gardens, "that we have been successful in attracting money for this project. The Aquarium was always one of our most popular galleries and the new Living Waters will be a much more exciting, up to date and colourful display. We hope it will make a real contribution to a better environment."

Living Waters will bring world-wide environmental issues to life for children and adults and will illustrate different underwater habitats in a series

of advanced technological displays.

The exhibits, which extend from floor to above head height, include a mountain river cascading alongside the stairs to the exhibition (there is a stair-lift for the disabled and a high-technology sound-guide system with facilities for the hard of hearing).

Visitors then arrive in the tropical rainforest shown in dramatic cross section, while an East African lake illustrates the conservation research conducted by Horniman scientists in conjunction with international research groups. The extinct (in the wild) cichlid fish successfully bred at the Museum will be on view in this exhibit.

The Sussex coast is illustrated in a dynamic cold marine display with cod, crabs and changing tides, illustrating the dangers of overfishing and pollution close to home.

The tropical marine display and living coral reef show the colourful environments of the Pacific and Indian Ocean and what may be lost to future generations if they are not protected.

The exhibition ends with life in a British pond and suggests how we can all make a contribution to conserving the underwater environment.

Living Waters is a new gallery at the Horniman Museum and will be part of the free admission to the Museum. The Horniman Museum is open Weekdays 1030 to 1750; Sun-

days 1400 to 1750.

Further information:
David Boston and Dr. Gordon Reid, Horniman Museum.
Tel: 081-699 1872.

Search for two marine biologists



Operation Raleigh, the International Youth Charity which organises expeditions for young people aged 17-25 in remote areas worldwide, is looking for two marine biologists to go to Alaska this year.

The marine biologists are required to help supervise and direct the Venturers, as the young people are known, to carry out sub-intertidal and upland detailed survey work in the newly proclaimed State Marine Parks in Prince William Sound. Jack Bay and the islands of Hinchinbrook, Hawkins and Kayak, were all affected by the Exxon-Valdez oil spill and inventories will be carried out to establish baseline data on existing flora and fauna communities.

For further information please contact The Press Office, Operation Raleigh, The Power House, Alpha Place, Flood Street, London SW3 5SZ. Tel: 071 351 7541.

1991 Supreme Weekend of Fishkeeping

Pontin's Holiday Centre, Sand Bay, Weston-Super-Mare (8-10 November, 1991) will, once again, be the venue for a fabulous weekend devoted to learning about fishkeeping.

Residential 'Weekenders' and day-visitors alike will find plenty of aquatic activity and alternative entertainment to interest them at this year's event. Once again, the accent will be on information and expert advice, although there will also be opportunities this time to purchase from a selection of trade stands.

On Saturday and Sunday there will be a full programme of illustrated presentations from eminent aquarists, both from home and abroad. As most people are coming to see fish, there will be some special features especially created for the occasion.

An International Guppy Exhibition will add dazzling colours, while a Pondfish Display will, no doubt, prove to be equally attractive. If you're not quite into fishkeeping just yet, feel doubtful about coping with the technicalities, or even a little confused about what fish are suitable, then two displays have been planned just for you:

- regular Practical Demonstrations will be given, showing how to set up that first tropical aquarium;

- a new Look Before You Buy display will put you on the right track when buying fish; here you will find a selection of the more commonly-available fish, together with information about their suitability (or not!) for the home aquarium.

You may even be forced into fishkeeping by being the lucky winner of Airport Aquaria's Prize Fully-Furnished Aquarium and Equipment but, rest assured, you won't be expected to take it all home with you on the day! If, following such a surprise, you're still a bit daunted, or get into any difficulties, the Federation of British Aquatic Societies' Information Stand can give you the contact address of your nearest 'helping hand' — your local aquarist society — anywhere in the UK.

For the established hobbyist wanting to move away from, perhaps, just that single decorative community tank, there is the chance to meet experts from the many specialist societies who will be pleased to advise you on all aspects of caring for your own particular favourites.

In addition, all of 1991's award-winning fishes will be competing for the prestigious Supreme Championship.

Special occasions attract special events, and at the Weekend, there will be the inaugural meeting of the International Gobies & Rainbowfishes Group. A Silver Jubilee Anniversary is something else not to be missed, and Mid-Sussex



Dr Gordon Reid (co-author of *Troubles at the Source of Life*, published in two parts, in last month's issue of *A&P*, and elsewhere in this one) is responsible for overseeing the success of the new Living Waters exhibits at the Horniman Museum.

Aquarist Society have chosen the Weekend as the time and the place to celebrate their 25th year, with a photographic display.

On the 'alternative side,' the full amenities of Pontin's Holiday Centre will be available (last year, the swimming pool was voted tops) and there will be coach trips available to local retailers for fish purchases. On Friday and Saturday evenings, live music and entertainment will provide relaxation after the hectic pace of the day, for exhibitors and resident guests alike.

As the F.B.A.S. say: "You won't know what you'll be missing unless you come, and, if it's still missing, don't worry, we'll put it on next year!"

Pontin's have, once again, arranged an excellent 'Weekender' break from Friday 8 - Sunday 10 November at a special price of £55.00 per Adult/£30 per Child (under 15). For booking forms contact: Colin Richards, 3 Uplands Avenue, Chesham, Bucks, HP5 2EA. Tel: 0494 772552.

New moves at Tahiti

Tahiti Aquariums of Manchester, have recently completed their long-awaited move to Aquarius Centre at nearby Ashton-under-Lyne. The new 75,000 square foot development incorporates the head office, plus greatly improved manufacturing, warehousing and distribution facilities.

The continued extra demand for the company's products meant a move to larger premises was inevitable, thus ensuring that Tahiti are well placed to continue their expansion plans.

David Glover has joined the company to spearhead the sales and marketing programme, which includes finalisation of the elegantly designed Islander. Further, a cabinet furniture production line is currently being installed and a new 'mystery' aquarium will be appearing shortly.

According to David, "These exciting additions to our ever-popular Marina range, will provide our customers with the most complete and saleable product line in the industry. This, coupled with our new and flexible approach to marketing, should ensure that Tahiti further extend their lead as the

UK's largest aquarium manufacturer".

Tahiti intend to exhibit at major trade shows throughout the UK in 1991, but are pleased to receive any enquiries on 061-339-3131.

New appointment at Lotus

Stephen Lally has been appointed Managing Director of Lotus Water Garden Products Ltd. Details released by the company state that his two years as Sales and Marketing Director of Lotus have seen the company consolidate its lead in the water garden market. Most Lotus products are new or have been updated during this period. Greatly improved customer service, an enlarged sales team and increased marketing activity have also brought considerable sales growth.

And for the future, Stephen Lally says that pre-season sales for 1991 are well up, so Lotus expect continued growth. "Even greater effort and support for our customers is seeing us ride over the top of this so-called recession, and will see us bigger and healthier at the end of it."

Lotus Water Garden Products Ltd, 260-300 Berkhamsted Road, Chesham, Bucks, HP5 3EZ. Tel: 0494 774451; Fax: 0494 791279.

First UK Fish Health Management Symposium for Pondkeepers

Owing to 'serious' interest shown by fishkeepers and veterinary surgeons to know more about some of the problems which fish suffer from, and how to deal with them, Vetark Animal Health and Kent Koi have pooled their experience in this first-ever symposium.

It is hoped that in future years, if the interest is maintained, other speakers on other specialist areas will be added to this year's team. At the very least, all will have the opportunity to comment on what is thought to be the current view on health, disease, filtration and nutrition. It is also hoped to invite specialist companies to have trade stands where pond-related equipment can be shown.

The speakers:

Bernice Brewster - fish health specialist with Kent Koi and regular contributor to magazines and books on the subject of fishkeeping.

Peter Scott - veterinary adviser to Vetark Animal Health, OFI and many other petfish related organisations, and author of many articles and several books.

SYMPOSIUM PROGRAMME

10.00 am	Welcome
10.05 am	Water quality
11.00 am	Importance of gills; Nutrition
11.45 am	Coffee/tea
12.00 noon	Viral and Bacterial diseases
1.00 pm	Lunch
2.00 pm	Filter design
3.00 pm	Parasitic diseases
3.45 pm	Coffee/tea
4.00 pm	Breeding
4.30 pm	Discussion

The cost of the full-day symposium, is £35.00 per head, including buffet lunch.

Venue: Berkshire College of Agriculture.

Date: 14 April, 1991.

For further details contact Vetark, PO Box 60, Winchester, SO23 9XN. Tel: 0962 880376; Fax: 0962 881790.

Aquaria and water gardens and Sandown Fishkeeping Exhibition to merge

For the first time, two of the UK's most exciting aquatic events are coming together at the National Hall, Olympia, London, on Saturday 1 and Sunday 2 June 1991.

The organisers of Aquaria and Watergardens and the Association of Aquarists are planning an event which will bring traders and hobbyists together in a new major event.

There will be old favourites - aquatic and watergarden displays; free lectures; aquarium demonstrations, plus the new Hobby Village - a unique feature area entirely devoted to the hobbyist and run by the Association of Aquarists. (See also News from the Societies elsewhere in this issue).

For individual and society participation and information, please contact:

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

For floorplans, rates and trade stand information, please contact:

Conference Marketing Services, PO Box 48, Henley-on-Thames, Oxon RG9 3NS. Tel: 0734 402875. Fax: 0734 404474 or Tel: 0633 838588. Fax: 0633 858585.





The Spanish Terrapin (*Mauremys (Clemmys) caspica leprosa*) lacks the small yellow skin spots of the European Pond Turtle. The larger, darker, specimen in this photograph is a female Red-eared Terrapin (*Trachemys (Pseudemys) scripta scripta*).

KEEPING BABY TERRAPINS



If you are planning to buy a baby terrapin, do your homework first, starting off with **Jim Wright's** comprehensive guide to buying and caring for these popular reptiles.
(Photographs by Julian Sims)

HAVE always looked upon tortoises as being the Cinderellas of the pet world, but I think the little terrapins which we see in the pet shops are on level terms with them. Baby terrapins are greatly misunderstood, and because of this, their life in this country is not always a happy one. I suspect that the fatality rate is very high.

Pet shop owners, no doubt, do their best for them while in their care, but many people who buy them either give them the wrong care, or quickly tire of them and neglect them. Further, when in captivity, terrapins fall easy prey to disease if neglected.

To care for baby terrapins properly requires patience and the will to give them plenty of attention. If cared for properly,



A female European Pond Turtle (*Emys orbicularis*).

they grow to about seven inches (c 18cm) in length, and can live for many years.

Sometimes referred to as 'water tortoises', these little creatures are lively, and spend part of their time in freshwater, and part of their time on land. In fact, they are never far from water, as this is their main means of escape from danger. But they are neither tortoise nor turtle as we know them; just terrapins.

MORPHOLOGY

A terrapin's shell is flatter than that of a tortoise; this allows it to travel through water with the least resistance. The shell is composed of an outer layer of horn, and an inner layer of bone. The outer layer of horn is the protection, and is composed of a number of tough shields or scutes. The underpart of the shell is known as the *plastron*, and the upper part as the *carapace*; they are joined at the sides by the *bridges*. If the terrapin is dropped, or is stepped on, the shell may break. The shell and the skin are very sensitive.

The terrapin's jaws are composed of bone, covered with a hard layer of horn which comes to a sharp edge. There are no teeth, but the hard horny jaws are very effective for biting and tearing up food.

The fore-legs are covered with scales, which gives them protection. This also applies to the head when it is withdrawn into the shell behind the legs. The hind-feet are webbed and are used as paddles to propel the terrapin along in the water. In some species, the fore-feet are partly webbed.

The terrapin's tail is hollow (but does contain the tip of the backbone, of course) and contains a sac, the cloaca, which is an communal reception chamber for urine and faeces, as well as leading to the sex organs. All urine and droppings pass through the hollow tail.

OTHER CHARACTERISTICS

Hearing in the terrapin, as in a tortoise, is, on the whole, non-existent, but it has quite good sight, but this naturally deteriorates with age. The sense of smell is keen, and is used for finding food, both on land and in the water.

Terrapins can breathe quite freely when on land, or in the water. On land they breathe by alternately contracting two muscles in the flanks, and two in the front of the body. By this means the lungs are expanded and contracted, air being sucked and pushed out. Although this method is quite effective, it is primitive compared to that of a land mammal. In the water, the terrapin breathes by using the lining of the throat, and by using two sacs in the cloaca, which allow air to pass through them.

While it is easy to sex adult terrapins, it is difficult to sex baby terrapins. In the adults the plastron is either flat or convex in the female, while it is concave in the male.

Terrapins, like most creatures, like company, so if it is possible, keep two or more, and they will live a happier life. They live in large numbers in the wild. If a terrapin falls onto its back when on land, it can usually



A Yellow-bellied Terrapin (*Trachemys (Pseudemys) scripta scripta*) exhibiting part of the yellow plastron that gives rise to its common name.

right itself, but if for some reason it cannot, put it on its feet immediately; otherwise it will die, as the lungs will be compressed by the intestines and other organs, preventing it from breathing.

SPECIES OF TERRAPINS KEPT AS PETS

Some years ago, practically all terrapins sold in pet shops were of the hardy species, coming mainly from Europe, but, for the past few years, large numbers of half-hardy terrapins from North America have been available.

European species are still imported, but in smaller numbers. One is the so-called European Pond Turtle (*Emys orbicularis*), a species which is found in North West Africa, Southern Europe to West Asia, and in parts of Holland, Germany, Poland and Lithuania.

The carapace of this species is black or brown, with yellow spots or radiating lines on the shields. The plastron is of a greyish-yellow colour with irregular brown patches. It is hinged between its two sections, and is joined at the side to the carapace by cartilage. The top of the head and neck are brownish-black with yellow spots. There are webs on both hind and front feet.

A second species of hardy terrapin sometimes imported is the Spanish Terrapin, (*Mauremys (Clemmys) caspica leprosa*), which is found in North West Africa and the Iberian Peninsula. Young specimens of this species have a yellowish-brown carapace with orange-yellow or red patches in the middle of the shields. The plastron is yellowish, while the skin is olive-green with orange streaks or spots.

By far the most common terrapin imported is the North American half-hardy Red-ear, (*Trachemys (Pseudemys) scripta elegans*), so-called because of the red or dark orange stripe on each side, running from the eye back onto the neck. The head and limbs have a background colour of brown or olive-green with yellow stripes. Its carapace is dark-green, while the plastron is yellowish with black markings. It is often referred to as the Elegant Terrapin. This species is found in Northern Illinois and Indiana, and westward through South West Iowa, most of Oklahoma and the Eastern half of Texas. It is also found in most of Missouri, Eastern and Southern Kansas, Western halves of Kentucky and Tennessee to North Alabama and

Southern Louisiana.

A second half-hardy subspecies sometimes imported from North America is the so-called Yellow-bellied Terrapin (*Trachemys (Pseudemys) scripta scripta*). It has a dark-brown or black carapace, while the plastron is yellow with some black pigmentation, and there are some black marks on the outer edges. A distinctive feature is the yellow blotch on either side, which curves from behind the eye down to the chin. This subspecies is found in parts of Virginia, North Carolina, most of South Carolina, West Georgia and North Florida.

FEEDING BABY TERRAPINS

The feeding and general care of both hardy and half-hardy terrapins is much the same. It must be remembered that these creatures will only feed when in the water. If at any time they find an item of food which they like, on land, they will drag it into the water to eat it. In the wild they live mainly on live food, and, being flesh eaters (carnivores), they eat fish, tadpoles, worms, insects, etc, in fact, anything in this line which is small enough to be eaten. They catch their food while swimming about.

However, in captivity, these babies will readily eat small pieces of raw fish, beef, offal, etc, herring and liver being especially good as part of their diet. There are also some very good commercially produced foods on the market. The pieces must be no bigger than a match head, otherwise the babies may choke. When healthy, they will eat heartily, and their diet must be varied in order that they get the essential vitamins, minerals, etc, which they need to keep them healthy. Offer them food daily, and add a drop of cod liver



A Red-eared Terrapin laying an egg.

oil to each feed. They will not eat in the cold, nor in the dark.

Although basically carnivores, terrapins should have, and will enjoy, a small amount of green food, such as lettuce or pond weed, about three times a week. When the terrapin is in the water, drop a few small pieces of cuttle-fish in front of it; and it should snatch them and eat them. These will provide calcium which it needs for growth of the shell and bones. Twice a week will be sufficient.

LIVING QUARTERS

The living quarters of a terrapin are very important, especially for the babies, as being too small to hibernate, they will have to live in them all the year round.

The vivarium should be as large as possible, allowing the terrapins to get all the sun's rays and natural light. In fact, on hot, sunny days they can be put out of doors in the sun, but they must have protection in case the sun gets too hot. They also need to be protected from cats, large birds, etc, which will eat them.

Baby terrapins should be kept in a roomy tank, and these can be bought in pet shops in various sizes. They must be of clear glass or perspex to allow natural light to get through to the terrapins. For two baby terrapins, a tank 18in long x 12in wide (45cm x 30cm) will be ideal at first, but a larger tank will be necessary as the terrapins get bigger. The water in the tank for babies should be about 4in (10cm) deep at first, but this can be deeper as the terrapins grow.

One important point which many people do not realise, and unfortunately are not advised about, is that these baby terrapins require heat; a temperature of 75-80°F (23-26-6°C). Ideally, fish tank heaters can be used, and, when providing heat, I always provide two heaters, so that if one fails, the other will provide some heat until the fault is rectified (eg 2 x 50w instead of 1 x 100w).

Another method of heating a tank is by making a solid wooden frame about 4in deep (10cm), and slightly larger than the base of the tank. Firmly fix strips of wood around the inside of the frame, about half an inch from the top. The tank will rest on these. A light bulb holder is then fixed at each end on the inside of the frame, allowing space so that, when the bulbs are fitted into the holders, they are about half an inch (12mm) from the base of the tank.

Water must be kept in the tank when the heat is on. You will find that two 25 watt or two 40 watt bulbs will be powerful enough.

A thermostat set at 75-80°F (23-26-6°C) must be kept in the tank at all times when the heater is in use, otherwise the water could become overheated, killing the terrapins. Alternatively, of course, a combined heater/stat will warm the water and control the temperature in one operation. A water thermometer is also essential to keep a check on the temperature in case the heating fails.

Another essential is an island onto which the terrapins can climb easily, as they do come out of the water to dry themselves. The top of the island must be just clear of the

water. A flat stone or piece of clean weathered brick, end uppermost, will be ideal, but it should not take up too much space.

The tank must be cleaned out at least on alternate days. In fact, it is a good idea to use a separate container, such as a plastic bowl with tepid water in it, to feed the terrapins in; this will prevent the tank from becoming fouled with stale cod liver oil, etc. After cleaning the tank and island, replace the water with clean fresh water, slightly warm. Always remove any food not eaten, as this will ferment and foul the water. If you wish to put some small pebbles in the bottom of the tank, make sure that they are clean and have no sharp edges. It is a good idea to pour boiling water over them, and then cool them off in clean cold water before using them. This must also be done each time the tank is cleaned. These pebbles must not be small enough for the terrapins to pick up and eat with their food.

BUYING A TERRAPIN

When buying a terrapin you will, naturally, want to choose a healthy one. There are a few points which will help you to do this.

The eyes should be clean and bright, and should be free of discharge. They should open and close freely. The mouth should also be clean, and should open and close freely. Failure to do this may mean some injury to the jaw, or disease of the mouth. It is also an idea to handle a few terrapins for weight, choosing the heaviest.

A healthy creature should be lively, and should move its head and limbs freely, withdrawing them when touched, taking into consideration the surrounding temperature (terrappins become lethargic in cold conditions). The shell should be clean and free of cracks, etc, as should be the skin. On putting pressure to the bottoms of the pro-

truding feet, a healthy terrapin should either push against you or withdraw them quickly.

Any responsible pet shop owner would appreciate your pointing out any creature which is injured or appears unwell, for, if diseased, it could affect the whole stock.

COMMON AILMENTS

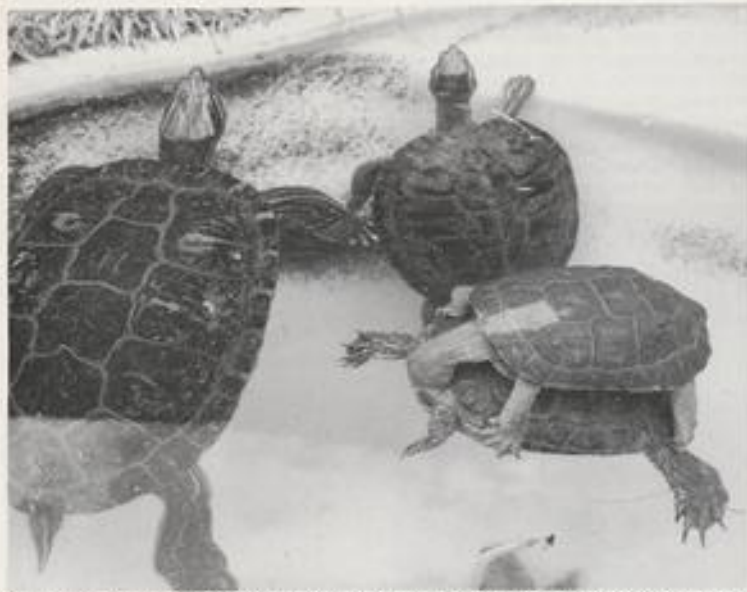
Terrapins kept in captivity can suffer from various ailments, due, in many cases, to incorrect feeding, or to foul water. I will describe the most important ailments, but I must emphasise the importance of getting veterinary treatment early, as with these creatures, their condition deteriorates quickly when ill or injured.

One common complaint is softening of



A hatchling European Pond Turtle. Note the characteristic long tail.

the shell, due to a lack of calcium. In its early stages this is treatable if caught in time. If a terrapin with a soft shell refuses food, take it for veterinary advice immediately, but if it is still feeding, offer it small bits of cuttle-fish and cod liver oil mixed in with its food. In these cases the shell feels rubbery.



Spanish Terrapins mating. A Red-eared Terrapin and a Florida Cooter (*Pseudemys floridana*) can also be seen in this shot.

Blindness and deformities can also occur through lack of sunshine and vitamins (this is why sunshine and vitamins are essential, of course, Vitamins A and D being necessary to correct these conditions). Again, veterinary advice is needed. Cod liver oil can be given by mouth if the terrapin is feeding, as this contains the necessary vitamins.

If the water in the tank becomes fouled, the terrapin could develop a mouth infection. This will be recognised by a reluctance to feed, a dirty mouth inside, with the mouth probably being partly open, as well as giving off a nasty smell. Such a terrapin should be isolated and veterinary advice sought, as this condition is sometimes infectious.

Swollen eyelids are usually due either to infected water, or to a lack of Vitamin A. Besides being swollen, the lids may be stuck together, and pus may form. Treatment is necessary, as soon as possible, as this condition quickly progresses. Isolate the terrapin in the meantime, since this disease can also be infectious.

Any other problems such as cuts, cracked shells, swellings, signs of worms or blood in the droppings must be dealt with by a veterinary surgeon as quickly as possible.

These little creatures deserve decent care. It is to be hoped that, with much wider publicity and advice on their care, their lives may become much happier than is sometimes the case — free from the ailments which many of them suffer and die from.

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SOME USEFUL ADDRESSES

British Chelonia Group Secretary: Mrs Diana Desmond, 29, Victoria St., Staple Hill, Bristol, BS16 5JP.

British Herpetological Society c/o Zoological Society of London, Regent's Park, London, NW1 4RY.

Association for the Study of Reptiles and Amphibians. (A.S.R.A.) c/o Cotswold Wildlife Park, Burford, Oxfordshire.

The Tortoise Trust B.M. Tortoise, London, WC1N 3XX.

The South Western Herpetological Society c/o Secretary, 'Acanthus', St Marychurch Road, Torquay, Devon, TQ1 3HG.

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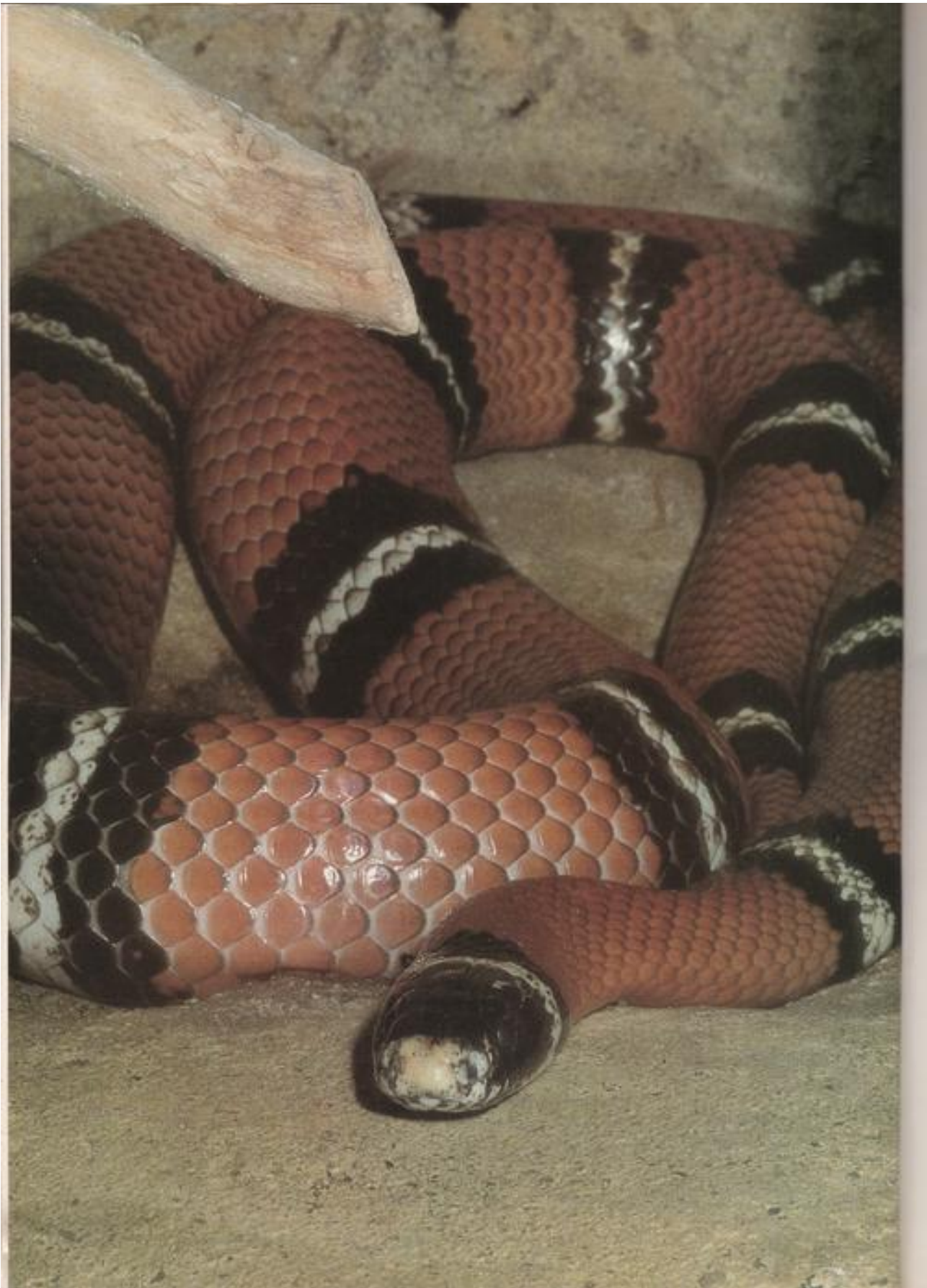
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Spotlight

MILKSNAKES (*LAMPROPELTIS TRIANGULUM*)

Marc Staniszewski takes a detailed look at one of the most colourful and popular snakes available to hobbyists.

(Photograph: Geoff Kidd)

Ask any reptile keeper to name the snake (s)he regards the most beautiful and odds on the list will include a tri-coloured North and Central American member of the genus *Lampropeltis*, commonly known as Milksnakes. Although the nominate form (i.e. the form on which the scientific description is based), the Eastern Milksnake (*Lampropeltis triangulum triangulum*), tends to be a rather drab brown and beige affair, its several subspecies can rightly claim to be some of the most attractive of all snakes, with their sequential bands of red between black, white/cream and black.

CONFUSED IDENTITY

Milksnakes are closely related to the tri-coloured King and Mountain King Snakes and the two types can be easily confused. Indeed, Milksnakes are frequently called Scarlet Kingsnakes, while Kingsnakes are commonly referred to as Milksnakes! The most notable differences are that, in Milksnakes, the white/cream bands always become wider on the flanks, and Kingsnakes are generally larger; more robust.

The common name milksnake is erroneously derived from the old wives' tale of these snakes drinking the milk from cows' udders. This is probably because of the fact that they frequently inhabit barns or grazing land, where they hunt for field mice and other small rodents. Over much of their range, from south-east Canada throughout central and eastern North America, to the northern parts of South America, these snakes are quite rare, tending to be secretive and largely nocturnal creatures.

Unfortunately, when seen, they are often killed because of their close resemblance to the poisonous Coral Snake (*Micruroides euryzonus*) and, invariably, milksnakes are also known as False Coral Snakes. The two can be told apart from the sequence of their bands, hence the familiar rhyme:

Red on yellow (or white)
Kill a fellow (or might)
Red on black
Venom lack

Milksnakes are adaptable reptiles found in a variety of habitats, including coniferous or

deciduous woodland, prairie grassland, rocky outcrops, river banks, sand desert, mountainous areas and, even, in man-made habitats such as parks and gardens.

POPULAR SUBSPECIES

Those subspecies available in captivity are almost solely captive-bred, as collection of these stunning snakes from the wild is widely prohibited. Below are some of the more popular subspecies:

Sinaloan Milksnake (*Lampropeltis triangulum sinaloae*)

This is possibly the most beautiful subspecies from the Sinaloan Desert in northern Mexico. Its body is arranged in broad bands of scarlet between narrow bands of black, yellow or white and black. Although, initially, hatchlings tend to be somewhat fragile, they will eventually grow to become sturdy, easily maintained snakes 27-39 inches (68.6 - 100cm) in length, with males being slightly smaller than females.

Honduran or Tangerine Milksnake (*L. t. hondurensis*)

This is largest subspecies, originating from the drier regions of the tropical rainforests of Central America. Reaching a length of more than 8 feet (2.4m) — but usually smaller — it is an aggressive snake which feeds on a variety of rodents, birds and even other snakes. Although an attractive subspecies, coloured with broad bands of carmine-red between bands of black, white and black, many individuals do tend to become darker with age as the black pigment suffuses into the red. The form (phase) most often encountered is the 'tangerine' one, where the white bands have been replaced with a deep orange pigment.

Wild-caught specimens of this subspecies still abound in reptile shops, but are best avoided owing to their unpleasant disposition and the potentially hazardous diseases they carry. By contrast, captive-bred snakes are frequently available and make excellent subjects for vivaria, although it is recommended to maintain individual snakes sepa-

rately because of their cannibalistic tendency.

Mexican Milksnake (*L. t. annulata*)

This is perhaps the most frequently bred tri-coloured *Lampropeltis* and its pale bands tend to be yellow or cream, with its snout nearly always black. It attains a length of about 24-30 inches (60-75 cm).

Other subspecies

Other subspecies often available include the Central Plains (*L. t. gentilis*), Los Angeles (*L. t. amara*) and the Louisiana Milksnake (*L. t. amara*), all of which are small, attractively coloured subspecies and can certainly be recommended for captivity. The 3½ft (1.1m) Pueblan Milksnake (*L. t. campbelli*), restricted to small areas around Mexico City, is not currently bred in as large numbers as other Milksnakes. It is similar to the beautiful Sinaloan subspecies.

As stated before, the Mountain Kingsnakes are very similar to Milksnakes and even more popular with snake enthusiasts. The Californian Mountain King (*L. zonata*) and the Sonoran or Arizona Mountain King (*L. pyromelana*) are both beautiful tri-colours and are more robust, and less fragile, than the Milksnake.

CAPTIVE REQUIREMENTS

Accommodation

The set-up for Milksnakes need not be complicated, for they will happily live in a vivarium that is sparsely furnished with one sturdy branch, a hide, a rock and a small water bowl (the contents of which should be changed daily).

For a pair of adults, a vivarium measuring around 3-4ft (90 - 120cm) in length by 15in (38cm) in width and depth is suitable, and I would recommend that these be a wooden surround/glass fronted type to reduce the stress that 'open-glass' aquaria can inflict on these snakes. As they are nocturnal species, a forty watt spot lamp should be on for between 12-16 hours during spring and summer.

At night, a low wattage heater pad will give

a thigmothermic situation i.e. one that is warm on contact, as these snakes will seek warm spots to gain heat from, just as they would from sun-baked rocks in their natural habitat. Ideal daytime temperatures should be 78-86°F (c25.5-30°C), night time 65-72°F (c18.3-22°C).

Breeding

To induce breeding in spring/early summer, the spot-lamp should be left on for 8-10 hours and the overall temperature should be 10-15°F (c5.5-8.3°C) lower (20 to 25°F - c11 to 13.9°C, for more northerly subspecies) than summer temperatures.

Separating males and females during this period, and for the first few weeks after warming-up, is also advantageous, only replacing the male when the female has sloughed off her skin. Excited by her strong pheromones (natural scent from skin secretions), he will inevitably couple with her.

Ovulation lasts for between 22 and 75 days, after which 2-16 eggs are deposited in a damp area of the vivarium (provide moistened sand and Sphagnum Moss accordingly). The eggs hatch 42-76 days later if incubated at 82-92°F (28-33°C) and the fragile 10-inch (25-4cm) snakes should immediately be transferred to small plastic sandwich boxes with high humidity.

Initially, they may refuse all types of food except small lizards, but can be 'cheated' into taking pink mice by rubbing a lizard scent onto a washed mouse.



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I AM A FRIEND OF THE EARTH ... AREN'T I? (Part 2)

Dave Keeley, of Underworld Products, airs some more personal thoughts on the pros and cons of the marine hobby.

Note: The text of this article is based on a paper delivered by the author at the autumn, 1990 British Marine Aquarists' Association seminar held at London Zoo

Having discussed my view of the CITES standpoint as regards ornamental fishkeeping in Part 1, I'd now like to turn my attention to the second of what I referred to as "responsible organisations", the Marine Conservation Society — a body which is well known to the vast majority of marine aquarists.

MARINE CONSERVATION SOCIETY

In 1985, the MCS published a report entitled *Exploitation of Coral Reef Fishes for the Aquarium Trade*, written by Dr Elizabeth Wood. It was this report that seemed to act as a catalyst for my previously-subconscious worries about the hobby.



Countries should assess and monitor their reef resources — one of the recommendations of the 1985 MCS report.

The report is 120 pages long and consists of well researched facts, gathered as a result of one year's application and study. However, it was generally not well received by the aquatic trade; in some instances it has actually been vilified. Since, to me, the

document is so important, I would like to present a synopsis of some of its more relevant findings.

The author divided the report into two parts, concentrating, firstly, on marine fish imported into the United Kingdom, and secondly, on the export of the fish from one major source, Sri Lanka. She examined the whole chain, from watching the individual native catchers at work on the reef, through the various holding facilities in Sri Lanka, via the airlines over to the UK, where she saw the fish go to wholesalers, retailers and hobbyists. I have to admit that the mortality figures which she came up with were, and are, my major concern, one which nobody, as yet, has been able to dispel.

Some findings

The findings of the report are as follows: It was calculated that 15% of all marine fish caught in Sri Lanka die through the process of catching — through shock, stress or injury. Sri Lanka is one of those countries where drugs and explosives are not used for fish catching purposes, so that the 15% would be far higher in less responsible areas. Of the remaining 85%, 10% die in holding facilities in Sri Lanka, or in transit to England. Of the survivors, another 5% die in English holding facilities — in shops or wholesalers. And then, (admittedly) from a small sample of British Marine Aquarist Association (BMAA) members, Dr Wood concludes that 50% of all marine fish purchased in the UK die within the first six months.

How these figures compare with mortalities in the wild, we do not know, but I believe that the 'aquarium' deaths are considerably higher.

These figures are collated from Sri Lanka, not from the Philippines or Indonesia, where catching mortalities are almost certainly greater, and from where travelling times are longer and thus more perilous. They are also collated from exporters and importers who were willing to talk to the author, presumably the more responsible and caring people, rather than 'sharks', and from hobbyists, who, if not all experienced, are at least sufficiently caring and responsible to join the BMAA.

Since virtually every one of these marine

fish are wild-caught, even if we put the welfare issue to one side (which I do not necessarily think we should) we are left, in my opinion, with one hell of a conservation problem. My point here is this: in wild marine fish, we are dealing in a finite resource. That is a fact. On the assumption that there is a general consensus, at the very least by its participants, that we continue the hobby, then it makes no sense at all literally to waste 60+ % of this resource.

Recommendations

I intend to return to this waste later. But first, let me continue with this report. Dr Wood makes a number of recommendations, and I would like to summarise these as briefly as possible:

- ① The possibilities of captive breeding programmes should be explored.
- ② Exporting countries should assess and monitor their reef resources with a view to longterm management. A balance must be struck between exploitation and conservation, which might entail close seasons, refuge areas, size limitations etc.
- ③ Collectors and exporters should be licensed, ensuring that international legislation is adhered to, inappropriate collecting methods are prohibited, holding tanks are available, records are kept, animals are quarantined prior to export, standards of packaging and transporting are agreed upon, and unsuitable species are not exported.
- ④ Particularly vulnerable species should be listed in Appendices II and III of Cites — including various Butterflies, Angels and Clownfish.
- ⑤ Those fish which are impossible, or extremely difficult, to keep in captivity should not be imported into the EEC.
- ⑥ Marine fish, corals and other invertebrates should be allocated separate tariff numbers by Customs, in order to facilitate record keeping.
- ⑦ There should be closer consultation between the Pet Trade and the International Air Transport Association.
- ⑧ HM Customs should be encouraged to clear live fish as quickly as possible.
- ⑨ Importers should be more realistic in their packing demands — delays must be allowed for. Delayed shipments should not

be allowed to be abandoned.

⑥ The Pet Animals Act should include invertebrates.

⑦ All importers of marine life should be licensed, to ensure that all imported fish have sufficient tank space, are quarantined, records are kept, and fish only imported from licensed exporters.

⑧ Retailers should also be licensed, and, again, records should be kept.

Reservations

With only slight reservations, I would have no hesitation in giving my support to these recommendations, and, as far as I am concerned, the sooner that they are implemented, the better. My main reservation concerns her recommendations numbers four and five — I am very wary of laws which cannot be effectively controlled.

These recommendations suggest that serious consideration be given to putting forward a proposal for listing of particularly vulnerable species in Appendices II and III of CITES. I think that everybody agrees that certain species should not be captured and imported, either because of their relative scarcity, or because of their unsuitability in captivity. And I am fairly sure that interested parties could get together and draw up such a list without too much conflict. But meanwhile, how would this recommendation be applied? If a collector catches, say, a *Chaetodon plobius*, and it is sent to the UK, what happens then? There is a 99% chance it will arrive undetected at its destination:

a) because, even if it is correctly identified on the invoice, I really do not think that Customs Officers will be able to monitor every item thus listed;

b) if its inclusion is noticed, it then has to be located. Would you like to search through 20 boxes of fish to find one specimen? And, of course, this search will cause both a delay and a disturbance which may well endanger the lives of all the other fish, and certainly

from a welfare point of view be counter-productive;

c) in any event, it is possible that the offending fish or fishes will be incorrectly invoiced anyway, probably through ignorance.

Of course, there could be problems later, and any legitimate shopkeeper who knowingly offered for sale a prohibited species would be asking for trouble. *Chaetodon* species can be notoriously difficult to identify anyway so, in any event, what does a retailer do if (s)he suddenly finds a prohibited species or two included in the case of fish which (s)he has just received on a consolidation? Kill it? Demand the money back? Send it back to Manila? None of these courses would be practical, and none would help the species in question.

Legislation

Just two years ago, a blanket ban was imposed in Germany, out of the blue, on the importation of all marine Butterflies and Angels. The Greens approached the appropriate government ministry with tales of fish wholesalers who were importing fish which had absolutely no chance of survival — ie certain species of Butterflies and Angel-fishes. Now, as a general rule, government officials traditionally have not been particularly interested in fish, or pets, or even in broad conservation issues; they are primarily interested in votes. But in the current climate, those people supporting conservation issues are far more likely to gain votes than those supporting trade, in particular (it seems) in Germany. It is fairly easy to follow the course of events. The minister involved weighed up how many people would be affected by a ban on two families of marine fish — ie how many votes this action would cost, against how many votes he could gain by being seen to be green.

In similar circumstances, English ministers like to take middle ground where



Captive breeding of marine species should be explored to reduce pressure on wild populations. So far, Clowns are among the few types of marine fish being bred on a commercial basis.

possible — compromise is the name of the game. So, the equivalent English politician would probably be quite happy to draft a recommendation mentioning just the applicable species, ie specifically those species which were unsuitable for captivity, probably in the form of a voluntary code. The German characteristic is that rules and regulations have to be drafted to deal with any situation, so the law in question must be capable of being obeyed, and policed. Since a prohibition on just a dozen or so fish would be unenforceable, and would actively encourage abuse, then the only acceptable alternative was to ban all Butterflies and Angels — and then one does not have to cope with possible disobedience.

By January 1 1993 at the latest, England and Germany will have to share common laws governing importing and exporting. At that stage, a trans-European decision will have to be made — ban all Butterflies and Angels (as in Germany), ban some (as in the UK), or ban some (as suggested by Dr Wood's report), and subsequently run the risk of flagrant breaches of the law.

The twelve recommendations listed earlier, as put forward by the Marine Conservation Society are, generally, both very reasonable and very practical, as far as this hobby is concerned. I do not think that any right-minded individual would object to the principal points. But, in finishing with this report, I do think that the recommendations fail to address one major issue.

If you recall, the figures I quoted earlier indicated that out of, say, 1000 fish caught, 264 die before they reach the hobbyist — a little over a quarter. As far as I can determine, most of the recommendations concern this fraction. But what about the 368 which die in the next six months? Somehow, the trade and hobbyists have got to be brought together to stop this waste.

(TO BE CONTINUED)



Some *Chaetodons* (this is *Chaetodon paucifasciatus* — the Red-tailed Butterfly) are notoriously difficult to identify. Some are relatively easy to keep — others very difficult.

OUT AND ABOUT

MAIDENHEAD AQUATICS

by Dick Mills

(Photographs by the author)

On a clear day, the view from Cliveden House, perched on the hill above the Thames at Taplow, is stunning.

Also well within eyesight range is Maidenhead Aquatics, nestling down in the Bourne End Garden Centre, a couple of free-wheeling miles down the steep hill. Once inside, be sure to keep your eyes on the move, both down as well as up, otherwise you will miss some outstanding features.

Entrance is through the cold-water section (you can't miss the aquatic section anyway, with its display of large ponds against the outside wall) and your first glimpse of fish will be the Koi pool on the right. There are a number of stacked and (stocked) aquariums containing both the usual Fancy Goldfish varieties plus (on my visit) some of the recently-imported Sail-finned Chinese Suckerfish (*Mystocyprinus asiaticus*).

In addition to the vats of coldwater fishes, statuary, nets, foods and all the usual things associated with pondkeeping, there is a most interesting D-I-Y section for people wishing to make up their own filter systems and other external watercourses — a whole rack of plumbing fittings!

Moving inside, turning left brings into view a room with three tiers of tropical freshwater fishes around the perimeter, facing inwards to an island of tiered marine fish tanks. It was hard to decide where to look first.

Between the 'fish room' and the dry goods area, there are two plant displays, one in the familiar cascading series of tanks. Two large aquaria present two stunning displays of two quite different types of fish environment: one is a coral reef and fishes, the other an equally 'rocky' scenario, a Rift Valley Lake with equally colourful cichlids.

Although the dry goods area takes up most of the 'shop' space one wall still retains fish tanks — containing large, more specialised species such as Discus, large cichlids etc. But, don't forget my earlier exhortation, for, on looking down, you will see that these fish tanks are supported upon three very large aquariums, each stocked with specimen size fishes, none

of which would seem to fit in any normal two-foot tank without some discomfort.

At the far end, the keen aquarist's eye will quickly work out how the recirculating sand/UV filter system works and this, in itself, is well worth a few minutes' examination.

So far, there's been plenty to see, and buy, but maybe you're wondering what you're supposed to keep it all in. Fear not, for a doorway leads into the newly-created tank display room. Running the whole length of the aquatic centre, there are tanks, tanks and yet more tanks. Cabinet aquaria of all shapes and sizes, all glass-tanks, including some special offers, means that no one should go away without finding the exact tank to suit almost any requirements.

David Lawrence, the brains behind it all, was most welcoming when I visited, and even apologised for some lack of stock due to air-shipping difficulties because of the Middle East crisis. Fortunately, since it was a mid-week visit, and at the beginning of the cold spell too, there weren't too many people around, so I was able to have a good chat and a good look. On fine weekend days, things should, and will be, much different, but what else can you expect with such a selection to choose from?

MAIDENHEAD AQUATICS, Bourne End Garden Centre, Hedsor Road, Bourne End, Bucks SL8 5EE (Tel: 06285 28882).



A corner of the coldwater section at Maidenhead Aquatics.



Wherever you look, there's something of interest to catch your eye, as well as helpful, unobtrusive advice.

TEWIN/PISCES '91

by John Dawes

Traditionally, April marks the start of the new cold-water season. Surprise, surprise, Tewn Mill Fish Farm have been quietly beavering away over the winter months to ensure that and — just as they've done in every one of the five years they've been in existence

— they've got new developments to announce and launch on to both the home and the overseas markets this spring.

Readers of *A* and *P* will already be aware of *The Israeli Connection* which I reported on in last August's issue. Impressive though the opera-

tion was then, it has been both improved and enlarged in the intervening months.

Most of the packing and shipping equipment that was previously housed in the village of Bet Halevi, has now been transferred to the company's base at the Kibbutz of Kfar Ruppim.

Expansion of the existing facilities also includes the building of a new hatchery and the digging of new ponds.

Backing this up is a regular (weekly) health check carried out by Dr Itzick Begerano, who I had the great pleasure of meeting last year at the Laboratory



A netful of Pisces Aquaculture Tewin Ltd's Chinese Redcaps.

for Research of Fish Diseases based at Kibbutz Nir David (where, incidentally, the 'Psoriasis-fish', *Garra rufa*, is also found). Another health measure undertaken is regular preventative treatment against Ulcer Disease — a problem that has been known to affect some Israeli stocks in the past.

Following an autumn 1991 trip to the Far East, two new key arrangements have been set up to increase the company's potential catchment area for coldwater ornamentals, expand the range of fish it has access to, and exercise control over the quality of fish imported.

In Japan, for instance, special holding facilities have been obtained, where Koi bought by Tewin/Pisces can be kept until they are required. This means that quality fish can be bought, as and when they become available, and later shipped to the UK at the appropriate time.

A somewhat similar arrangement has been struck in Hong Kong, this time with the emphasis on Chinese Fancy Goldfish.

Then there's Yewtree Farm in Norfolk, where (mostly) British coldwater fish, such as Orfe (Golden and Blue), Rudd, Tench, etc. are being bred in large numbers in the company's 25 acres of existing ponds, with others being dug at this very moment.

The final new development for the 1991 coldwater season involves a revolution in transportation methods between Israel and the UK in which the fish are transported — not in traditional polythene bags — but in large, specially constructed containers, each of which can hold 6-10 times more fish than a conventional box. This arrangement also involves less handling (and, therefore, less stress on the fish), parti-

cularly since the containers are used, not just for shipping, but also for the cooling down pre-shipment process at Kfar Ruppin, and for re-acclimatisation



Some of the ponds at this Japanese Koi-holding facility are exclusively reserved for the company's Japanese Koi.

once the fish arrive in the UK. Dispatch of orders to the trade, both in the UK and all over Europe, is now handled at new facilities built at Tewin, with large orders being shipped out in the company's own transportation truck which has been especially adapted to incorpo-

rate full life support systems for the fish.

Tewin's all already-existing, and extensive, tropical freshwater, marine, coldwater, pond, dry goods and other facilities are, of course, also still available . . . and getting bigger all the time.

Clearly, someone's been rather busy during the dark, cold months of winter!

Martin Symonds and Adrian Barnes of Pisces Aquaculture Tewin Ltd. (the fish-handling company) are, clearly, looking forward to the new coldwater season with great optimism. We wish them well.

Further details (and a brochure) are available from Pisces Aquaculture Tewin Ltd., Tewin Mill Fish Farm, Kingsbridge, Tewin, Nr Welwyn, Herts AL6 0LJ. Tel 0438 71 8558, 0438 71 7050; Fax 0438 84 0096.



A well-established native coldwater fish breeding/rearing pond at Yewtree Farm in Norfolk.

Derek



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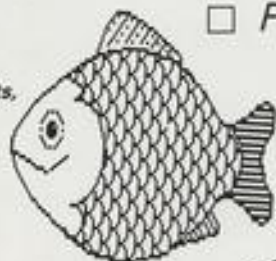
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THE POPONDETTA RAINBOW

(*Popondichthys connieae*)

Rainbowfish specialist **Robert Kirkup** provides expert guidance on this tiny, but spectacular, New Guinea species

(Photographs by the author)



Male *P. connieae* in relaxed swimming posture.

If one were to mention the setting up of an aquarium for Rainbowfishes, you would automatically think of the fabulous *Melanotania* and *Glossolepis* species which are commonplace within our shores.

These species grow to around 100mm (3.9in) and need a spacious aquarium to display their colours and breeding rituals to full effect. However, there are well over a dozen species of Rainbow (more being discovered as recently as 1989) which remain fairly small and have a beauty and character all of their own. The males of these species, in particular, amaze aquarists with their breathtaking displays of raised fins and scissor-like flashes as they shimmy and drive their partners when sparring and courting.

The best-known members of this group will be *Iriatherina werneri* (the Threadfin Rainbowfish) and *Pseudomugil signifer* (the Southern Blue-eye) which, because of their extensive range and variation of habitat, exhibit considerable differences in colour. Unfortunately, for the armchair aquarist, these beauties, likened in their breeding habits to the Aphyosemions (Killifish), are not subject to the attention of the commercial fish breeders and farmers, largely because of the individual attention required and slowness of egg production. Some com-



A male *P. connieae* (rear), in full glory, displays to a female.

mercial breeders have, in fact, dealt with these little Blue-eyes, but only for a season.

That puts the ball in our court, as aquarists, so to speak. If this type of Rainbow is to be spread, it is up to individual hobbyists to care for, breed and pass them on.

BACKGROUND

The genus *Popondichthys* consists of two species to date (Allen, 1987), *P. furcata* (Nichols, 1955, *AGP*, June, 1989) and *P. connieae* (Allen, 1981), formerly known as *Popondetta* and *Pseudomugil*, respectively. They were discovered in the hostile eastern part of New Guinea near the town of Popondetta. Because dangers exist in this part of the world, collections of the Forktail Rainbows will remain a rarity for some time to come.

The subject of this article, *P. connieae*, was discovered in the Auga Creek, near the Kumusi River, by Dr G Allen (date: 04.10.1978). The length of the fish caught was a mere 43mm (c 1.7in).

MAINTENANCE AND BREEDING

The 'Connie' is not a difficult species to keep, although it would be a good idea to keep it in a species tank until you have established a group and they have reproduced in sufficient numbers.

Sexual differences

The males in my possession reach a size of 50mm (c 2in), the females, 40mm (c 1.6in).

Providing you have both sexes present, sexing is not a problem. The males' colours

are much bolder, and their fins more elongated.

P. connieae females are different to other Blue-eyed Rainbows in that they are quite colourful; indeed, more colourful than some males of the various *Pseudomugil* species. The basic body colour is a blue-grey, with a dark blue stripe running along the lateral line and forming a triangle on the caudal fin. This is flanked above and below with orange, giving the species its characteristic forked tail.

The orange colour also runs along the bottom of the body and is present on the edges of the two dorsal fins, the inner edges being blue. The anal fin has three bands of colour: white, black and white. All this and turquoise eyes too . . . not bad for a female!

The males' colour pattern is similar, but much more intense, with orange pectorals ('wings') and sky-blue in the fins!

Aquarium requirements

A five-gallon (22.5-litre) tank will comfortably hold six *P. connieae*. A ratio of one male to two females is recommended as the males will be very boisterous in their advances to the females, and out-numbering the females can result in serious damage and even death.

The pH in the natural habitat is reported to be between 7.7 and 7.9, but water conditions are not a problem. I keep mine in water that is close to neutral.

A floor covering of fine medium is recom-



Fry at four weeks old. The caudal fork will soon intensify in colour.



Fry at approximately 10 weeks old. All the characters are present by now.



P. connieae male showing the iridescent, elusive, blue body that is so difficult to capture on film (females above and below).

mended. Fine gravel or sand would be OK in order to 'balance' with this small fish. The back of the tank should be covered with slate, driftwood and large-leaved plants. In the foreground, a piece of bogwood overgrown with Java Moss (*Vesicularia dubyana*) makes an ideal spawning site. I have tried artificial spawning medium and, although the eggs are more easily detected, this also applies to the parents who can be avid egg-eaters!

Water temperature between 73°F and 86°F (c 23°-30°) will be tolerated. A flow should be created across the front of the aquarium by a couple of sponge filters or a small internal power filter.

Feeding is not critical. Naturally, they will eat mosquito larvae, bloodworm and *Daphnia*, but they will also benefit from a daily feeding of flake food. The vitality of the fish will be 'charged' by frequent water changes.

Separation of the sexes, later placing them together for a few days, as in the larger Rainbows, is not necessary with this species. The fish will breed continuously, though not prolifically, all the year round.

Splitting them up will result in infertile eggs when they are placed together. However, removal of damaged fish is a must.

Breeding

Courtship can usually be observed in the morning. The male will dart wildly around the female, opening and closing his fins. Then, when they approach the spawning site, the males' fins are splayed wide open; a vision to behold, especially on a large dominant male. He will next head off the female, heading her towards the Java Moss. At this point, her swimming and evasiveness is much slowed down, as if she were hypnotised by the males' splendour.

The pair dive, side by side, into the moss, where one to three eggs will be deposited in the interior of the tangle of strands. Here, they hang like little glass balls on a 5mm (0.2in) or so fine adhesive thread.

Courtship is not restricted to the mornings, though. It can begin again at any given time of the day.

The above-described display can also be between rival males and rival females — not just mated pairs — but, in these cases, instead of looking for a spawning site, the fish swim at incredible speeds, usually around each other, making a circle of about

50mm (c 2in) with fins spread out, fit to tear. These encounters make for the best viewing, as they are in open water and the fish are not interested in looking for cover. I have watched an encounter between three males for a good twenty minutes — an unbelievable sight!

Hatching and rearing

Always remove the eggs from the parents, leaving the 'pops' (short for *Popondichters*) in their environment. With patience, one can take the medium out from the aquarium, and pick the eggs out with the finger.

The eggs can be placed in room-temperature tapwater, in a shallow small aquarium (around 0.4 gallon — 2 litres). The chlorine will help prevent fungus and will not damage the eggs. Since the eggs take ten to fourteen days to hatch, the water will be aged by that time.

As the fry hatch and leave the empty egg shell behind, they will go directly to the surface. Being black in colour, they are easy to detect at this stage. Light aeration at this time helps to break the surface film, thus helping the fish to feed.

Green water and fine powder food make for a good start in life. As the fry are quite large, they can be offered Brine Shrimp nauplii after only twenty-four hours.

Fry will always hatch out on the same day, so green water should be added for at least seven days.

Growth is rapid and, in three to four weeks, the fry will be around 1cm (0.4in) in length, with orange fork-tails, and visibly flitting around the aquarium. Larger foods should now be applied (eg *Daphnia*, etc. but one should not forget to feed some flake or the young fish will become too dependent on live food.

A fortnightly water change will keep the fry growing well, but if you have doubts about your tapwater (high nitrate level or too many added chemicals) then use rainwater or springwater instead, as deformities can occur under unfavourable conditions. Optimum breeding conditions will be attained between six and twenty-four months of age.

Unbeatable display

The whole shoal of growing fish can be placed in a metre-long (39in) wide shallow aquarium, where they will form an unbeatable sight. Well worth it, for what is, in reality, a little amount of commonsense and care. But be warned! Your shoal will soon dwindle when your fellow aquarists come to view your fish!

ACKNOWLEDGEMENTS

Many thanks to Kaj Anderson, of Denmark, and Jim Clark, of Skelmersdale. Without their efforts this species would be even more of a rarity in this country.

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SOUTH AMERICAN SUCKERMOUTHS

(Part 1)

David Sands begins a review of the large catfish family, the Loricariidae, including some of the latest species to make an appearance on the aquatic scene.

In the past five years or so, a host of new 'plecs', suckermouths and armoured catfishes, have been imported into Europe. It would appear that a great percentage of them are new to science, increasing in a trice, the incredible diversity of species in the family Loricariidae. I could, in fact, have produced another

The earliest imports I ever saw came via a West German fish collector, Arthur Werner, in Belem, Brazil in 1985/1986. The identity of these *Leporacanthicus galaxias* imported specimens remained a mystery until Isbrucker and Nijssen's papers published in the West German fishkeeping magazine, *DATZ* (September and October 1989).

enthusiasts, and several should only be kept together if they can be maintained in a large aquarium with plenty of bogwood and caves.

They enjoy bright, well-oxygenated water with a pH range of 6.7-7.2 and a low hardness. Temperatures should be between 77 and 84°F (25-29°C).



Leporacanthicus galaxias — one of the distinctive Angelica Plecs to make an appearance in recent years.

volume to *Catfishes of The World* simply by adding the accumulated information that I have gathered since the publication of the original volume!

ANGELICA PLECS

One species really set the aquarium hobby talking. The 'Angelica Plec', sometimes called 'Gold Spot', has been available without a scientific name for some years. New papers on *Leporacanthicus*, by Isbrucker and Nijssen have determined the various species as follows:

Dorsal 1/7; members of the genus *Leporacanthicus* from Brazil possess an adipose fin and a spiny body.

① *Leporacanthicus galaxias* Brazil. The holotype*, from the Rio Tocantins in Brazil, measured 113.7mm (4.48in) SL (Standard Length) although one specimen measuring 211mm (8.31in) was collected in the Rio Jamari.

② *Leporacanthicus joselima* Brazil. The holotype measured 92.8mm (3.65in) SL and was collected in the Rio Tapajos, Brazil, with an additional specimen measuring 89.2mm (3.51in).

③ *Leporacanthicus heterodon* Brazil. The holotype measured 102.6mm (4.04in) SL and was captured in the Rio Xingu, Mato Grosso and was the largest specimen detailed by Isbrucker and Nijssen.

The trade called them 'Angelica Plecs' because of their striking similarity (in the white spotted/black pattern) to the African catfish, *Synodontis angelicus*. Sometimes the spots are yellow, sometimes they are white, and it is not clear if these represent different populations or different species. It is also not clear if the other species in the genus are imported as aquarium fishes.

The territorial exploits of this sucker-mouth are well known among catfish

ADONIS PLECS

During the same period, lots of other exotic loricariids arrived on our shores via South American and West German shipments; the most striking of these was *Acanthicus adoni*, Isbrucker & Nijssen, 1988.

This impressive loricariid appeared in several publications, including the original edition of Volume One, *Catfishes of The World* (on page 195). I tentatively identified this new catfish as *Acanthicus hystrix*, and strangely enough, this is the species to which it is now known to be most closely related!

In aquarium terms, large specimens (the holotype measured 135.5mm — 5.33in — SL) are extremely territorial towards their own kind and can be especially disruptive in small aquaria. Yorkshire fishkeeper, Ian Lund, purges specimens on red un-cooked potato to provide roughage. (Like *Panaque*, *Acanthicus* can be difficult to feed.)

The holotype was collected in the Rio Tocantins, by Arthur Werner, in 1987.

The species most closely related to the 'Adonis Plec' is *Acanthicus hystrix* Spix, 1829.

The Black Suckermouth, *Acanthicus hystrix*, feeds on smaller food particles; unlike *Acanthicus adoni*, and appears more tolerant of its own kind, towards *Acanthicus adoni*, and towards other loricariids.

A specimen described as having an affinity with *Acanthicus hystrix*, in Isbrucker and



The spiny body of *Acanthicus hystrix* can be clearly seen in this shot.



Acanthicus adonis showing why the Loricariidae are often known as Suckermouth Catfishes.



A beautifully marked Hypostomus from Ecuador.

Nijssen's paper, published in *Die Aquarien und Terrarien Zeitschrift*, June 1988, measured 192mm (7.56in) SL. Specimens from the Rio Branco (1060mm — 41.7in — SL) and the Peruvian Rio Huallaga (Xeberos) (450mm — 17.7in — SL), Brazilian Rio Purus (454mm — 17.9in — SL), Rio Tocantins (343mm — 13.5in — SL) were examined. Both species display caudal fin extensions, although these are often broken during collection and export.

New forms show how little we know about the fish fauna of South American Rivers. I share a worry with a great many other people that the rainforest ecosystem will be lost before we can know more about its fauna. Any aquarium detail, no matter how insignificant, is therefore welcomed.

THE FAMILY

The South American family of Armoured or Plated Catfish, the Loricariidae, are dwarf to large-sized catfishes, grouping 80-odd genera comprised of almost 600 species.

Almost all species display some degree of sexual dimorphism (sexual differences), with the males of certain species showing stronger coloration than females, (often) bearing larger head, cheek and pectoral bristles, and being bigger than females. There are five subfamilies in the Loricariidae, of which one, the Loricariinae, has suffered from extensive generic fragmentation by a current researcher.

1 Subfamily Lithogeneinae

Lithogenes villosus is a small species from Guyana which has an enlarged papillated

mouth, a rounded caudal peduncle, a lobed caudal fin and lacks interopercular spines.

2 Subfamily Neoplecostominae

The genus *Neoplecostomus* links two species which possess a long, broad, flattened head, spotting in the fins, an indistinct adipose fin and a banded caudal fin.

3 Subfamily Hypostominae

This subfamily consists of 18 genera.

The genus *Rhinolepis* groups three species from Brazil and Paraguay and is distinguished by lacking an adipose fin. *Pseudorhinolepis* links three species from Brazil



Pterygoplichthys species are superficially similar to *Hypostomus* but grow larger and have more rays in the dorsal fin.

which possess a small fringe of opercular/cheek bristles and also lack an adipose.

Moninancistrus carachama from Peru lacks an adipose fin and possesses distinct plates.

Delanus links three species from eastern Brazil possessing a short, stocky body with an adipose fin that is almost touched by the

last dorsal fin ray, and pectoral bristles.

Pogonopoma wertheimeri from Brazil possesses an adipose fin and, apart from a small fringe of cheek/head bristles, is externally very similar to *Hypostomus*.

Pseudancistrus groups six species from Venezuela, Surinam and Guyana, while *Hemiplichthys* groups six from Brazil that appear to be spiny in the body, and possess an indistinct adipose and rounded head which can be fringed by elongated bristles.

The genus *Pariorhina* links two species from Brazil which possess a broad, depressed head and lack an adipose fin. *Pariorhina rudolphi* may have been collected.

The genus *Kronichthys* links two species from Brazil which have a cylindrical body and possess an adipose fin.

The genus *Corymbopoma* links two species from Guyana which lack an adipose fin and resemble *Chaetostoma*.

Upsilodus victori from Brazil has a distinctive long-based adipose fin.

Pogonopomoides parahybae from Brazil lacks an adipose fin and cheek bristles.

The genus *Isoinloricaria* links two species from Ecuador that are characterised by an extremely long, slender and spiny body.

Aphanotorulus franki from Peru has an indistinct adipose fin and is externally identical to *Hypostomus*, but has spoon-shaped teeth, as do members of the genus *Cochliodon*, the latter lacking the buccal papillae present in *Aphanotorulus*.

The genus *Hypostomus* groups almost 120 species that are widespread across South and Central America. They lack the interopercular spines of closely related genera and have seven rays in the dorsal.

The genus *Cochliodon* groups six large species from Colombia which are externally similar to *Panaque* and *Hypostomus* but possess spoon-shaped teeth, thickened pectoral spines and a more robust body.

Pterygoplichthys groups 20 large species which are widespread in South America. They resemble *Hypostomus* but grow larger and possess many more dorsal rays. Within this genus, there appears to be several complex species groups (eg the 'Gibbiceps' and 'Multiradiatus' groups).

*FOOTNOTE

The holotype is the single specimen on which the original description of a particular species is based.

(TO BE CONTINUED)

News from the societies

Association of Aquarists

The two major fishkeeping exhibitions, AQUARIA and WATERGARDENS (ex-N.E.C.) and the AQUARIUM FISH-KEEPING EXHIBITION (ex-Sandown Park) are to merge at a new venue: Olympia in London, on 1 and 2 June, 1991.

Within this event, the A of A will feature a 'Hobby Village' where various aspects of hobbyists' interests will be presented.

In previous exhibitions, from the first British Aquarist Festival in 1951 in Manchester, and at such events as those staged at the Horticultural Hall, London, the Scottish Festival at Motherwell and the Yorkshire Festivals at Doncaster, the 'hobby' has been presented to the fishkeeping public in the form of displays or tableaux, these being used as a means of entering fish competitively by the members of the societies who build the displays. These displays, subject to the expertise of those involved, have ranged from fantastic aquatic or aquascape features, to attractive models or themes related (or not related) to fishkeeping. Some have been magnificent, others mildly attractive, still others average, and some quite frankly 'grotty'.

Many of these scrape through the show rules as a means of exhibiting in competition, but do not present the 'hobby' too well to the interested visitor.

Critics of these displays have always existed, and it is difficult to answer their question: "What has this got to do with keeping fish?" Recently, this criticism has been more vocal from the aquatic trade and from some well known celebrities.

Those of us involved in exhibitions know that the majority of people who do the 'donkey work' at exhibitions come from members who work on these tableaux and very often travel large distances to these events. These displays, at their best, present both quality and rare species to the public. They also give information and present themes such as 'conservation' in an attractive way; some even amuse the child in us all.

There will still be a place for

the better tableaux within the 'Hobby Village' at Olympia, but the aim of the Association will be to get individual fishkeepers and societies to work together to present the varied aspects of our hobby in an interesting and attractive way, and to persuade the enthusiasts and the experts to attend these displays to share experiences and offer advice to the visitors.

The Association is determined to cover as many aspects of the hobby as is practical. Success will depend on the support of members, specialist societies and our friends in the other organisations. We would welcome help and co-operation from any aquarists with enthusiasm, expertise and energy, and from societies, whether they belong to other organisations or not. If direct involvement is impractical, a visit is support enough.

The Association of Aquarists will organise the 'Village', and trust we will be able to live up to our motto of 'bringing the fun into fishkeeping'.

Mervyn Strange, Hilltop Nurseries, Sherborne St. John, Basingstoke, Hants RG24 9LL. Telephone: 0256 22545.

British Marine Life Study Society

The British Marine Life Study Society was officially formed on 4 June 1990. In the early stages, it is envisaged that the main function of the Natural History Society will be the production of the journal 'Glaucus'. The first copy was published on 23 September 1990. The second issue, a 28-pager, was sent out to paid-up members in the winter of 1990.

Regular features include:
Wet Thumb: Articles on marine 'Aquariology'.
Under Sea Wind: Practical conservation, and man's impact on the environment.
Diverse Reports: Reports of firsthand experience of the undersea world around Britain.
Rockpooling: Fauna reports of the coastal zone of the U.K.
Cetaceans: Articles on British whales and dolphins.
Others: Featured species, quiz, forum etc.

Writers include Dr Chris Andrews, Andy Horton, Steve Savage.

The annual subscription of £10.00 entitles the member to one copy of 'Glaucus' quarterly, and attendance at any events (eg seminars, held during the year. Membership application forms are available from: Jane Barrett, 1 Half Moon Village, Newton St. Cyres, Exeter, Devon. EX5 5AE.

FBAS NEWS

1 British Open Championship

The 3rd British Open Fish Championship, sponsored by Interpet, will be held at the Corby AS Open Show on 19 May 1991 at the Festival Hall, Civic Centre, Corby, Northants. Once again, all 'Best in Show' winners (from 1990 Open Shows) are eligible to enter, and to win what is probably Fishkeeping's largest trophy.

Last year, the trophy was won by an equally large fish, the Common Eel, owned by Marion and Robin Day, but this year it could well be something else. Entries for the British Open should be sent to Alan Henderson, 5 The Nook, Corby Village, Northants NN16 1XA (Tel: 0536 68269).

2 Even more trophies for shows!

Thanks to the generosity of Interpet, the number of 'Best in Show' trophies has been increased for 1991. These trophies are available to all societies which are Full or Associate Members of the FBAS. (Note: Associate Member Societies' Shows do not have to be run to FBAS Rules to be eligible for the scheme).

One main condition for qualifying for an Interpet 'Best in Show' Trophy is that the society's Show Schedule must carry the approved Interpet advertisement. Copies of these advertisements (A5 size, ready to incorporate into Show Schedules), together with full details, are available from Alan Henderson (address above).

Macclesfield Aquarium Society

The new committee of the MAS for 1991 is as follows:

Chairman: K Lawn, 29 St Johns Road, Macclesfield.

Vice Chairman: Mrs L Jackson, 38 Thirlmere, Macclesfield.

Treasurer: T Jackson, 38 Thirlmere, Macclesfield.

Show Secretary: Mrs J Lawn, 29 St Johns Road, Macclesfield.

Secretary: Mrs K Hayter, 96 Gassworth Road, Macclesfield.

For full details of the society please contact the Secretary, enclosing a SAE.

Reigate and Redhill Aquarist Society

The Committee of the Reigate and Redhill A.S. for the current year consists of the following:

Chairman — Sid Fewtrell (Tel: 0293 786078)

Secretary — Ivor Stemp (Tel: 0293 783249)

Treasurer — Dick Gush (Tel: 0737 765152)

P.R.O. — Jeremy Spence (Tel: 0293 512932)

For further details regarding the society, contact the P.R.O. at the above number or at 60 Railey Road, Northgate, Crawley, West Sussex RH10 2BZ.

Aberdare Aquarist Society

The new Aberdare committee is as follows:

Chairman — S. Rees
Vice-Chairman — C. Roberts

Secretary — Allan Jones
Treasurer — Mrs Y. Rees

Show Secretary — Brian Rees

Assistant Show Secretary — Mrs M. Evans

Minutes Secretary — Mrs K. Harding

Trophy Secretary — A. Turner

Meetings are held on the first and third Tuesdays of each month at Abercwmboi Rugby Football Club, Aberaman, Nr. Aberdare. For further details of the society, please contact Allan Jones, 34 Maesdyfryd, Cwm-bach, Aberdare, Mid Glamorgan CF44 0DN. Tel: 0685 878692.

Diary dates

Reigate and Redhill Aquarist Society

The next Bring-and-Buy sale will be held at Strawson Hall, Albert Road, Horley, Surrey, on **15 April**. Doors open: 7.00 p.m. Sale to commence: 8.00 p.m. Refreshments will be served at around 9.30 p.m. Members and non-members welcome. Contact Jeremy Spence (P.R.O.), 60 Railey Road, Northgate, Crawley, West Sussex, RH10 2BZ. Tel: 0293 512932.

Aberdeen Aquarist Society

The 1991 AAS Open Show will be staged on **Sunday 7 April** at the Centre for the Deaf, Smithfield Road, Aberdeen.

Benching: 10 am - 1 pm.
Judging: 1 pm - 4 pm approx.
Viewing of fish: 4 pm - 5 pm.
Presentations: 5 pm. Auction: 1.30 pm. For further information, contact the Show Manager, Alan Bruce, 11 Arnage Terrace, Aberdeen. Tel 0224 685 932.

Anabantoid Association of Great Britain

The 1991 A.A.G.B. Members' Weekend will be held on **13-14 April** at the University of Sheffield (Sorby Hall). There will be an Anabantoid Fish Show, a programme of lectures - with contributions from **Otto Roth, Bob Taylor and Kevin Webb** (whose superb anabantoid photographs appear in *A & P* from time to time) - and an auction.

Bed and Breakfast accommodation is available at the following rates:

Friday (B&B),	£17.50;
Saturday Lunch,	£7.00;
Saturday Dinner,	£7.75;
Saturday (B&B),	£17.50;
Sunday Lunch,	£7.00

For further details, contact Chris Clark, 19 Alder Grove, Balby, Doncaster, South Yorks, DN4 8RF.

Halifax Aquarist Society

The Spring Auction of the H.A.S will be held on **Sunday 14 April** at Forest Cottage Community Centre, Cousin Lane, Ovenden, Halifax. Booking in of lots: from 12 noon. Auction to commence: 1.15 pm. For further details contact David Shields on 0422 360116.

East Kent Aquatic Study Group

The East Kent Aquatic Study Group will be holding its 8th Open Show on **Sunday 21 April**. For schedules and full details of venue and timings, contact Adrian J. Dempsey, 194 Greenhill Road, Greenhill, Herne Bay, Kent, CT6 7RS.

C.A.S.T. 88

The second C.A.S.T. 88 Open Show will take place on **Sunday 5 May** at the Boys Brigade H.Q., Castle Street, Caergrwle, Clwyd. Benching: 11.30 a.m. - 1.00 p.m. Judging: 1.15 pm prompt. More details from Peter Jones, 1 Hope Street, Caergrwle, Wrexham, LL12 9AA. Tel. Wrexham 761829.

Bournemouth Aquarist Society

The 1991 B.A.S. Open Show will take place on **Sunday 12 May** at Kinson Community Centre, Pelhams Park, Kinson, Bournemouth. Further details and schedules are available (as from 1 April) from Jack Jeffery, Show Secretary, 8 Hatfield Gardens, Bournemouth, Dorset, BH7 7HE.

Thorpe and District Aquarist Society of Norwich

The Thorpe & D.A.S. Open Show and Exhibition will be staged on **Sunday 28 April** at

Hewett School, Hall Road, Norwich. Further information from P. Sparks, 5 Gowing Close, Hellesdon, Norwich, NR6 6PX. Tel: 0603 406276.

Heanor & District Aquarist Society

The first Open Show of the Heanor & District Aquarist Society will be held on **Sunday 7**

April at Heanor Leisure Centre, Hands Road, Heanor, Derbyshire.

There will be 35 classes of entry, plus an auction and full catering (including a bar during normal licensing hours). Benching: 11.00 a.m. Schedules, plus additional details (on receipt of an S.A.E.) are available from Norman Slater, 33 Marlborough Drive, Belper, Derby, DE5 1LB. Tel: 0773 825263.

REVISED SHOW LIST

1 YORKSHIRE AQUARISTS FESTIVAL

Venue: Doncaster Racecourse
Dates: 20 - 21 April 1991
Contact: Derek Harrop, Croft View, Oldfield, Monley, Huddersfield HD7 2RL
Telephone: 0484 666591

2 AQUARIA AND WATERGARDENS '91

Venue: Olympia, Earls Court, London
Dates: 1 - 2 June 1991
Contact: Savita Ayling, Concept Conferences and Exhibitions Ltd, 27 Brandreth Avenue, Dunstable, Bedfordshire LU5 4JP
Telephone: 0582 601456

3 HAMPTON COURT PALACE INTERNATIONAL FLOWER SHOW (including Aquatics)

Dates: 11, 12, 13, & 14 July 1991
Venue: Hampton Court Palace Grounds
Contact: The Organisers, Westfield House, Hampton Court Road, Hampton Court, East Molesey, Surrey KT8 9BX
Telephone: 081-977 0050

4 SCOTTISH AQUARISTS FESTIVAL

Venue: Perth City Hall, Perth, Scotland
Dates: 3 - 4 August 1991
Contact: John Wells, 57 Ramsey Place, Rosyth, Fife KY11 2YG
Telephone: 0383 415820

5 KOI '91

Venue: Billing Aquadrome, Northampton
Dates: 17 - 18 August 1991
Contact: John Beattie
Telephone: 0604 416316

6 BRITISH AQUARISTS FESTIVAL

Venue: Bowlers Exhibition and Conference Centre, Manchester
Dates: 26 - 27 October 1991
Contact: Arnold Chadwick, 9 Bronville Close, Chadderton, Oldham OL1 2RH
Telephone: 061-652 6207

7 SUPREME FESTIVAL OF FISHKEEPING

Venue: Pontins Holiday Centre, Sand Bay, Weston-super-Mare
Dates: 9 - 10 November 1991
Contact: Colin Richards, 3 Uplands Avenue, Chesham, Bucks HP5 2EA
Telephone: 0494 772552

“I can honestly say Aquastar is the best lighting I’ve ever been under.”

Albert the Angel Fish

So there I was, half way down the tank, when ‘zing’ suddenly everything takes on a different hue. The colours are just like being back home in the tropics. Even my fins looked their old natural self.

Glancing up I realise all this is the result of my owner installing some new fluorescent tubes.



Then I overhear him telling his wife about it. Seems it’s called Aquastar and has been specially developed for aquariums. “There’s all the natural light you’d want” says he and “each lamp is guaranteed to last at least 8,000 hours. What’s more Aquastar is manufactured using the latest lamp technology by Sylvania, to the highest possible standards (BS 1853 no less).”

Finally he adds “Because Aquastar also promotes healthy plant growth, Albert here won’t go short on the old oxygen front.”

“Costs a fortune I suppose” is her only response. But it turns out Aquastar is very affordable, which means he’s plenty of cash left over to buy a new friend for me. She’s called Angela. Very nice too.

For further information on the ultimate aquarium lighting contact your local aquatic retailer.



AQUASTAR
GRO-LUX®
professional
W. Germany
SYLVANIA GLE

Arcadia

PRODUCT ROUND-UP

BY DICK MILLS

Blagdon Water Garden Products

Big or small, **BLAGDON'S** have it all — or so it seems from the latest Catalogue from the largest water garden supplier in the UK.

The **NATURA** range of ponds features no less than 11 designs in sizes ranging from 3ft 6in to 8ft — 1.1m to 2.4m (17 gallons to 60 gallons — 76.5 to 270 litres). Aimed at providing marshy habitats for plants and to encourage aquatic/amphibious wildlife to the garden, the ponds are guaranteed for 10 years and are both modestly-sized and modestly priced enough to be suitable for even the smallest garden.

Right at the top end of the scale, **BIOPOLDS** are superbly-produced, surface area-depth ratio-balanced, carrying a 15-year guarantee. Water depths range from 2ft 6in — 2ft 8in (75 — 81cm) and the three models contain 422, 445 and 822 gallons (1,900; 2,000; 3,700 litres). Although each pool comes with the usual built-in intermittent shelving for marginal plants, the addition of Bridging Trays enable you to extend these shelves to the whole circumference of each pool.

Additionally, each Biopool can be fitted with the new **BIO-POOL FILTER** system. This is an ingenious surface filter pipe which is normally situated

around the perimeter of the pond and fed to the inlet of the pond pump which sits on the marginal shelf. The 2-metre (6ft 6in) long filter pipe is covered with a special matting which filters mechanically and biologically and operates in the warmer, shallower areas of the pool where bacteria are the most numerous. Because of the large filter area, there is no loss of pump performance, so waterfall and fountain operations are not impeded. The filter is said to remove much of the surface debris before it can sink to the pool floor, and nitrifying bac-

teria in the filter matting convert potentially toxic fish wastes and other decaying matter; cooler water in the lower levels of the pool is unaffected by the filter's action. Still with filtration matters, Blagdon have new additions in the form of in-pond **EXTENDA — FILTERS**, **MULTI-BRUSH EXTERNAL BIOLOGICAL FILTERS** and **POND-CLEAR UV FILTERS**. As its name implies, the **Extenda-Filter** can be tailored to your pool's exact requirement by simply clipping extra elements together on to the inlet of your pump; each foam-

filled element (easily dismantled for cleaning) services up to 150 gallons (675 litres) so calculations for your pond's actual needs are easy.

The **Multi-Brush External Biological Filter** now results in even better filtration; the brushes act as a mechanical pre-filter 'upstream' of the main biological filter medium to remove debris and to prevent otherwise early clogging. Brushes are easily removed for fast rinsing (using pond water to avoid destruction of valuable bacteria). **Multi-brush Filters** come in 3, 4 and 5 brush Models capable of servicing pools of 500, 1,000 and 1,500 gallons (2,250; 4,500; 6,750 litres) capacity. The **Pond Clear UV Units** may be fitted to the external filter if required. Three models (8, 15 and 30 watts) are tailored to suit the previously-described external filters and their pool-serving capabilities are exactly matched.

The 1991 Blagdon Catalogue will provide you with every conceivable idea for your water-gardening requirements, from nets to jets, or you can see the products themselves at Blagdon Water Gardens, Upper Langford, Somerset.

Details from: **BLAGDON WATER GARDEN PRODUCTS**, Unit 6 & 7, Commerce Way, Walrow Industrial Estate, Highbridge, Somerset TA9 4AG. (Tel: 0278 781556 Fax: 0278 782079).



The 'Dart' — One of the 11 shapes in Blagdon's new Natura range.

Grand Champion (UK)

While everyone recognises the benefits of Vitamin C in diets, and while many animals are also able to synthesise it within their bodies, there are one or two drawbacks. Firstly, it is a pretty unstable material, losing effectiveness during food production and subsequent oxidation during storage; also, some fishes may not produce as much in captivity (with all its associated stress) as they might in the wild.

Faced with these problems, the solution was not simply to pack fish food with as much

traditional (and costly) Vitamin C as could be practical, but rather, to find and develop a more stable form at the outset. Without boring you with long scientific analyses (that I couldn't even pretend to understand), suffice to say that the foods produced by **GRAND CHAMPION** do indeed contain Stabilised Vitamin C, **STAY-C**, a result of research development work by **Rangen Incorporated**, the Idaho-based aquaculture feed producer.

Based around a balanced formula (optimum protein and fat levels, in order to provide the necessary derived energy levels) **GRAND CHAMPION**

KOI, GOLDFISH and **CICHLID FOODS** are each designed to prevent 6 different diseases in fish, in addition to having strong nutritional values. The foods have a twelve-month shelf life and only produced to order, to ensure freshness.

The **Koi Food** is available in two forms — **Red Bag** and **Blue Bag**; the **Red Bag** formula has added *Spirulina* to enhance colours and growth; the **Blue Bag** contains a high-quality wheat-based formula more digestible at lower (minimum 45°F — 7.2°C) water temperatures, ideal for autumn feeding. Both are available in 1, 4, 11 and 25lb sizes, all with choice of

pellet sizes of 3mm, 4.5 and 6mm. Red prices range from £5.45 to £78.50; Blue from £3.20 to £39.95.

The **Goldfish** and **Cichlid** foods are, again, formulated for colour enhancement and *Spirulina* content and are available in 8oz and 1lb sizes, with similar pellet size choices for **Cichlid Food**, but only medium size for **Goldfish Food**. **Goldfish Food** prices are £2.73 and £4.10; **Cichlid Foods** £3.30 and £5.45.

Full details from: **GRAND CHAMPION (UK)**, 14 Boxhill Way, Strood Green, Betchworth, Surrey RH3 7HY. (Tel: 0737 842921 Fax: 0737 842062).

MMR Algarid

The range of ceramic-magnet equipped filters from MMR ALGARID has been benefiting large ornamental ponds for many years, and now the company has turned its atten-

tion to what is being put into the pond (water-quality-wise) in addition to treating the water already in the pond.

Working on the principle that municipal water can be much of an unknown quality, the new filters will help protect valuable stock from unexpected

and unpleasant water conditions. The 330H filter will remove chlorine and reduce undissolved particles. The twin-tube 300HM features a high-density media bed, which absorbs lead, iron, sulphur and manganese, and a carbon sediment filter to remove preci-

pitated metals, chlorine and other solids. The use of either of these filters will thus enhance the safety of valuable fish.

Details from: MMR LTD ALGARID, 39 Marsden Street, London NW5 3HE (Tel: 071 284 0553 Fax: 071 482 3528).

Cyprio

To discover the secret of a clear, healthy garden pond, look no further than a filtration system that performs the task expected of it. No matter what size or type of pond, this principle holds good, and where better to go for specialist filter advice than to the largest company of its kind in Europe, and one who is prepared to guarantee its filters' performances — in other words, CYPRIO.

The range of Cyprio filters includes all types, from the smallest to the largest, internal or external, all designed with the same scientific principles no matter what size (or price!).

The smallest, in-pond FOAM CARTRIDGE models simply fit on to the inlet pipe of the pond pump, but the five models enable a wide range of pool sizes to be thoroughly and efficiently filtered.

External filters such as the BIOFLOC and BIOZORB

range use their open-cell, non-toxic foam medium to excellent effect, relying on its optimum mechanical filtration, plus huge specific surface area for bacteria colonisation. Furthermore, Cyprio filters deploy either open-void plastic or Cypricell Biomedica to boost biological filtration capacity further (Cypricells have over twice the surface area of some ring media and a larger voidage.)

Of course, you can always add a weatherproof ULTRAVIOLET CLARIFIER unit for further water clarification; the units' square-chamber design not only creates extra turbulence but lengthens exposure/contact time for better results. A further design touch is that tapered hoses now obviate the need to fit a narrower hose to your pump to accommodate a UV Unit.

The GREEN MACHINE is the company's answer to green water: team any of the three models to your pump and,

thanks to its unique 'chamber within a chamber' design, this filter will give the triple benefit of filtration through brushes, foam cartridges and Cypricell Biomedica (add a UV too, if you feel so inclined, and the Cyprio guarantee still holds good).

The SC3P models (SURE-CLEAR POND PURIFICATION PACKAGES) are top of the range, fibre-glass filters. You can have them as complete packages with pump and UV units, or simply as filters, or even bare tanks. They can be pump- or gravity-fed and can

process ponds from 3,000 to 15,000 gallons capacity (13,500 to 67,500 litres).

Send £2.50 for the Cyprio Product Portfolio for all you want to know about Cyprio products, plus general advice about filters, pond pollution and a disease identification and treatment chart too. A mere s.a.e. will get you a 'Pond Filtration Made Easy' poster or information leaflets. All from: CYPRIO LTD, 131-133 Eastgate, Deeping St James, Peterborough PE6 8RB. (Tel: 0778 344502 Fax: 0778 348093).



Range of Cyprio internal foam cartridge pond filters.

Pet Products

Pondfish, unlike humans (and other animals) do not enjoy the luxury of having a contented relaxing period on a full stomach after feeding. This is due to them not having conventional stomachs but, rather, a continuous digestive tract. Therefore they feed continually throughout the day as, and when, the need arises. It follows that feeding 'little and often' is better suited to their requirements than morning and evening feeds only.

The EASY FEEDER, the new automatic feeder from PET PRODUCTS, has been designed to do this feeding service for you. It is based around two units: the 'brain' part sits indoors (or under shelter) and sends the operating signals (times and length of feeds) to the food hopper suspended over the pond, whose delivery tube has an adjustable aperture so that different types of food can be given.

Recommended optimum aperture sizes are 'twice pellet size' and '1.5 times stick size'. Although flake foods can also be used, performance may be impaired during damp weather, as the flakes will absorb some moisture from the atmosphere.

Two models of feeder are available: STANDARD and DE LUXE. The De Luxe has three controls, time length of feed (1-15 seconds), time between feeds (20-240 minutes) and number of times per day

(1,2,4,8,12, and continuous). The 24-hour timer starts the set programme from switch-on. The Standard model only has feed length times and feed interval times as settable parameters (if you leave it on, they get fed through the night as well!). Again, the programme starts from switch-on time. Although a generous 15 metres (49ft) of connecting cable is supplied, this can be extended up to 45 metres (148ft) if necessary without any drop-off in performance. Power consumption can be said to be negligible: 3 watts when operating, virtually nil between feeds; there is no danger factor involved either, even if the hopper falls into the water.

As can be expected, the food hopper is of some considerable size — it holds approximately 2 kilos (4.4lb) of food — and would be hard to disguise when hung over a modest-sized fibre-glass pond. However, against the dimensions of a Koi pool, it could well be relatively

unobtrusive and, despite being made of weatherproof, UV-stabilised dark green polythene, it would not be beyond the bounds of possibility to disguise it inside a hanging lantern. The easily-understood instructions give details of fitting even larger food reservoirs and also point out that 110v AC and 12 volt DC models are available to order.

Each model carries an 18-month guarantee (not applicable to water damage) and replacement motors and controllers can be purchased separately if required. Of perhaps more value to larger-pond owners (especially those with Koi), there is no reason why the feeder could not also be used in other animal-keeping areas where regulated, round-the-clock doses of food are needed.

Full details from: PET PRODUCTS INTERNATIONAL LTD, Pedigree House, Gamston, Nottingham NG12 2LQ. (Tel: 0602 811088 Fax: 0602 455561).



Versatile, large automatic feeders are the latest products to be launched by Pet Products International.

Aquasoil

Pond owners! It's time you helped preserve your reputations as aesthetic connoisseurs! Who says so? Well, according to **AQUASOIL**, more gardeners than pondkeepers are buying their **PONDOLA SERENITY**, and this simply will not do! (see my article **Planning and Designing a Pond** in this month's Supplement for a picture of this model).

Don't you want to beautify your pond further by straddling it with a beautiful piece of Japanese-inspired wooden architecture? It can provide a welcome shade over the pond, or a wind break around it, as well as providing a good sound structure on which plants can climb

and spotlights be mounted. OK, so if you have the Serenity, then it'll look out of place in your otherwise undecorated garden. Well, the answer to this problem (or was it merely an excuse?) is to get the accompanying **GATEWAY TRANQUILLITY** and **GARDEN DIVIDER** and **GATE** really to give an overall co-ordinated effect. Each structure is quality-

made from timbers treated with two coats of wood preservative. All joints are pre-drilled and pre-greased and the kit comes 'flat-packed' ready for self-assembly.

Details from: **AQUASOIL PRODUCTS LTD**, Mount Zion Mill, Diptford, Totnes, Devon TQ9 7NG (Tel: 054 882592).

GPS-Gloria

It is no secret that, around this time every year, the pondkeeper's mind will turn to avoiding, or getting rid of, green water. Filters and UV lamps have all been advocated, and now, in addition to these two standard remedies, comes a totally new approach.

GPS SPRAYERS have launched **GLORIA POND CLEAR**, a method that neither uses electricity nor algicides, nor harms the fish or plants.

By injecting the pond, immediately under the water surface, with a mineral agent, the algal green cells and other nutrients which usually cloud the water are bound together with atmospheric oxygen and float to the surface from where they can easily be netted out.

Operation is simplicity itself: the liquid mineral agent is housed in a tank (slung under the injection lance) and pumped into the pond by means of water from the mains. The 2-metre (6ft 6in) long injection lance enables all parts of the pool to be reached comfortably, and each 'tankful' of diluted agent (250ml agent, plus 1,750 ml water) will treat 555 gallons (2,500 litres) of pond water. Each treatment takes about ten minutes of undersurface spraying and results should begin to appear within an hour.

Because the pre-pond 'venturi mixing' of mains water and mineral agent can only occur effectively under water, fish and plants actually receive extra oxygenation during application — the injector lance could therefore be used advantageously

during thundery weather to alleviate low-oxygen levels. (Alternatively, the injection system could be adapted to distribute disease remedies to all parts of the pond extremely easily.)

The 'delivery system' is made to the highest quality, with brass screw fittings throughout; half-inch standard fittings make for easy connection to garden hoses and the reservoir tank (when filled) balances the long injection lance's weight comfortably. An easy trigger action energises the delivery of agent and shuts off the water supply when released.

Practical problems, such as fry being trapped in the floating bound-up algae or effects on the surrounding lawn from overflowing mineral-agent-treated pondwater, are said to have

been investigated and found to be groundless.

Full details from: **GPS SPRAYERS**, Unit 5, Woodway Farm, Long Crendon, Bucks HP18 9EP (Tel: 0844 208703 Fax: 0844 201677).



Revolutionary algae treatment from GPS.

Haddonstone

How often do you not realise there's a pond in the garden until you nearly fall into it? Surely a pond needs a surround for at least a couple of very good reasons. An artistic surround completes the picture (in addition to drawing your attention to the pond in the first place)

and where there are youngsters or infirm people around, it serves as a good-looking safety barrier too.

HADDONSTONE make their pool surrounds, fountains, balustrades, pilasters, entablatures, columns, copings, temples, pavilions and garden furniture from reconstructed limestone in a choice of Portland, Bath, Cotswold or Terra-

cotta finishes. Their latest **EXTRA LARGE CIRCULAR POOL SURROUND** measures no less than 7820mm (308in - 25ft 6in) across its outside kerb diameter, the smallest is 2100mm (82.75in). Straight Pool surrounds are also available, and a combination of both curved and straight pieces enable pool surrounds of practically any shape to be specified.

(See my article on **Planning and Designing Ponds** in this month's Supplement for a photograph of a Haddonstone pond surround).

A magnificent 76-page brochure is available on request from: **HADDONSTONE LTD**, The Forge House, East Haddon, Northampton NN6 8DB. (Tel: 0604 770711 Fax: 0604 770027).

New World

Looking at natural aquarium decorations these days, you would think you'd have to travel the world over to get a sample of each type, wouldn't you? Not so now, and it's less hazardous too.

In the former case, you'd probably be justifiably nicked for taking natural resources from some countries; now **NEW WORLD** has taken on the job for you, legally, and almost from the comfort of your own armchair. Be it gravel, pebbles, lava, slate, stones with the improbable names such as Utah Ice and Wonder Stones or Petri-



Virtually anything you want in terms of rock decorations can be provided by New World.

fied Wood, Corals or Sea Fans, all your wildest aquascaping dreams can come true.

A colour brochure and price list will give you a far more accurate picture of the wide selection available than could ever be contained in these columns. (Now, let me see... Wessex Ochre, topped with Sombre Chips, with featured Tril-Wood and Rustic Rock? Or shall I go for Sunburnt Pebbles and Tweed Cobbles?)

Details from: **NEW WORLD**, Aquatic Distributors Ltd, Cardiff Road, Glanllyn, Talffs Well, Cardiff, Mid Glamorgan CF4 7QQ. (Tel: 0222 810663/811190 Fax: 0222 813519).

Heritage Construction

Many aquarists who keep their fishes in rainwater may have been up against it during last summer's drought period, and the alternative of using now often-questionable quality water from the mains was of little comfort.

You can now have an unlimited supply of water from the rainbutt (as long as it keeps raining, of course, for reasonable periods) thanks to **HERITAGE CONSTRUCTION's** continuous-flow water butt system.

By now, you've guessed it works on an **UNDERGROUND GARDENER'S RESERVOIR** basis; the reservoir is filled from

the rain-gutters on the house and automatically tops up the rainbutt on demand.

The reservoir has a 1,000 gallon (4,500 litres) capacity (larger versions can be installed if so desired) and is hidden beneath the lawn or patio, with only an inspection cover showing, although above-ground systems can also be installed. No planning permission is

required and the system can be fitted by Heritage, tailor-made to exact needs, anywhere in the South of England.

A free consultation and advisory service is available on request.

Details from: **HERITAGE CONSTRUCTION, 21 North Street, Littlehampton, West Sussex BN17 6JH.**

Interpet

Right on time, at the beginning of the coldwater season, comes excellent advice from **INTERPET's** Dr Neville Carrington. In a press release, Dr Carrington stresses that this time of year is when many fish losses occur, owing to poor water quality. Two major stress factors in the pond at this time are increased toxic wastes and unduly high alkalinity, both of which will take advantage of the fishes' weakened state (after their long period of inactivity and not taking food) and cause losses.

Despite these factors being 'invisible' to the human eye, they can be detected (and



Pond Check, the easy, safe way to monitor water conditions.

treated, or countered) using Interpet **POND CARE** Products. Toxic wastes manifest themselves as increased nitrites and these levels, and the current pH levels, can be monitored

using **POND CHECK TABLETS**. To reduce the effects of nitrite, or toxic waste induced stress, the use of **POND GUARDIAN**, a balanced physiological salt product, is

recommended.

Should the water prove to have a higher than normal pH, then Interpet's **pH ADJUSTER** will bring it down to a safer lower level without harming the fish. Often, a cause of high pH is rapid plant growth and the abundance of green water organisms which deplete the water of carbonates. Here, **GREENAWAY** will remove the green water and, being completely acceptable, ecologically-speaking, it will do no harm at all to the fishes' environment.

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NEXT MONTH



May means Koi! Our **Spotlight Special** has no less than four major illustrated features on Koi, plus our established popular regular, **Koi Talk**, of course, and our new monthly page, **Koi Calendar**.

● **Nigel Caddock** of Nishikigoi International has some super photos in his latest **UK Koi and Ponds** — an amazingly beautiful set-up owned by top Koi-keepers Danny and Jean Doherty.

● **Peter Skinner** of Koi Kraft will plumb the depths of that vitally important subject, **Koi Water Quality**.



● **John Cuvellier** will reveal the excitement and pitfalls experienced on the way to **Constructing a large-scale Koi Pond**.

● **David Twigg** will turn our monthly focus on a spectacular Koi variety — the **Kin Shows**.

Backing up our **Spotlight Special**, the many highlights of what promises to be a really great issue of *A & P*, will include:

● Stunning underwater photography by **Rick Gibson** from The Fish World in Tampa, Florida, of his recent trip to the **Cayman Islands** — a diver's paradise in every sense.

● The start of a major new series from our native marine expert **Andy Horton** — always something to look forward to.

● **David Sands'** second instalment on those intriguing and fascinating **South American Sucker-mouths**.

● **Environmentally Friendly Marines** — an important report from **Dr. Elizabeth Wood** on a project that is likely to have far-reaching consequences for us all.

● Specially commissioned, fully illustrated one-offs for our tropical and herpetological readers.

May is also one of our **'Poster Months'**. We have yet another cracking one for you next month ... but you'll have to book your copy of *A & P* to find out just what it is. One thing we can definitely tell you is that it is, of course, absolutely **FREE!**

● News, views, reviews, comment, expert advice on coldwater, plants, Koi, marines and freshwater tropicals, plus the start of a brand-new series — **PAPER ROUND** — in which **Dr. Ian Winfield** will be "doing the rounds" of recent scientific papers which contain material of relevance/interest to aquarists and pondkeepers worldwide — all go to make our May issue one not to be missed on any account.

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