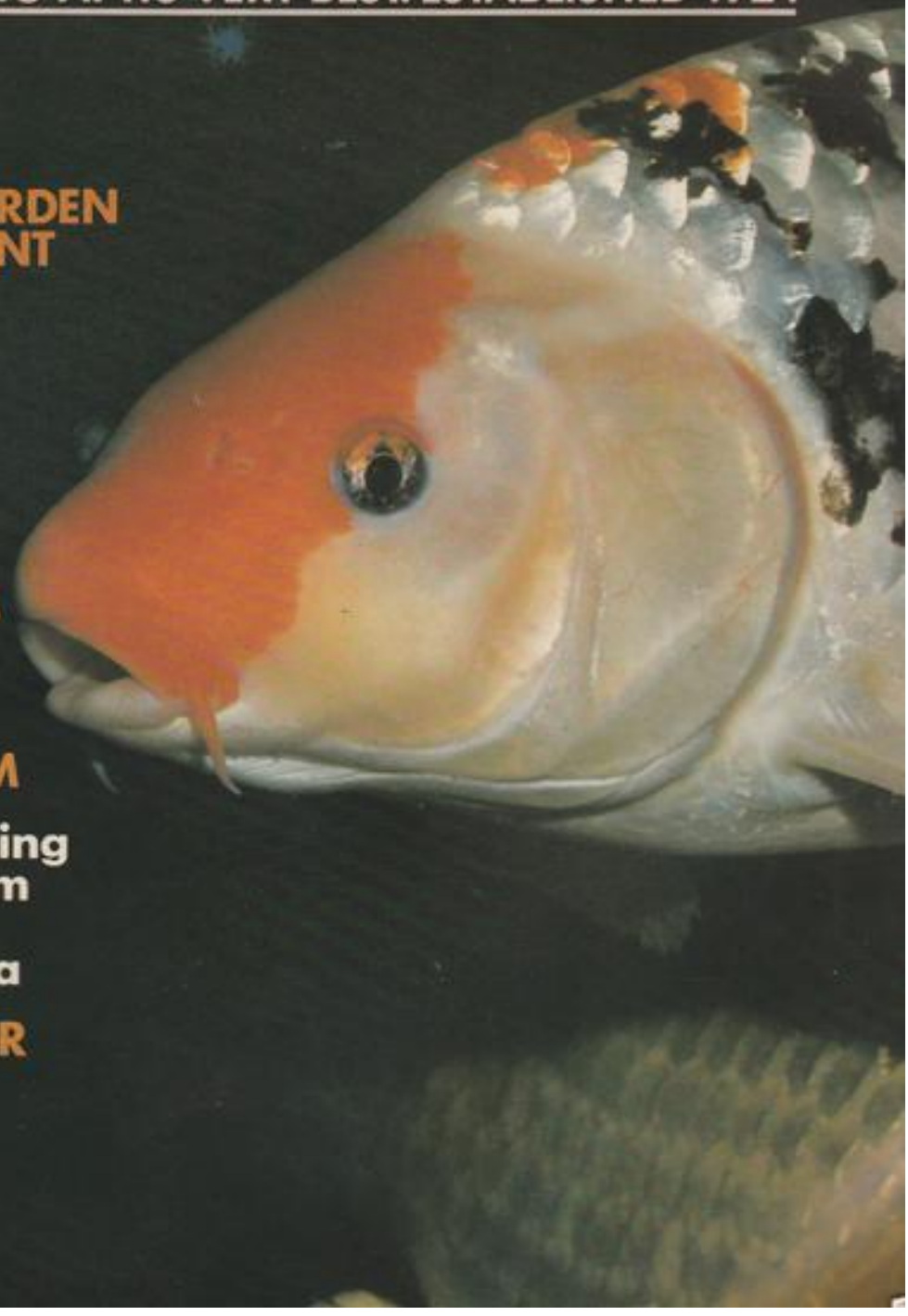
MAY 1986 95p

AQUARIST

AND PONDKEEPER

FISHKEEPING AT ITS VERY BEST. ESTABLISHED 1924



SPECIAL WATER GARDEN SUPPLEMENT INSIDE

New tank blues – How to avoid them

BEAUTIFUL WRASSES FOR THE MARINE AQUARIUM

A challenging Cichlid from Lake Tanganyika

PONDS FOR KOI

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Cover Story
KOI Photograph by Laurence E. Perkins

I admit it—Gremlins *do* exist! Did you see the intended(?) slip-up on our April cover? Here's a clue: do you know of any *serious* Koi keeper who refers to these magnificent fish as Koi Carp? Of course you don't! The fact is that the word 'Carp' is superfluous since Koi means 'Brocaded Carp'. Including 'Carp' after Koi is, in principle, the same as referring to Goldfish as 'Goldfish Fish'—and, let's face it, few people would make that mistake.

Now to the explanation for our April slip-up. The Cover Line should have referred to our Koi Cart Cartoon competition in Tomorrow's Aquarist. However, at a very late stage in the printing process, someone spotted the 'mistake' ("surely, Cart must be wrong—it should be Carp—shouldn't it?"). In any case, to save our blushes, the 'mistake' was rectified—except that we *did* mean Koi Cart! What would we do without Gremlins? Well, the publishing game would be easier, albeit less interesting. Sorry folks!

AQUARIST
AND PONDKEEPER

MAY 1986 Vol. 51 No. 2

CONTENTS

Readers write

Tribute to Laurie Perkins

On behalf of our Member Societies, we would like to pay tribute to the long years of service not only directly to the *Aquarist & Pondkeeper* magazine but also indirectly to the fishkeeping hobby in general, by your retiring Editor, Laurie Perkins.

In recent years, Laurie has, by circumstance, been less in the public gaze and many of the magazine's present readers may not even be too familiar with his name; however, many hundreds of fishkeepers will have made his acquaintance regularly at major *Aquarist*-supported Shows at Alexandra Palace, Belle Vue, Doncaster and Motherwell each year, enjoying good-humoured conversation with a practised raconteur who always took pleasure in meeting his readers.

In addition, many a book has been and, we are sure, will continue to be, graced by 'L. E. Perkins' photographs but surely Laurie's main contribution over the years was of maintaining the magazine's style and success whilst other similar publications waxed and waned.

We wish him every success and happiness for the future, together with our grateful thanks and appreciation for his work for '*A&P*'.

The Federation of British Aquatic Societies

Pearls from a crab

Shortly after my article on the love song of the spiny lobster was published (*A&P* —Jan '86) I received a small parcel which, on opening, was found to contain a letter and a crab for autopsy. The results of the autopsy were so interesting that I thought the reader's letter and my reply might be worth publishing.

My cousin bought a crab in Brixham, but on opening it we found it full of shot. There were enormous amounts on and in the body, where it is attached to the large shell, and on the legs and tail. Needless to say, we did not eat the flesh; we felt we might get lead poisoning! Can you explain?
Mr. S. G. Carr, Exeter.

Well, this is one of the best questions I have ever had—a real detective story. When I looked at the specimen I was suspicious that the pellets were not shot after all, because there's no puncture through the shell from the outside, and they are not all of the size they would be if they were shot from a shotgun cartridge. But when I tested them with a knife I found they were so hard that I couldn't dent them or cut them, which made me think they were indeed metal, and I was totally foxed. It was at this stage that I enlisted the aid of the Zoology Department at the University of Sussex. The zoologists were also puzzled, but they had apparatus which showed quite clearly that it isn't shot, but rather eggs. Where did they come from? They are eggs which have undergone a chemical change which has hardened them, and the staining from the chemical change has penetrated right through the shell, in this very striking way. Now what are these eggs? They might have come in with the water circulating within the crab that supplies it with oxygen, they might be fish eggs or the eggs of a starfish, something of that order. However, the respiratory apparatus of the crab is such as to render that very unlikely. You are then left with the possibility that it's the eggs of the crab itself which have suffered some appalling accident, some terrible rupture, which has released the eggs throughout the parts of the crab. There are a very large number of eggs mixed up with the meat of the crab, and some of them have found their way into the gap between the back of the crab and the shell. There, as they underwent this mysterious chemical change, they became hard and began to irritate. The irritation then led the crab to lay down layers of shell around the little hard, pelleted eggs. So this is not shot: the crab has borrowed the oyster's trick, and these are no less than *crab pearls*.

Dr. Andrew Allen

Zoo Pacus

I read with some interest Dr. Goldstein's article on Piranha in your February 1986 issue, and I thought your readers might be interested in our observations on *Colossoma* in the London Zoo Aquarium.

Colossoma (or Pacu) are regularly exhibited in the Zoo Aquarium, and we currently have three Black-finned Pacu (*Colossoma nigripinnis*) and two, as yet unidentified, *Colossoma* sp. These fish are displayed in a 3,000 gallon tank containing principally South American fish, including *Arapaima* up to four feet in length, Red-tailed Catfish up to three feet in length, and an eighteen inch Shovel-nosed Catfish.

The *Colossoma* are all similar in size and, being discoid in shape, measure about twenty inches across, and each weigh around 20 lbs.

At the Zoo the *Colossoma* are fed several times a week on fresh or frozen fish, including herrings and sprats, strips of lean beef heart, and (but only occasionally) soft fruit such as grapes and bananas, chopped apples and sliced carrots. On this essentially carnivorous diet, the *Colossoma* have grown from about two inches in length to their current twenty inches in about 2½ years. An excellent growth rate, and one which is probably much faster than that of similar fish reared on a more vegetarian diet. Clearly, *Colossoma* are able to utilise a largely carnivorous diet, even if their reputation is that of a plant and fruit eater. The value of small amounts of fruit and vegetable matter in the diet should not necessarily be overlooked, and may be important in providing variety, micronutrients, etc.

Returning to Dr. Goldstein's article, the spread and apparent breeding of *Colossoma* and their relatives in North American waters considered unsuitable for them, highlights the need to be particularly careful when introducing 'exotic' fish into areas where they do not exist —even if all the text book data suggest that the fish will not survive or breed there. By the way, examination of the growth rate and growth pattern of fish (as shown by their scales and bony structures), and the nature of their resident parasite burden, can sometimes be very useful if providing information on the recent history and origins of certain fish—but it does usually mean killing and dissecting them!

Dr. C. R. Andrews
Assistant Curator—London Zoo Aquarium

One of the large Pacus (Colossoma nigripinnis) on show at the aquarium. (*Photograph* courtesy of London Zoo Aquarium)

Helping hand

Nick Lushchan

The Advantages of Proper Facilities

Every newcomer to fishkeeping is warned about the dangers of overstocking a tank and of the advantages of providing fish with roomy aquaria to swim in. "Buy the largest tank you can—they are easier to maintain and your fish will be happier and healthier" is the usual advice.

Good filtration is a must, of course, and if you are digging a pond, particularly for Koi, depth of water is always stressed as being absolutely vital for winter survival of the fish.

At this stage, some of you must be thinking what this has to do with the Helping Hand series, but just stop and think for a moment. Think of all the things we are expected to provide for our fish in order to present them with the best possible set-up for their needs. If we give them what *they* require, then both *they* and *we* benefit.

If you look at the situation more closely, *our* requirements are almost the same.

If a trader provides premises that are clean and displays his goods in a manner that leaves the gangways clear, giving customers room to get around to view good clean tanks filled with eyecatching, healthy fish, there are not many customers who will walk out without making at least one purchase—all because of the way the trader portrays his business. What's more, the customer will tell his friends of the outcome and, soon, the good news spreads and business picks up. It is just a question of putting into practice in a shop those same principles that we preach concerning the welfare of our fish.

It is great to see that more and more traders are beginning to think along these lines in providing facilities for the disabled. As a result, they find that *all* customers benefit from the improved services they provide.

Sadly, there are still exceptions, like the retailer who made a local disabled fishkeeper pay in advance for a 48 in. × 18 in. × 18 in. tank and then refused, on receipt of the tank, to deliver it saying that it had slipped his mind to mention this at the time of purchase. He was not prepared to budge one inch. Luckily, a local fishkeeper was able to help out. But what do you do if there isn't a 'Helping Hand' around?

The number of complaints I get along these lines is, fortunately, quite small. On the happy side, more and more readers are informing me of premises that *do* cater for the disabled. Following such reports, plus a series of discussions over the 'phone, I visited Wildwoods of Enfield quite recently and was most impressed by what I saw there.

Although the original layout was a conversion from greenhouses and contained no upstairs, the length of the building was nearly 300 feet and had three changes in floor level. All were, however, made accessible by easily negotiated ramps.

While this provided adequate facilities for disabled aquarists with a mobility problem, the management thought of improving things futher. However, before they started the work, Michael Everett, Bill Heritage and David Monk gave some thought to points raised in Helping Hand and made a few more adjustments to cater for wheelchairs.

Having spent a full afternoon viewing their premises and discussing numerous points, such as the heights of coldwater display ponds, ramps and a number of other items, they were surprised to hear that requirements for the disabled would, in fact, help their staff, e.g. in moving heavy tanks on trolleys, as well as customers out with their families.

Talking to David Monk on the running of the shop, it was nice to hear that they have a frequent flow of disabled visitors, ranging from the solo fishkeeper to a number of Sunshine Coaches throughout the year, and how little assistance the disabled required moving around the shop. As they have found out, disabled people try to cope with most things on their own. They do, nevertheless, require some assistance retrieving items from the top shelves—just the same as many other customers do.

During a quiet spell, all members of staff came round and we had a full discussion on the new work that was being carried out by the builders. This included the height of the counter (an important part of the construction), and the raised ponds for the display of coldwater fish which not only enables a person in a wheelchair to view the fish in comfort, but, at the same time, plays a safety role in respect of small children who are less likely to fall in.

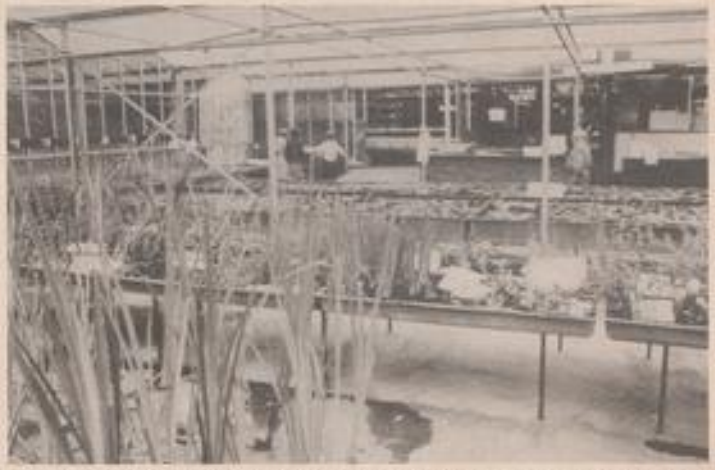
The subject of wide paths was met with the same positive reaction, as was the raised plant display troughs, the slate and rock display units and a number of other topics we discussed.

All in all, my visit to Wildwoods proved a great success. It's so nice to see people applying commonsense so effectively.

I hope to report on other success stories in future editions of Helping Hand.

In the meantime, Good Health and Happy Fishkeeping.

Nick Lushchan, 27 Hungerford Road, Rugby House, Calne, Wilts., SN11 9BH.



The spacious layout at Wildwoods makes everything accessible to wheelchair-bound visitors

Tomorrow's aquarist

Do you ever walk into an aquarist shop and leave without the fish that had caught your eye—that glorious specimen in the third tank on the right—purely because you did not know enough about it? I doubt it. If you leave empty-handed, it is probably because the shop-keeper has answered your questions by telling you that it will eat your Neons or outgrow your tank.

On the other hand, have you ever come home from a spending spree, only to watch those glorious plants you bought—don't they set the Cherry Barbs off a treat?—gradually rot and die within a few weeks? If that is the case, have a look at the plants illustrated on this page. If any of these have been a source of disappointment to you, here is the answer—one you would have got from the shopkeeper if you had only thought to ask.

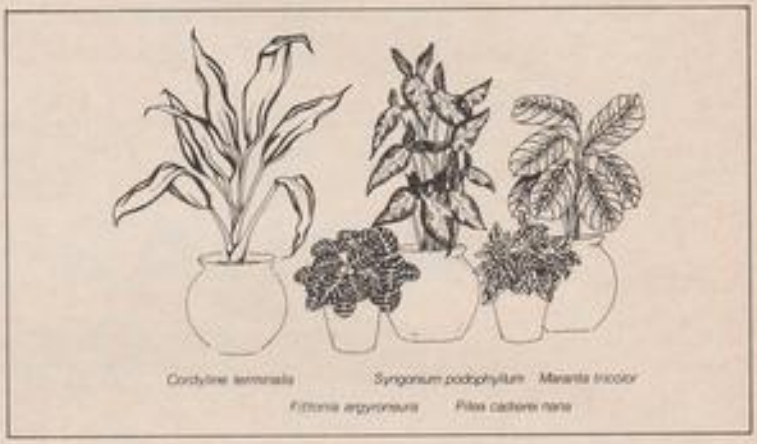
These are not aquatic plants. Some will survive for a few months under water, some only a few weeks. They are sold to provide a temporary splash of colour or interesting leaf pattern to your tanks; much as a garden centre supplies bedding plants in the summer. Although bedding plants *grow*, it would be unrealistic to expect them to last more than one summer. Equally, the following plants, in an aquarium, would not last more than a few months at the outside and they will not *grow* under water.

Let's start with the most colourful. *Maranta tricolor* is a glory to look at. The oblong leaves grow up to five inches long, are dark green and have yellow/green margins and 'splodges' up the centre. The midribs and veins are a bright crimson or pink and the underside of the leaves is purple. With an upright growth habit, you can see what a focal point this plant would make in a tank.

Cordyline terminalis 'Rededge' is a palm-like plant that grows from a central point. The lance-shaped leaves are a glossy dark green with attractive red edges. Specimens offered for sale are usually about six inches tall.

Pilea cadierei nana is an upright, branching Plant, sometimes called the 'Aluminium Plant'. Its leaves, which grow opposite each other, are oblong/ovate and about one and a half inches long. They are dark green and easily recognised by the distinctive silver patches on them. These patches are slightly raised, giving the leaves a bumpy, uneven feel.

Fittonia argyroneura—the 'Snakeskin Plant'—is a compact, low-growing plant with a creeping habit. Its ovate leaves grow up to four inches long. The main attraction of this plant is that the veins of the leaves are finely picked out in white, giving a skeletal appearance.



The final illustrated plant is a climber, *Syngonium podophyllum*. If you have any climbing plants among your house-plants, you'll know that they need support and, if denied this, they will trail down-wards. When this happens, the strong leaf-stems will hold the leaves up and forward, making them look like swans' heads. This is how they will look when you buy them. The leaves are glossy and more fleshy than the other plants described. As there are many variations in pattern, I've illustrated just one of them, though all are basically green and white.

The aim of this feature is *not* to put you off buying these plants. If you have enough money to replace these plants regularly in your tanks, any one of these will be a credit to your underwater landscape. If money is tight, you'd probably prefer to stick to the true aquatic plants.

There is, however, a compromise that might suit you. What applies to fish applies to plants. Most of us would not turn down the chance to own a beautiful short-lived fish. We would, however, make sure that we could give it the best possible environment to ensure that 'short-lived' does not turn into a matter of weeks.

The best environment for these plants is a pot and compost. Search around for plants with a good root system and buy them for use as houseplants. Then, if they grow well, you will always be able to take rooted offsets or—in the case of the *Cordyline* a few leaves—and add them to your tank when you want something extra. That way, you will have extra plant interest in your tanks and a window-sill full of choice houseplants.

Next month

COMING UP IN JUNE:

- Special Cichlid supplement with articles from top writers
- **Ian Sellick** picks his six favourite species
- **Richard Crow** introduces some New World Cichlids
- **Mary Bailey** describes the attractions of some Rift Lake inhabitants
- **Eberhard Schulze** untangles the difficulties of Discus classification and provides expert hints on their upkeep
- Spiny Eels, fishfarming, coldwater, regular features and much more, all add up to a colourful, information-packed issue

Be sure to order your copy early!

THOSE 'NEW TANK BLUES'

A new tank is raw and potentially hostile to fish and plants, while a properly established one is balanced and safe. Dr. Chris Andrews of the London Zoo Aquarium shows how this critical transition can be carried out quickly and effectively

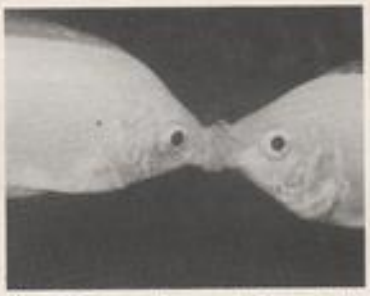
A newly set up tropical freshwater aquarium, complete with lights, filters, gravel, plants and water is *not* an ideal environment for all those beautifully attractive fish that you have seen at your local aquarium shop, and there are two important factors that you should first consider before stocking can begin. These are: the *water* and the helpful *filter bacteria*.

Most aquarists use tap water to fill their tanks, but tap water is intended for drinking and not necessarily for keeping fish in. Local water authorities or water companies provide us with a very wholesome supply, but it may be unsuitable for fish on a number of counts.

The pH may be outside the range that is preferred by the fish we wish to keep. Most aquarium fish will survive in the pH range 6·5 to 7·5 (or 8·0), but if your tap water is normally outside this range, you would be well advised to keep only fish which prefer your local (and therefore quite extreme) pH, or to take steps to modify the pH of the water you intend to use in the aquarium. Your local aquarium dealer should be able to tell you how this can be done, and there is useful advice in a number of the easily available aquarium books (such as Neville Carrington's 'Fishkeepers Guide to a Healthy Aquarium' from Salamander Books).

Assuming that your tap water is within the range 6·5 to 7·5, it will still contain chlorine and perhaps even toxic metal ions such as copper. The chlorine is added by the local water authority to eliminate micro-organisms from the supply, and the copper can originate from water pipes (especially new ones). Metals such as copper, zinc, etc. are far more toxic to fish in soft water than in hard water, although at the levels normally found in tap water chlorine and the heavy metal ions are all harmless to humans.

Chlorine can be eliminated by allowing the fresh tap water to stand at room temperature for about 12 hours or so, during which time it will dissipate to the atmosphere. However, chlorine, toxic metal ions, and even one or two other 'nasties' like chloramine, can be easily and quickly eliminated by the addition of a good quality tap water conditioner to the newly drawn tap water. Several such conditioners are available from your local aquatic shop, and the addition of such a product means that the tap water (once it has been brought to the correct temperature with a little boiling water from a kettle) can be added to the aquarium straightaway.



Kissing Gouramis are gentle, graceful fish and they do well in an established aquarium, where they will help control algal growths on the glass and rocks

Do not forget the importance of conditioning tap water for aquarium use—not only when you fill the tank for the first time, but also at every partial water change.

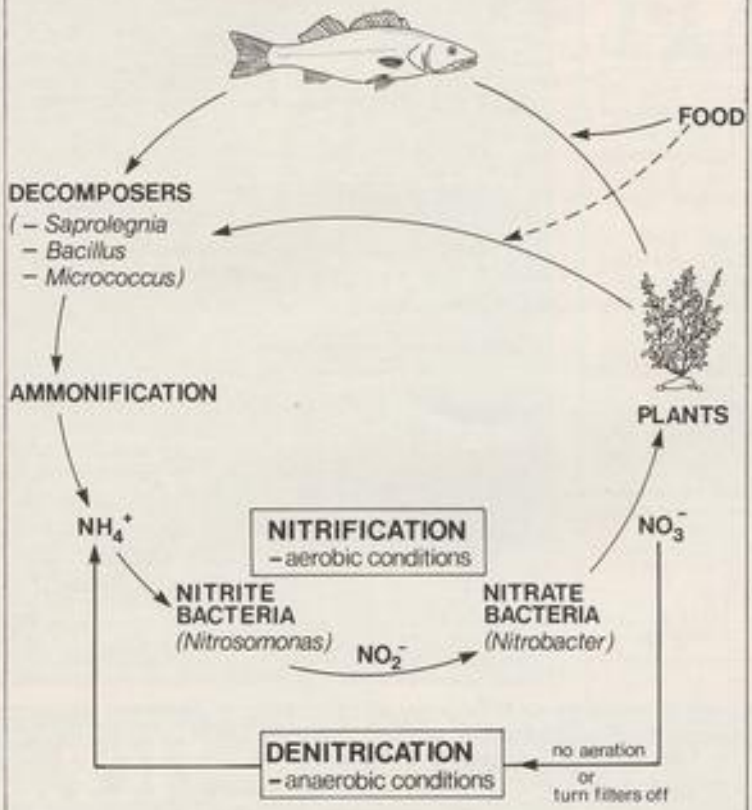
Moving away from the water in a newly set up aquarium, let us now consider the filter or filters. In a recently set up tank, the helpful bacteria which normally convert uneaten food and certain fish wastes from ammonia to nitrite and then nitrate are not yet present in any numbers. As these helpful bacteria become established, the new aquarium goes through a typical 'settling in period', where the levels of potentially toxic ammonia and nitrite build up and peak after about two to four weeks (at around 20°C), and then decline as the filter microbes begin converting the ammonia/nitrite to much less toxic nitrate. As well as being relatively harmless to most freshwater fish, nitrite is also a useful food for plants and also (unfortunately) algae. After the characteristic rise and fall of ammonia and nitrite, the levels of both these pollutants should then remain very low (less than 0·1 mg/l), and the levels of nitrate are prevented from building up too quickly as it is absorbed by the plants and diluted out at the regular partial water changes using tap water with a lower nitrate reading.

It is fortunate (and also extremely useful and interesting) for the aquarist that ammonia, nitrite and also nitrate can all be measured with comparative ease and accuracy using the test kits that are available from aquarium shops, and it is the above-mentioned rise and fall of ammonia and nitrite (and its effect on fish in newly established aquaria) that has been given the name of 'new tank syndrome'. In a newly set up tank, levels of ammonia and nitrite of several mg/l are not uncommon, and such levels can be toxic to a range of freshwater (and especially marine) fish. Thankfully the overall efforts of the new tank syndrome can be minimised by one or two simple procedures.

To begin with, a newly set up tank should only be stocked with a small number (say 5 or 6) small, hardy fish such as Barbs or Danios. These fish, sometimes termed 'the suicide squad', help to encourage the growth and development of the helpful filter bacteria, and are also relatively resistant to the effects of ammonia and nitrite. Nonetheless, during this approximately month-long settling in period, no other fish should be stocked into the tank, and the above-mentioned 'suicide squad' should only be fed rather sparingly. About 10 or 14 days after first setting-up the tank and introducing the fish, a 25-50% water change should be carried out, as this (along with only frugal feeding of the fish) will help to prevent the ammonia/nitrite climbing too high. Of course, the tank should be topped up with fresh water, conditioned with a suitable conditioner, and brought to the correct temperature with a little boiling water from a kettle.

Once the peaks of ammonia and nitrite have subsided, the stocking level can be gradually increased over a period of weeks. As a rough guide, most tropical freshwater aquaria have a maximum safe stocking level during these first few months of about 'one inch of fish (excluding tail fins) to every 10 square inches of water surface'. A much quoted rule—but one which actually works!

THE NITROGEN CYCLE IN THE AQUARIUM
(after Scott, 1981)



Ammonia (NH_4^+/NH_3) → Nitrite (NO_2^-) → Nitrate (NO_3^-)
Very toxic — Toxic — Much less toxic

The nitrogen cycle in the aquarium. Bacteria such as *Nitrosomonas* and *Nitrobacter* are responsible for the nitrification process, whereby ammonia is converted to nitrite and then nitrate. These bacteria require oxygen to survive and are not particularly numerous in a new aquarium or its filters. However, within a month or so, their numbers usually build up so that they can prevent ammonia and nitrite levels becoming a problem in established tanks. If at any time the filter is turned off for a long period, not only is the nitrification process interrupted, but a different set of bacteria may take over from *Nitrosomonas* and *Nitrobacter* and these actually convert nitrate back to potentially toxic nitrite and ammonia. In a well-established aquarium, ammonia and nitrite levels should be negligible, and if elevated levels occur at any time, it may be an indication that the tank is overstocked or being overfed, or that the filters are not functioning properly, or are being inadequately maintained

As time goes by, and as the *fishkeeper* becomes an *aquarist*, this stocking level can be exceeded, especially with sensible, regular tank maintenance and good filtration.

Once the filter bacteria have established themselves, they will carry on perfoeming their very useful 'waste disposal task' so long as they are supplied with water containing plenty of oxygen. What this means is that all *biological filters* (that is filters with this biologically performed conversion of ammonia and other waste to nitrite and then nitrate) must be left running for most, if not all, of the day and night. If biological filters are turned off for any length of time (say more than a few hours), the supply of life-giving oxygenated water is terminated, which essentially kills the filter. Once the filter bacteria die, the whole process of *nitrification* (as this conversion of ammonia to nitrite and nitrate is known) stops, with consequent increases in the levels of ammonia and nitrite. In fact, if the filter is turned off for a protracted period, a totally different group of bacteria may take over, and they actually convert nitrate to nitrite and ammonia, which naturally causes water quality to deterioriate even further.

Not only must biological filters be left running most of the time for efficient operation, they must also be regularly serviced. In the case of the typical undergravel filter, this means 'hoovering' the gravel with a siphon tube or gravel washer every 2-4 weeks, and this can most easily be performed when you are carrying out a partial water change. This regular clean-up of the gravel bed prevents it from becoming clogged with debris, thus enabling it to function efficiently in the long term. Similarly, the sponges of sponge cartridge filters and power filters must also be regularly removed from their filters and carefully rinsed in luke warm running water for the same reason. The intention of these operations of filter maintenance is to prevent clogging *but* without destroying the helpful filter bacteria. Hence a too vigorous cleaning, or cleaning in heavily chlorinated water, are both to be guarded against. With this in mind, it is obvious that a total strip-down of an established tank and its filter system is like starting over again, and thus the tank and its filters may have to be allowed time to mature as if it were a totally new tank. However, 'seeding' new or cleaned gravel with mature or old gravel can speed up the tank maturation process.

It is worth pointing out that the bacteria responsible for the nitrification process do not only occur in the filter, but also on any exposed surface in the aquarium. However, the numbers are far greater in the filter, which is usually because good filters have a very large surface area within their medium or media. This is why good filtration enables you to keep far greater numbers of fish in a given tank safely.

Therefore, to avoid expensive and soul-destroying losses during your first few weeks as a fish hobbyist, it is important to condition the water you are going to use in the tank, and gradually to condition and mature the filters serving the tank, before you add large numbers of fish. Then, with regular and careful tank maintenance *and* filter maintenance, your fish should stay healthy and the aquarium look attractive for . . . for as long as you carry out the necessary maintenance!

GO FORTH AND MULTIPLY

by Amanda Grimes

After the fun and games with the Keyholes, I decided to lower my sights. I had, after all, only been keeping fish for a few months and entering the fish-breeding 'Olympics' was, on reflection, just a little ambitious. So I decided to give the Bronze Catfish (*Corydoras aeneus*) a try. I've always been a dab hand at the egg and spoon race . . .

True to my habit of nicknaming everything in the community tank, my large female carried the unflattering title of 'Fatticus'. Her partner was elegantly slimline and would patrol the front of the tank, cruising along in search of food. Fatticus would bounce behind him, rolling her eyes and displaying a comical fault in her braking system. Every time he stopped, there was a pile-up. She would bounce down on top of him and spend the next minute or so trying to spot where he'd gone. The constant reunions were accompanied by much frenzied fussing—no sentiment involved, just another characteristic I've observed in *Corydoras*. This serendipity must have made her the happiest fish I own—and happy fish breed, I thought, eyeing one of the spare tanks.

Unhappiness is a bare tank

In January, we transferred four gallons of water from the community tank into a small tank, 24 in. × 8 in. × 8 in. Leaving the tank bare, as advised in our books, we introduced the fish. The result was instant and extreme. Two very unhappy Aeneus, huddled in a far corner, trying to hide behind each other! After four days tempting them with Tubifex, lack of bright light, and approaching the tank on our hands and knees in an effort to make them feel less vulnerable, we capitulated and put in gravel and plants. Outcome—end of hunger strike and, on the female's part, resumption of bouncing.

I had set up the tank beside my bed, which gave the fish privacy during the day and meant that the tank was lit by daylight only, the bed being near the window. That way, I crept into bed in pitch black and hung over the edge, spying on them shamelessly. Within the week, I was rewarded; waking to find spawning in full swing. Swing being the operative word—the eggs were going everywhere! Fatticus, ventral fins juggling eggs, was flying around all over the tank. I couldn't see any milt in the water and this might have been the reason why so many of the eggs failed to stick to the glass. It was very haphazard. Not wishing to disturb them, I was forced to remain in bed till around midday. Well, that's my excuse.

Later that day, I put the parents back in the main tank, removed the plant and hoovered out the gravel. Then I added some Methylene Blue to the water to prevent fungus. In spite of this, all the eggs had fungused the next day. Which left two questions. Would the fish learn the importance of fertilisation the next time round? Or had the Bouncing Bomb knocked the stuffing out of the male?

We didn't have to wait long for the answer. On 28th February, having put the roed-up female and her male into a larger tank (24 in. × 12 in. × 12 in.), complete with a little gravel, plant—and a filter this time, to ensure the water was clean—we were presented with nearly 200 eggs, neatly placed on the glass and filter. We took out the parents, gravel and plant again, switched off the filter and put in more Methylene Blue. As an extra precaution, we also put a gently-running airstone by the eggs.

On the 2nd March, the fry were visible inside the eggs. By evening, they'd started to break free of their shells. If Fatticus was bouncing, I was on a trampoline! I jumped up, and stayed up for four days. Hour after hour, I sat by the tank, magnifier in hand, watching the struggle for life. Some of the fry gained freedom from their shells with ease. Others strove mightily, twisting and wrenching. They all came out tail-first, but some of them hung for anything up to an hour, their heads and yolk-sacs imprisoned by the shell-cases. Not all of them made it.

A typical 'Fatticus'—in this case, a female Peppered Catfish

Three days later, I cleared the empty shells off the glass, removed the airstone and put in a polymer filter. I'd also lowered the water-level by several inches and managed, in my excitement and ignorance, to pollute the water! While fully aware that they could live for quite a while on yolk-sacs, I'd hit on the brilliant idea of building up Infusoria in the tank water. I'd added so much green water, Liquifry and egg infusion, the water was rich enough to feed a whale. Bill called in that night and gave me one of his long, hard looks . . .

It didn't take long to syphon out half the water and replace it with water from the community tank, but the exercise brought me back to earth. I climbed off the trampoline and promised not to bounce again. "It's a risk, changing half the water," Bill had said, "but they'll die anyway, in that soup". The water change worked, however and although I lost about half the fry to Velvet Disease when they were fifteen days old, I sold and gave away almost one hundred youngsters.

Killer curiosity

Fatticus produced her third and biggest batch one month later and we hardly lost any at all. On the fourteenth day after hatching, we dosed the tank against Velvet Disease and it did the trick. Believe it or not, the only thing that killed any of the 'cats' was curiosity. As they grew, we had to introduce an internal box filter to keep up with their voracious appetites. It was in this filter that we found sardine-packed, dead *Corydoras*. They had swum down into the base and got jammed. We transferred them to a tank that would accommodate an outside box filter and sold the last of them once they had grown.

I still have the Bouncing Bomb and her slimline partner. In the intervening years, all the spare tanks—there are now eight—have been used for breeding and raising various types of fish, for isolation and medication purposes, to house a stray snake (that's another story!) and to keep a fresh supply of Daphnia over the winter months. The lady still roes up at regular intervals and, with summer coming, I might just give her another chance this year.

In the other room, my sister had a plant called a Mother-of-Thousands. It's growing very well for her—I never had much luck with that plant. But if I gave my favourite *Corydoras* another shot at the jackpot? Well, I could always point to Fatticus with pride and say, "Yes, my Mother-of-Thousands is doing very nicely, thank you".

IDIOSYNC

Wrasses come in a bewildering array of shapes, colours and sizes. Gordon Kay of the British Marine Aquarists' Association and the West Midland Marine Aquarist Group selects some of the best species for the tropical marine aquarium

There can be few marine aquarists who do not have at least a nodding acquaintance with the engaging Cleaner Wrasse. The sight of a large Angel lying on its side to be attended to at the Cleaner's 'parlour' is enough to warm the heart of any fishkeeper. But what about the other members of the Wrasse family? There are some 600 species in the family known as Labridae, most of which can more than hold their own in the beauty stakes; and when it comes to interesting behaviour patterns they can have few equals. Let's have a look at some of the Wrasses found in the aquarium, with the emphasis on their little quirks, so you will know what to expect should you be tempted to buy one. All of the following fishes are commonly seen in dealers' tanks and most of them are easy to keep.

The Cleaner Wrasse (*Labroides dimidiatus*) is common throughout the Indo-Pacific, where it lives in pairs. Each pair sets up a cleaning station at some strategic place on the reef where they work from dawn to dusk, ridding the reef community of parasites and disease. All sorts of fishes come to the 'clinic' to be cleaned, standing shoulder to shoulder, patiently awaiting their turn.

Dusk sees an end to this activity. Large predators which, a little earlier, had been lying still to allow the little Cleaners to probe even into their gaping jaws, would have no compunction in eating them!

As well as being interesting to watch, a Cleaner Wrasse will provide a useful service in the aquarium, being a reliable indicator of parasites and disease. In a well maintained aquarium, however, it is unlikely to find enough food to keep it alive and so needs to be offered small items of food.

Be very careful when buying a Cleaner Wrasse, for there is a fish which looks for all the world like the real thing but will do untold damage to its tankmates. It is the False Cleaner (*Aspidontus taeniatus*). It does the same little dance as a Cleaner, to attract customers, but then rips scales and pieces of flesh from its victim. If the Cleaner you are about to buy has an underslung mouth, then leave it where it is.

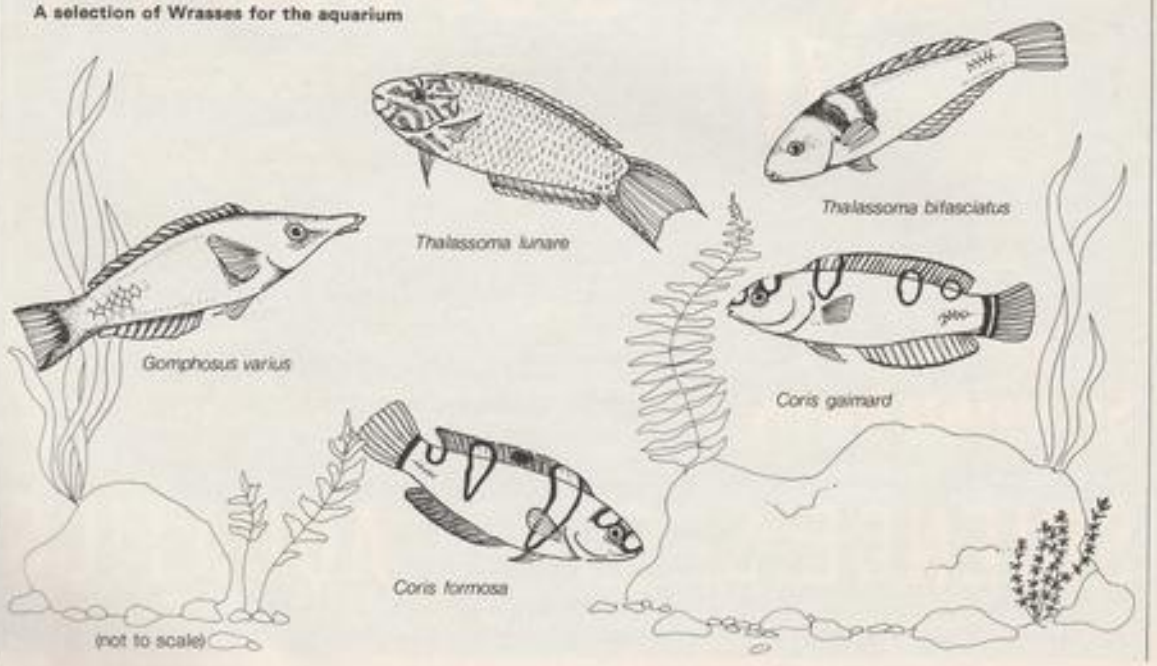
In complete contrast, the Lunar Wrasse (*Thalassoma lunare*) grows to 12 in. in length and is strikingly beautiful, being one of the few green fishes found in marine aquaria. They have violet markings on the head and a lovely lyre-shaped tail, giving rise to their alternative common name of Lyretail Wrasse. These fish come from the Indo-Pacific as well as the Red Sea.

The Lyretail Wrasse will eat anything, at any time—so feeding will be no problem. No problem for the Wrasse, that is, but its tankmates must be bold species that will compete for food. The Lyretail will push anything out of the way to get at its grub, so Butterflies and the like are definitely out.

Hyperactive

The amazing thing about this fish is its level of activity—it never, ever, stops! It glides around the tank, seemingly without effort, until it literally just zonks out in a shell. When that happens, nothing will wake it up until next morning when

A selection of Wrasses for the aquarium



WRASSES

A Cleaner Wrasse (*Labroides dimidiatus*) at work removing parasites from a Diagonal-lined Butterfly (*Chaetodon fasciatus*)

it is up and about all over again. With this in mind, it is considerate to provide this species with a large clam shell.

Another, closely related, species is the Bluehead Wrasse (*Thalassoma bifasciatum*). This is a gorgeous fish. The juveniles are pure yellow but the adults come in two colours. Most of them have a yellow back fading to pale cream on the underside. They have a dark brown spot on the front of the dorsal fin. The adult 'supermales', however, have a blue head and a greenish body with the two colours being separated by two black bands which have a white or light-blue band between. This fish is not as hardy as the previous species, being sensitive to water quality. They should be offered a wide variety of foods.

The Birdmouth Wrasse (*Gomphosus varius*) is a fish which is both hyper-active and shows strange colour variations. It is also very easy to sex, which is very unusual in marine fishes. The females are brown and the males are a lovely bluish-green. Both have the characteristic elongated snout which gives them their name.

Swimming endlessly

The Birdmouth behaves very much like the Lunar Wrasse, swimming endlessly all day in a Dolphin-like fashion, poking its 'beak' into crevices around the tank. This species also comes from the Indo-Pacific, is very hardy and grows to around 10 in.

No look at Wrasse species would be complete without a mention of the Clown Wrasses (*Coris gaimard* and *Coris formosa*). Just to confuse us, both are usually sold under the label of 'Clown Wrasse' or 'Coris Wrasse' and the beginner will have difficulty in distinguishing the two. In truth, there are a lot of dealers who don't seem to know the difference. Both are red with a white spot on the nose and four white bands spaced along the back of the fish. These white bands are edged with black. On the *Coris formosa*, the spot on the nose extends down both sides of the head and the second band on the back extends on both sides of the body to the belly. The real give-away is an oval spot on the dorsal fin.

When these fish reach about 3-5 in. in length, they start to change colour. When adult, *Coris gaimard* has sky-blue dots on a dark background, with a yellow caudal fin and green stripes on the head. An adult *formosa* is reddish-brown with large black spots. It has one green stripe on each side of the head, behind the eyes, and one behind each gill cover. Both species are nearly always sold as juveniles and grow to 14 in. or so. Guess where they come from!

Curious Habit

All members of the *Coris* genus have the curious habit of diving into the sand to sleep or when they are frightened. When first introduced, they will do just that and stay buried for up to three days. However, if left alone, they will come out to explore the tank all day before retiring into the sand again until next morning. They will bury themselves at approximately the same time every day and this can lead to problems. You could well buy a fish that will go to bed in the middle of the afternoon, long before you get home from work to start your feeding regime. You could try experimenting with your lighting routine in an attempt to fool the fish but this cannot be guaranteed to work.

Be sure to buy a *Coris* Wrasse only if you have enough sand on the bottom of your aquarium, to allow for its excavating habits. In other words, people who use the Tunze filtration system or similar will not have enough sand for a *Coris* to be happy.

Both of these species are relatively hardy, with *C. formosa* being tougher than *C. gaimard*. In fact, I personally know one adult *Coris formosa* which spent ten days trapped underneath the gravel-tidy in its owner's tank. When finally discovered, it had large patches of bare flesh on its sides and its jaw tissue had receded to such an extent that its teeth protruded out of its mouth. After a little extra care by its owner, to keep the wounds clean and free from infections, it is now in superb condition!

I do hope that this has whetted your appetite sufficiently for you to have a go at keeping a Wrasse. Whatever your leanings, the Wrasse family has something to please everyone. It is a big family and there are lots of other interesting members like the Twin-spot Wrasse which grows from a beautiful juvenile to a hump-headed monster.

One word of caution, however. In the wild, Wrasses are opportunist feeders which eat marine worms and all sorts of small marine invertebrates. They would wreak havoc in an invertebrate aquarium!

Naturalist's notebook

Introducing: The Marron

What is a Marron? This was a suggested introduction to 'fish-farming' which I considered a good test for the new *Oxford Dictionary of Natural History* (O.U.P., 688 pages, £20), which I had just received. It wasn't in it, but even with 12,000 entries, one cannot expect everything.

A Marron is the giant Australian Crayfish, *Cherax tenuimanus*, and if it ever gets into our rivers there will be a greater risk to native crays than the present-feared American Signal crayfish, already in some southern waters, escaped from fish-farms and a carrier of fungus disease. It is the third largest crayfish in the world, weighing up to 2·7 kg, a foot or more long and almost like a lobster.

Rare Blackfish

However, the dictionary does mention Britain's rare sea fish, the Blackfish or Black Ruffe, *Centrolophus niger*, from the North Atlantic caught at Cullercoates, Tynemouth at New Year, and heralded in the distorted angling interest as a new British record when, misleadingly, it was only the first caught on rod in British waters. It has long been known in the North Sea and the English Channel and caught from the Forth to Ireland. Most misleading lists of maximum weights of British fish are published when they are only those caught by fair angling and are often well below the known maximum.

The Blackfish grows to nearly 2 ft long, rather elongated, and allied to Mackerel. A peculiarity of Blackfish is that their oesophagus is lined with hooked teeth. Unfortunately, the same name is given to the unrelated Alaskan Blackfish, *Dallia pectoralis*, a freshwater fish reputedly frozen in the winter ice of peat-bogs but surviving temperatures down to minus 20°C only when there are no ice crystals on the body. Most stories of ice-bound specimens are myths.

Special Protection for the Wels

One of Sweden's rarest fish the Wels or European Catfish, also called Sheathfish, *Silurus glanis*, is to receive special protection because it does not breed every year, owing to fluctuations in local weather. Once widespread, it has been endangered by the building of dams and by water pollution. Breeding experiments have been started in the hope of restocking waters and specimens have been fitted with ultrasonic transmitters for further studies in one of the three rivers inhabited by Sheathfish.

Known also as the Danubian Catfish, this large, scaleless fish has been introduced to British waters from Woburn Abbey and Leighton Buzzard lakes to Tring reservoirs, and Claydon lakes in Bucks. It has grown to over 70 lb here, but the ease with which it is kept in the aquarium is countered by the possibility of that weight increasing to over 500 lb and the smaller American Catfish is preferred. These spawn in summer, laying adhesive eggs on water plants in the shallows. They are Europe's largest freshwater fish, barring introduced Indian Grass-carp. Old specimens rarely move from the muddy bottom in which they lie buried with only the eyes and barbels showing, sucking in smaller fish attracted to them.

Suggestions that this predatory catfish's prey extends from frogs to ducks and geese swimming on the surface needs confirmation. Gesner even asserted a human head and hand were found in one specimen!

Shining Habits

The Bannerfin Shiner, *Notropis leedsi*, is a little known North American cyprinid belonging to a group which evolved, for better survival, the habit of spawning in narrow crevices. But its spawning behaviour was unknown until recent observations in a Tulane University, New Orleans, aquarium. The males establish and defend a breeding territory at a suitable crevice with mock battles and chasing away intruders. To simulate this, two clay tiles were placed 7 cm apart, separated by silicon beads and laid flat on two jars.

Males display by raising dorsal and white anal fins, circling clockwise and anti-clockwise; then suddenly one butts the other's side with its snout, and the other responds. They may break and swim parallel in line with fins erect, showing their broad, dark lateral lines and white tubercles, then circle again until the more aggressive male controls the site. In the related Spotfin Shiner, *Spilopterus*, males grab rivals by anal or pelvic fins with their mouths.

Females, which meanwhile school in midwater, gather round the dominant male, and wherever one selects a spawning place in its territory, he joins her. He may first put his snout in the crevice, then his anal fin and part of the caudal and slowly move his body along the crevice, testing its suitability for depositing his milt as well as a courtship display. Finally, the more uniform grey female, with more bluish-grey lateral line, swims close along the crevice with her vent close to it, while the male swims up and below her. The two swim along it, he, always behind, until the female, suddenly arching her body, ejects 5 to 15 eggs with force some 4 cm into the crevice, and then leaves upwards. The male circles round and eats any eggs that fall out of the crevice. The female spawns every few minutes for 15 to 45 mins, her entire laying being 26-228 eggs in intervals of 4 to 5 days, occasionally 3 to 10 days. About 10% of eggs turn white and fail, fertilised ones remaining almost transparent with the yolk visible.

Dams and pollution pose major threats to the Wels

PHOTOGRAPH COURTESY LONDON ZOO AQUARIUM

On the test bench by Ian C. Sellick

Technical Aquatic Products

Every so often, a new company appears on the aquatic scene that is different from the plethora of small firms that come and go in the generality of things. Such a company, from the incredible range of products it is about to unleash on the market, is Technical Aquatic Products (TAP).

In 1986, TAP are introducing a range of good aquarium remedies developed and formulated by themselves, are becoming the agents for the simplest, accurate and best value for money test kits ever to come out of Germany, are producing some truly unique products, such as an 'Appetite Stimulator' for fish, are even entering the hardware field with undergravel filters on the cards, and are marketing an amazing filter to add on to your power filter that will remove protozoa from water, in addition to fungi and many bacteria.

Introducing such a range of products is no good if these are virtual carbon copies. According to their literature, the research and development phase, particularly of the remedies, was 4 years before marketing trials were performed in 1985. The products all have Ministry of Agriculture, Fisheries and Food (MAFF) approval.

White Spot Remedy appears to be based on the traditional malachite green formulation, and I therefore see no reason why it should not be effective. At £1·80 for a 50ml bottle (i.e. enough to treat 500 gallons) it is remarkably good value for money, although care needs to be taken in calculating tank volumes with low drop per gallon remedies. A warning on the label suggests the aquarist be careful if using White Spot Remedy with *Botia*. This, as with similar warnings on other products in the range, I take as an indication of the care taken in research, rather than a bad sign: any new product should be tried with as many fish as is possible and the aquarist informed of any reactions; this is the sign of a caring company.

Fungus Cure is a little different from the norm in that it is not designed to be used as an in-tank remedy, but as a dip. The contents of the bottle (a blue coloured formulation) are to be used as a 3% solution, the whole bottle being added to 2 litres of water and netted fish dipped in for 45 seconds. Fungus cure is £1·80 per bottle.

Broad Spectrum Bactericide. Used at the rate of one drop per gallon, and added at this rate daily for a week, it is claimed it will control "fin rot, fungus and general disorders". It can also be used to swab the skin of fish to, for instance, clean wounds, and may be used to clean nets, equipment and live foods. A blue/green liquid, Broad Spectrum Bactericide can be used in both fresh and salt water. If it works as well as claimed, £1·99 for a 50ml (500 drop) bottle or £3·99 for the 125ml size seem extremely good value compared with other products on the market with identical claims.

Above: Copper Test Kit distributed by Technical Aquatic Products includes simple pictogram instructions and clear colour comparator scale

Right: The range of remedies manufactured by Technical Aquatic Products. Clearly labelled, good value for money products

Paracure is a remedy for external parasites, particularly flukes, and again, a plus, may be used both in fresh and saltwater aquaria. Paracure is sold in 50ml bottles at £1·99 and 125ml at £3·99.

For the marine aquarist, **Marine Multicure,** I am informed, is not based just on copper, but also on other transition metals for maximum effectiveness. Again, cost effectiveness is the principal feature, 50ml is again only £1·99, 125ml just £3·99. In practical terms, this means that a five foot marine tank containing, say 50 gallons of water, can have a whole course of treatment (over 2 weeks) for just the cost of a small bottle of Marine Multicure—£1·99. That I find truly good value. The usual caveats apply with this genre of cure—do not use in tanks with invertebrates, or with sharks or rays.

TAP's **Dechlorinator** is rather different from any other on the market, in that it is a two part product. Each pack of **Dechlorinator** contains two 125ml bottles, used sequentially. The first, Part A, is used at 10 drops per gallon, the water mixed well, then Part B is added an hour later. This product is extremely effective, not only against chlorine, but will also deal with chloramine, a much more harmful chemical to fish, that is often left untouched by conventional dechlorinators. The pack of two bottles costs £2·99 and is enough to treat 125 gallons.

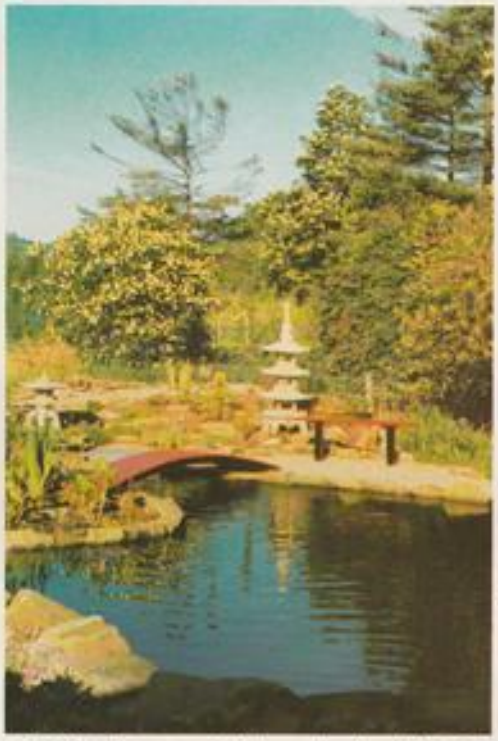
Establish is a somewhat more difficult product to judge. It is actually an aid to the preparation of biological filtration in the aquarium, whether that be undergravel filters, trickle filters or external canister filters. Ways of helping bacterial colonies to become established in new tanks are always welcome. TAP seem to have identified a need and produced a product to fit that need. Probably of most interest to the marine aquarist wishing to quickly introduce delicate specimens, **Establish** retails at £2·49 per 125mls.

Other TAP products include Marine Buffer, pH Adjusters, Marine Carbon, Ammonia Remover, Test Kits, and an ingenious disposable Capsule Filter.

All in all, Technical Aquatic Products have launched an impressive range of products on to the market following what seems to be considerable research into market needs. What they seem to bring is quality and efficiency, coupled with good value for money. Having seen the trade discounts offered, I can see that retailers will be more than happy to stock their products too.

For the latest catalogue, telephone Winterbourne (0454) 778160.

SO YOU WANT TO BE A KOI~KEEPER!



A garden given over to Koi can be a beautiful sight

Koi can transform your life, as John Culvelier of the B.K.K.S., knows only too well. Here he presents several options open to the potential Koi-keeper hoping to build a pond for these majestic fish

If you have decided to read this article, and do not as yet possess a Koi pool, you could be about to commit yourself to a course of action which will transform the lives of you and yours! This is no exaggeration, as five minutes conversation with any Koi-keeping family will confirm. Should you already be a Koi-keeper, you'll read on anyway, as the word 'Koi' attracts the undivided attention of any enthusiast, however expert!

What I hope to do in the course of this

A small part of the author's large Koi collection

article is to acquaint the newcomer to the hobby with the various options open to him or her as regards the construction of a pool suitable as a home for these delightful creatures.

Broadly speaking, Koi-keepers can be divided into 3 main groups, each group being sub-divided yet again as we shall see anon. **Group 1,** we can call the 'Collectors', their all-consuming interest being the quality of the fish they collect, always striving to obtain fish of better colour and pattern with which to improve their collection. Needless to say, only the financially foetunate can belong to this group, as very high class examples of Koi command appropeiately high purchase prices!

Group 2, we can call the 'Water Gardeners', the lucky few who have been able to improve upon a natural pool by means of careful landscaping, with perhaps the addition of filtration and, of course, some Koi. There are not too many who come within this group but those pools of this type I have come across have been a delight to behold, combining as they do, natural surroundings with the colours of their Koi.

The vast majority of Koi-keepers come under the umbrella of **Group 3,** (myself included), a collective name being somewhat difficult to coin, as they are basically a combination of the previous groups with a bias towards Group 2, because of financial constraints. These are the enthusiasts who start off with a normal garden, be it a 'Postage Stamp' sized plot or, like mine, a third of an acre, and transform it into a stretch of water looking as natural as circumstances permit.

Before starting to outline the various construction options, some mention must be made of filtration. This subject would fill a book on its own and should really be covered before the actual pool proper as, in reality, the filter is the most important part of any Koi set-up. But human nature being what it is, you are more interested in getting started on your pool. You'll learn!! Come what may, in designing your pool you must be aware that filtration is essential if you are to achieve your goal of a pool containing sparkling clear water in which your Koi can be seen in all their glory, so allow plenty of space for a filter system in your plans. (An area equivalent to, at least, one third of the surface area of your pool).

Whichever type of construction you decide to employ, there is one major hurdle to overcome, THE HOLE! You cannot escape, it has to be dug. What you *can* do is to ensure you do not dig it any deeper than is absolutely necessary! I have seen pools which were 9 feet deep! Now I'm no masochist, and I'm sure you are not, so take it from me, the optimum depth for your Koi pool is 5 feet. At this depth winter temperature fluctuations are insignificant, there is adequate swimming room for the Koi to exercise their muscles and stimulate growth, and pool maintenance is that much easier. Every foot of depth in excess of the above figure is an unnecessary load upon both pocket and muscles of the digger.

The 'puddled' clay pool

This is the most natural type of pool, only possible where the ground is composed of heavy clay. Briefly, after digging of the excavation is completed, the interior is 'compacted' to the point at which it becomes watertight. This type of pool is fraught with difficulties with regard to keeping it clear, firstly because Koi, being members of the Carp family, like nothing better than nosing around the bottom of a muddy pool creating clouds of silt. Secondly, the installation of a pump, should you wish to filter the pool, can also be difficult. Thirdly, pool maintenance is a filthy task; the less said the better! On balance, this type of pool should be considered as a last resort.

Glass fibre

This material has gained many converts in the recent past. Two methods of using this material are currently available the most interesting of which uses the technique of 'blowing' a resin/fibre mix directly on to the walls of the excavation, assuming the walls are firm and sound. The second method is the traditional laying up of glass matting and resin to the surface of a concrete block, cement rendered excavation, although I understand that some success has been found with direct application to the walls in a similar manner to 'blowing'. Some difficulty may be found in obtaining a good 'bond' between the glass fibre and the PVC/ABS piping used for services etc. Glass fibre does tend to be somewhat expensive when compared to other methods, although, no doubt, the installers using this material would dispute that comment. The application of this material is something I would recommend be left to the professionals as it is appallingly messy.

'Liner' pools

This is probably the most popular method in use today. Various types of material are used as liners, ranging from ordinary polythene sheet, PVC, some of which is reinforced, through to the most popular, buytl rubber. The last of these will give the longest service, (approx. 15 years) and so is that much more expensive than the others, particularly in the heavier grades. The only recommended use for polythene is really as a temporary holding pool for fish in an emergency as it degrades very rapidly, especially when subjected to direct sunlight.

It is not possible to 'stretch' a butyl liner into a Koi pool, the method beloved by the writers in water gardening publications, owing to the depth involved. Rather, the liner must either be 'tailored' by means of welding prior to installation or folded into position in the excavation, resulting in unsightly pleats which gather dirt and mulm at an unbelievable rate. The use of any type of liner does limit the user to a formal or, at best, a semi-formal design of pool although I feel certain that anyone with a bottomless purse could have any shape fabricated 'on site'. Great care must be taken to ensure that the liner, when filled with water, is not subjected to any stress due to incorrect positioning, particularly where pipe connections are situated, as there have been instances of liners tearing with obvious results. Having said all that, there must be countless hundreds of liner pools around the country giving every satisfaction, so the reader must make up his /her own mind.

Concrete pools

This traditional method of constructing a pool fell into disgrace with the advent of the liner. The liner does not suffer from frost damage, cracking etc. The liner pool is certainly easier to install and you can put your fish into a liner pool virtually straight away. However, the advent of new materials and techniques has given us the 'hi-tech,' concrete pool, impervious to all that winter can throw at us, highly resistant to cracking, and the capability of moulding the shape of your pool to what you would really like! OK, so it takes a bit longer to build, is harder work if you DIY, might even cost a little more although that point could be argued, but the finished job is there forever. There have been a number of articles published covering the construction of concrete pools where vast quantities of 9 in. × 9 in. × 18 in. blocks, supported by miles of steel reinforcing rods, have been used for the job. Forget all that! The only people to benefit are the builders' merchants. Unless you build your pool in an area where the soil and sub-soil is very light and sandy, the 9 in. × 4 in. × 18 in. dense concrete block is perfectly adequate provided you use the material reviewed in this very magazine a couple of years ago. I refer to a material which goes under the title of 'Fibromix', a fibre which when added to a rich cement mix results in an incredibly strong rendering material. My own 8,000 gallon pool was built 3 years ago using the above system and I'm still delighted with it.

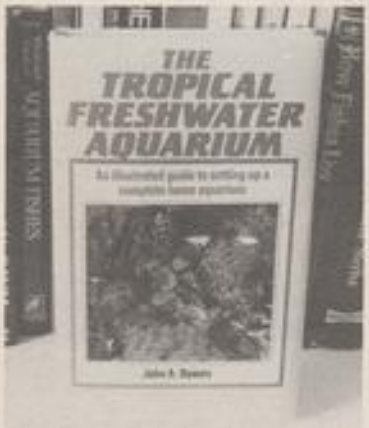
You may recall at the beginning of this article, the grouping of Koi-keepers into three types. The sub-division of these groups takes place at the design stage and is governed by our old friend, lolly, lucre, loot, call it what you will. Your final efforts will obviously be related to the size of your wallet. The beauty of Koi-keeping is that just about anyone can enjoy it.

One final plea before closing. Prior to picking up your spade or indeed, your pencil and ruler, do please contact other Koi-keepers, either through the National Society, your local dealer or Garden Centre, or by word of mouth. Go and look at as many pools as possible, picking the brains of the owners who will be only too happy to help, and you will save yourself a lot of cash and wasted effort.

Books

An essential aquarium guide

The Tropical Freshwater Aquarium
John Dawes
Hamlyn: £6·95
ISBN 0-600-30649-6



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Subtitled "An Illustrated Guide to Setting Up a Complete Home Aquarium", this seems to me a very apt description. The flyleaf objective of the book is to "enable readers to set up their own aquarium confidently and successfully". The book, in 160 pages, achieves this objective admirably. The practical sections, comprising some 70 pages, are clear and detailed, but not so complex the beginner couldn't understand them. There is no shying away from technicalities and scientific terms; these are explained as they are come to.

Starting off with the basic requirements of the home aquarium, the reader is rapidly passed on to a short section dealing with what fish are, and what plants are. Obvious though the answers may seem, this potted biology is not out of place.

Fish nutrition, both the biological requirement and how to satisfy it, are very fully covered, with useful summaries of available food types, plus live foods.

20 pages are devoted to fish health, with some good common sense being expounded. Not 20 pages about White Spot, but including all areas of fish health, including the all-too-often forgotten environmental ones (e.g. water quality). Summary tables help possible diagnosis, and there are a few good illustrations, albeit sometimes rather inappropeiately placed in the text.

In the chapter on fish reproduction, there is a summary of the main reproductive strategies in freshwater fish, with some good diagrams and photos, particularly of the livebearers.

Finally, 18 pages on 'The Aquarium'. This section should be required reading for all, but particularly the novice aquarist. Simple discussions on filtration, water hardness and pH, heating, etc., are followed by a logical, step-by-step summary of how to set up a tank, split into 10 'Phases', each with a number of important points. While I would disagree with the absolute order of some of the points within the 'phases' (such as the instruction "fill aquarium and test for leaks" coming before "lay polystyrene sheet on the aquarium stand"), there is nothing that appears to have been left out.

The remainder of the book is devoted to a brief discussion of about 100 species of fish, all fully illustrated with colour photos, and 20 different plants, illustrated with excellent colour paintings. The selections are fairly traditional, although do include a few of the more exotic species now becoming commonplace in the aquarium, such as Fire-eels and *Cyphotilapia frontosa*. The description of each fish is very brief, but the intention of the book is not as a species-atlas. Its main purpose, to assist the aquarist in setting up and maintaining his aquarium, it achieves well.

At only £6·95, there is no excuse for not adding this book to your collection, nor for not making sure that every novice has it included in his initial list of essential ingredients for a successful freshwater aquarium.

Ian C. Sellick

Fascinating insight

Catfishes of the World
Volume 5 (Bagridae and Others)
David Sands
(Dunure Enterprises, £15·00, paperback and looseleaf)

Right to the last, the author's irrepressible enthusiasm still shines through. In this final volume the collection of genera is very much a mixed bag but, true to the title of the series, "Catfishes of the World", even coldwater and marine catfishes are included.

South American, African, Asian, North American and European species are described in four sections. Included are fish such as the 'notorious' *Clarias*, *Malapterurus*, the Electric Catfish, *Kryptopterus*, the Glass Catfish and the Bumblebee Catfish *Leiocassis*.

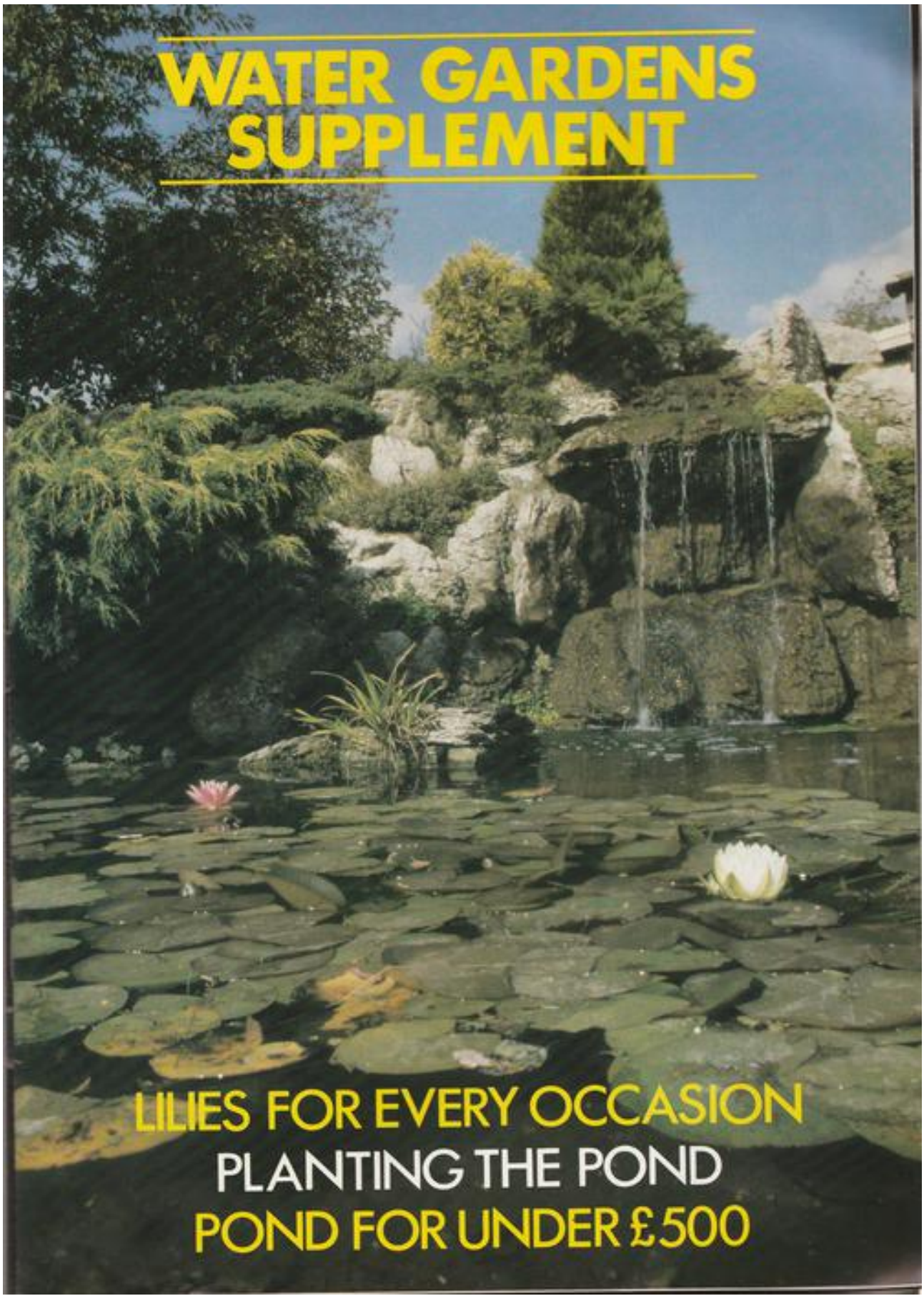
Once more, the author has managed to collect some fascinating information—there are delightful line-illustrations of the lifestyle activity (including spawning behaviour) of *Clarias gariepinus*. Contributions from Australia, a concise key to *Mystus* by Dr. J. C. Jayaram, and a treatise on two re-classified *Mystus* spp (now *Aorichthys*) by Dr. D. Price lend extra scientific weight to the book.

Illustrated throughout with excellent colour photographs, the work is completed with useful Feeding Charts, Glossary and Bibliography.

In the six years from the first Volume, the author freely admits to having to continually learn about problems of book production, and sometimes the reader will find his 'learning curve' both a rewarding and sometimes arduous experience, but always fascinating. We can only echo the words of Dr. Jayaram, "I hope this series of volumes would attract many more ichthyologists to catfish study."

There are two Supplements each for Looseleaf Volumes One and Two available at £4·95 each and a triple Supplement pack containing a Third Supplement for Volume One, and first Supplements for Volumes Three and Four. The triple pack costs £15·00 and you also get a free Index for Volumes One, Two and Four.

Dick Mills


WATER GARDENS
SUPPLEMENT
LILIES FOR EVERY OCCASION
PLANTING THE POND
POND FOR UNDER £500

A POND FOR UNDER £500—IN A WEEK!

It can be done! Stephen Smith describes how he and a friend tackled the challenge—and won

I didn't really feel it could be done, but when a friend of mine asked me to help him to construct a budget-priced pond within a matter of days I found the challenge just too hard to resist.

A six-inch layer of concrete was all that could be seen on the chosen site of the pond. Torrential rain did nothing for our enthusiasm—though it must have spurred us on as we had lifted the last of the rubble in a day, and I would easily have estimated three times that for even the most hardened labourer!

Day Two: This is where it all had to be done properly. In view of the short timescale and lack of budget, it was decided to build the walls using timber roofing joists. The straight edge of the pond was to be approximately 14 feet long, and against a wall which was already in-situ, while the shape was to be semi-circular.

Having calculated the lengths of each section of joists, these were placed in position.

At this stage great care had to be taken to ensure that the whole structure was laid level, and hardcore put to one side from stage one was used to provide a foundation for the joists.

The following day was spent digging the hole itself. The pond was to have a maximum depth of no less than three feet, and torrential rain was no help to the task, which involved heaving our way through virtually solid clay.

With us sloshing about in a mud-bath under the downpour, neighbours must surely have wondered about our sanity, despite oilskin coats and waterproof leggings (highly recommended for losing weight though!).

Day four and at last an end to the rain! A three inch layer of soft sand over the base and sides of the pond enabled us to see for the first time that we really were getting there.

Next—the pond liner.

One thousand gauge black polythene liner was used for the task. The pond took about five hours to fill while the liner was constantly adjusted to smooth out creases and tuck corners in neatly.

This job was done barefoot in order not to puncture the liner with stones or heavy boots.

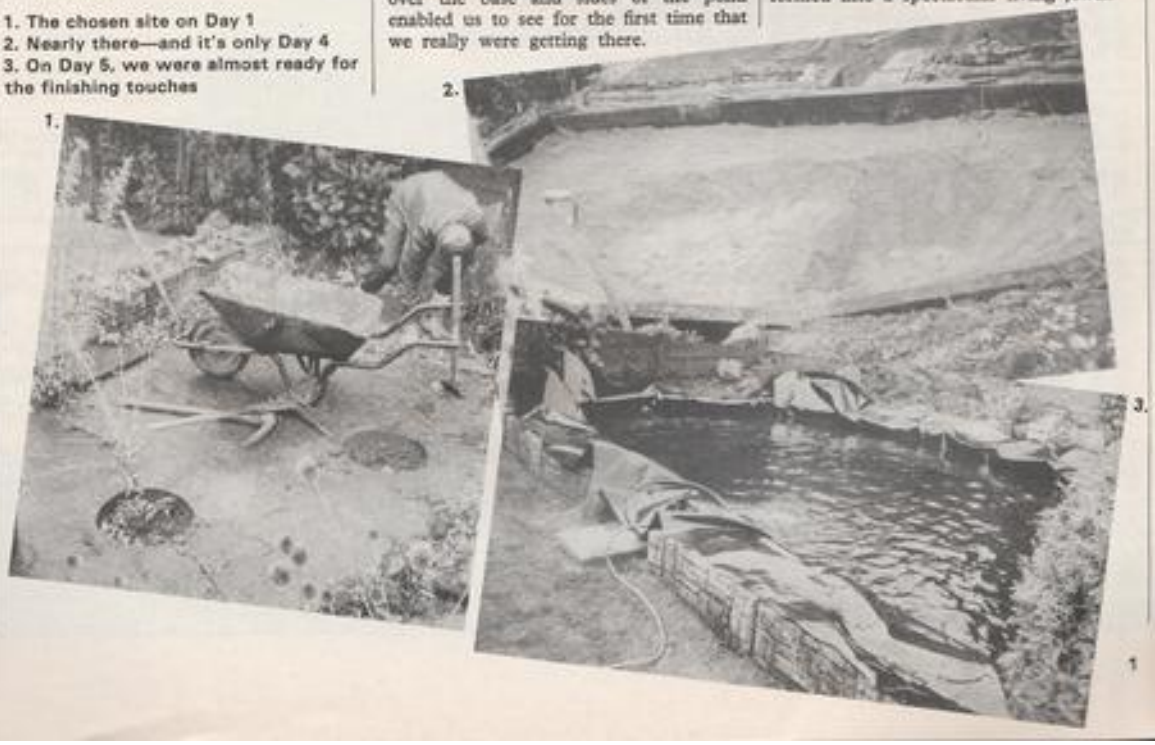
Once the pond was full the liner was trimmed and nailed carefully to the top of the joists using roofing nails.

Finally, crazy-paving slabs were used to cap the walls, and rockery around the circular edge of the pond was banked behind to just below the capping.

A huge Lily was introduced to the new feature and the pond began to come alive. After the introduction of Irises and several other marginal plants, Comets, Shubunkins and other fancy fish were eventually introduced to their new surroundings.

After only five days and still with change from £500 after paying for materials and delivery, labour and other expenses, a lifeless concrete oval in the middle of the garden had been transformed into a spectacular living jewel.

1. The chosen site on Day 1
2. Nearly there—and it's only Day 4
3. On Day 5, we were almost ready for the finishing touches



PLANTING THE POND

May is an exciting month for water gardeners, as Bill Heritage of Wildwoods demonstrates in this comprehensive illustrated guide to pond plants

THE green pea-soup discoloration of pond water, all too familiar to most pond-keepers, is caused by a myriad tiny green plants—single-celled algae. Like any other green plants they need two things to survive: nutrients and sunlight. If they can be deprived of either they will be in trouble. If they are substantially deprived of both they have no chance of survival. They die, the water clears, and we have that happy condition referred to as 'pond balance'.

No such thing

Pond balance is a term that requires examination. In reality there is no such thing. In any pond, things are always in a state of change. Nothing is ever static. Innumerable life forms multiply and then decline, waxing and waning with no visible evidence of their existence, unlike the algae whose presence is only too obvious. I use 'pond balance' simply to describe the situation when water has become, and remains, clear. To achieve and maintain this state of affairs without resorting to algicides or filters is one of the aims of pond planting. The other, of course, is to achieve the greatest possible ornamental effect with attractive flowers and foliage. Some aquatic plants, though undoubtedly ornamental, have little effect on pond balance; some are of enormous practical value but aren't much to look at; and some combine both beauty and utility. In the last category the most important by far are the Water Lilies, though Water Hawthorn (*Aponogeton*) and Water Fringe (*Nymphoides*) are not to be despised on either count.

Dual-purpose plants

With superb flowers—like water-borne Camellias—produced from June to September or later, and spreading pads that shade the water so effectively, lillies are the perfect dual-purpose pond plant.

They are hardy and easy to grow. There are 70 different varieties commercially available in this country, which makes it all the more regrettable that most ponds boast nothing more adventurous than white, anaemic pink and pale yellow varieties. Such superior lilies as the carmine James Brydon, rich pink Rose Arey, deep yellow Sunrise, very dark red William Falconer, and very double white Gonnere will not be found in every garden centre, but they are well worth the trouble of visiting a specialist water-plant grower. Lilies vary somewhat in their depth requirements but a pond depth of 18 to 24 inches (leaving 10 to 16 inches of water over a container 8 inches deep) will admirably suit the majority.

Starving the algae

Submerged oxygenating plants are the other half of the partnership that keeps the water clear. Lilies steal the light, oxygenators soak up nutrients dissolved in the water, thus starving the algae. In addition to keeping it clear, oxygenators have a tremendous effect on the quality of the water. The total area of the leaves and stems in a thick bed of (for example) *Lagarosiphon major*, better known as *Elodea crispa*, is quite enormous, and every square millimetre is clothed with microscopic organisms helping the plants in the process of converting fish wastes and other decaying organic material into healthy plant and animal tissue. A good bed of oxygenators is the original biological

WATER GARDENS

Lobelia fulgens grows best in shallow water around the pond margin

A large bed of *Pontederia cordata* in bloom (foreground) is a magnificent sight

Marginals in 5" pots soon root through. 8" square pots hold far more soil and have greater stability

The impressive blooms of the Water Hyacinth *(Eichhornia)* are seldom seen in their full glory in outdoor ponds

Water Hawthorn *(Aponogeton distachyus)* combines beauty with utility and is delicately scented

Lilies should be planted in the largest available containers, finishing the soil off with a layer of gravel

filtration system. Hornwort (*Ceratophyllum*) is as valuable as *Elodea* and, being slightly bristly, is less palatable to fish. It doesn't have to be planted.

The oasis effect

Marginal plants are the ones that grow on the shelf with their toes in the water. With flowers and leaves held well above the surface they have no oxygenating and little shading effect on the water. From the practical point of view the pond could do without them, but a number have highly ornamental flowers or foliage and help to create the oasis effect which is so desirable.

Floating plants, in the main, are neither use nor ornament. *Azolla* certainly creates surface cover, but doesn't know when to stop and can be almost as much of a nuisance as the pestilential Duckweed, *Lemna minor*. Water soldier (*Stratiotes*) is a likeable curiosity but spends most of the time sitting on the bottom. Frogbit (*Hydrocharis*) is just snail fodder. And the Water Hyacinth (*Eichhornia*), which has really beautiful flowers under glass, won't produce them (or survive the winter) outdoors in this country.

The best time for planting aquatics is when their roots are actively growing and when the water is warm enough for them to get established and grow away without check. In general terms this means from mid-May through the summer, even into September in favourable seasons, though some marginals may be ready earlier and *Elodea crispa* seems

WATER GARDENS

A Selection of Ornamental Plants for the Marginal Shelf

Name	Characteristics	Height	Season	Depth*
Acorus calamus variegatus Variegated Sweet Flag	Leaves boldly striped with green and cream. Creeping rhizome	30 ins	Summer	0-2 ins
Calla palustris Bog Arum	White arum-type spathes, followed by orange berries. Shining dark green leaves. Low, spreading growth	6 ins	June	0-3 ins
Caltha palustris plena Double Marsh Marigold	The showiest of a useful family. Compact and tidy. Abundant yellow blooms. A must.	9 ins	March-May	0-1 ins
Eriophorum angustifolium Cotton Grass	Rapidly spreading grassy foliage flying banners of silky white down.	18 ins	June-August	1-3 ins
Houttuynia cordata plena	Double form of an attractive plant with red stems and blue-green leaves. White petals edged with crimson.	18 ins	June-July	0-4 ins
Iris laevigata Japanese Water Iris	Lavender blue flowers. I.l 'Snowdrift' has white flowers; I.l 'Colchesteri' is white mottled with blue.	24-30 ins	June	2-4 ins
Iris laevigata variegata	Superb variegation persists; flowers blue. First choice.	24-30 ins	All summer	2-4 ins
Iris pseudacorus Common Yellow Flag	Vigorous and very nearly indestructible. When established it can be moved into 12 ins of water.	3-4 ft	May	0-6 ins
Iris pseudacorus variegatus	Leaves striped yellow/green, fading to green in June. Compact.	2-3 ft	Early summer	0-4 ins
Lobelia cardinalis (*L. fulgens*)	Purplish foliage and flower spikes of the most vivid red. Stems are often damaged by water snails.	3-4 ft	Aug.-Oct.	2-6 ins
Mimulus guttatus frequently listed as *M. luteus*	Cheerful yellow flowers, spotted with red, through the summer. Not long-lived, but survived by many seedlings.	12-18 ins	May-August	0-2 ins
Pontederia cordata Pickerel Weed	Shining leaves and spikes of lavender blue flowers. Restrained growth and valuable late flowering period.	30 ins	July-Sept.	2-4 ins
Sagittaria japonica plena Double Arrowhead	Arrowhead with handsome leaves and very double white flowers, like tiny snowballs.	18-24 ins	July-August	4-6 ins
Scirpus zebrinus Zebra Rush; Porcupine Rush	Favourite foliage plant whose 'quills' are banded alternately green and white. Needs splitting every 3 years.	3-4 ft	All summer	2-4 ins
Typha angustifolia Slender Reed Mace	These are the plants that are often called 'Bulrushes', a name that properly belongs to *Scirpus lacustris*. They need to be controlled by planting in containers. Even so, roots will try to wander. *T. minima* is the best bet.	5-6 ft	Summer	3-6 ins
Typha minima Dwarf Reed Mace		18-24 ins	Summer	2-4 ins

*Water depth in inches over the soil, whether in a trough, a container, or a natural mud bottom.

to be prepared to root at almost any time. Some specialists supply aquatics ready-planted in containers just about large enough for one growing season. Transferring these to your pond involves no root disturbance and can be done at any time of year.

Speed of execution

Growing in containers has many advantages over the older method of spreading an eight-inch soil layer over the entire pool bottom, not least when it comes to cleaning out. But do make sure to use the largest possible for lilies, even a plastic laundry basket for the very vigorous varieties, if the pond is deep enough; and use broad-based pots for marginals for the sake of stability. Plastic seed trays are excellent for oxygenators.

The ideal soil is a heavy loam but any reasonable garden soil can be used. Avoid peat and peat-based composts. Soil-based John Innes No. 3 is satisfactory.

A very important aspect of planting is speed of execution and, for a complete pond-planting job, this requires some forward planning. Try to have all necessary soil, containers, container liners and gravel on site with, if not before, the plants—and muscular help if large containers are involved! Keep plants wrapped, or immersed in water, while awaiting attention, and don't do the planting out in the sun. Move each container into the pond (and this applies especially to oxygenators) the moment it is finished. Floating plants and Hornwort, of course, are just dropped in.

THE WATER GARDEN SCENE

Watergardening is fast becoming one of the most popular aquatic pastimes in the country. Visit your nearest water garden centre to sample this colourful, exciting aspect of the hobby

Ten years ago, there were relatively few places that could genuinely be regarded as water garden centres in the strict sense of the word. Today, things have changed dramatically and the term "Water Garden Centre" has become part of our everyday vocabulary as more and more such enterprises open up and down the country. With this welcome expansion has come a gradual widening of the 'definition' of what a water garden centre actually is.

To the purists, only those places given over entirely to the needs of pondkeepers and watergardeners would qualify as *true* "Water Garden Centres". At the other extreme, some people would regard *any* aquatic department within an existing garden centre as constituting a water-garden section. While the latter view may lack some credibility, it does show that there is tremendous scope for diversity within the general, overall concept. One thing is certain—no two water garden centres are alike—and long may this diversity survive.

If you have visited a water garden centre, then you'll know just how pleasant and rewarding the experience is. If you haven't visited one yet—you are well overdue. Use the first opportunity that comes your way and the chances are that you will get hooked—just like so many of us have become over the years.

One great thing about these centres is that the vast majority will cater for your every need in terms of plants, fish and equipment—be that a small submersible pump, a large glass-fibre pond, or just a single Marsh Marigold or Common Goldfish. But there's more . . .*much* more.

Some places have huge exhibits that are outside the scope (financially and spatially) of the vast majority of pond-keepers. This in itself is, of course, a major attraction. After all, if you cannot have a huge lake in your garden brimming over with large, colourful healthy Koi, then the only way you are going to be able to enjoy this visual feast is to visit a water garden centre that has such a feature—Stapeley, for example.

Other centres, like the Japanese Water

One of the fully established ponds at Egmont Water Garden Centre. (*Photo:* Egmont)

Blagdon's Henri Studio range includes some interesting and original pond ornaments (*Photo:* Blagdon)

WATER GARDENS

Part of the outdoor display of coldwater fish at the Japanese Water Gardens (*Photo:* Japanese Water Gardens)

The spectacular 60' x 30' lake at Stapeley Water Gardens contains magnificent Koi such as these (*Photo:* Stapeley)

Gardens have impressive Oriental layouts which will provide you with a wealth of ideas for your own Japanese-style water garden. If you want to take things further, Japanese Water Gardens even have annual tours of Japan to allow clients to visit Koi farms and breeders.

Not every member of the family may be a keen pond/water garden enthusiast, of course. If their inclination lies elsewhere, be that in tropical or marine fishkeeping, then many places, such as Wildwoods or Matlock Waterlife Centre, are just ideal. The former was recently featured in one of our Company Profiles. The latter is attached to Matlock Garden Centre and, therefore, offers yet another series of opportunities for both traditional gardeners as well as those who fully appreciate the concept of the water garden, treating their pond as an integral component of the *whole* garden. Incidentally, at Matlock you can also see the highly sophisticated Minireef for marine tanks in operation as well as an impressive display of Bonsai and a formal Japanese Water Garden.

Although (as our Supplement photograph taken at Wildwoods shows), fully established water features take time to develop, seeing a well-designed mature layout can provide a wealth of ideas for adapting to your own circumstances and needs.

Since the very people who design these features are on hand at water garden centres, expert advice can be obtained on-the-spot. It is difficult to put a price on the value of this advice but, as all successful watergardeners will testify, it is immense. There is no doubt that it can mean the difference between spectacular success and equally spectacular failure. And the advice does not stop at helping you decide which pump to buy or what fish to stock your pond with.

Visitors to Matlock Waterlife Centre will be able to see a formal Japanese Water Garden containing beautiful Koi. Also on permanent show is a large selection of Japanese Bonsai trees (*Photo:* Matlock Waterlife)

In many cases, it goes all the way from designing a complete water garden to its eventual construction and installation. At Egmont Water Garden Centre, for example, there is a series of complete pond and water garden displays which include the price of each item as well as that of the whole set-up. Therefore, if you visit this centre and like one of the displays sufficiently to have it installed in your own garden—it can be done—and you are likely to know more or less what it's going to cost you from the start.

Land- and aquascaping is a service offered by many enterprising water garden centres, some of which own their own nurseries, either for hatching and growing fish or for propagating plants or even both.

Maydencroft Aquatic Nurseries, for instance, built their facilities specifically to cater for the needs of all coldwater enthusiasts and, therefore, have included both plant and fish-growing areas at their Gosmore site.

Highlands Water Gardens, while selling fish and all other coldwater requirements, specialise in plants and have extensive propagating, growing and display facilities which are guaranteed to win the heart of even the most hardened cynic.

Blagdon Water Garden Centre is yet another large, spectacular magnet, this time in Avon, for pondkeepers and watergardeners from all over the country. In addition, they (like some others) can offer their own range of pond products (the Henri Studio range in this case) which includes a very interesting and attractive assortment of fountain ornaments.

One of the many attractions of water garden centres is that, being owned or managed by highly creative and enthusiastic people, one can always find that certain individual touch not found anywhere else. It could be a unique individualistic approach to filtration or, as in the case of The Waterlife Studios, an incredibly well-designed and researched Water Wheel modelled on an existing, large-scale working model.

And where else would you find an offer like the one made by Finchamstead Water Gardens who will care for your fish while you move house or go on holiday? (They do, of course, also offer a full range of products and services including pond construction, clearance, repair and re-lining).

May is a great month for watergardening and all the centres are bulging at the seams as the season gets into full swing. All we now need is a good summer . . . don't we always?

WATER GARDENS

LILIES FOR EVERY OCCASION

An impressive display of assorted Lilies

'Candidissima' is believed to be a hybrid between *N. alba* and *N. candida*

N. 'Moorei' is a hybrid produced from *N. alba* and *N. mexicana*

Philip Swindells, Superintendent at Harlow Car Gardens in Harrogate, helps you choose the best waterlilies for your garden pond

Photographs supplied by Stapeley Water Gardens

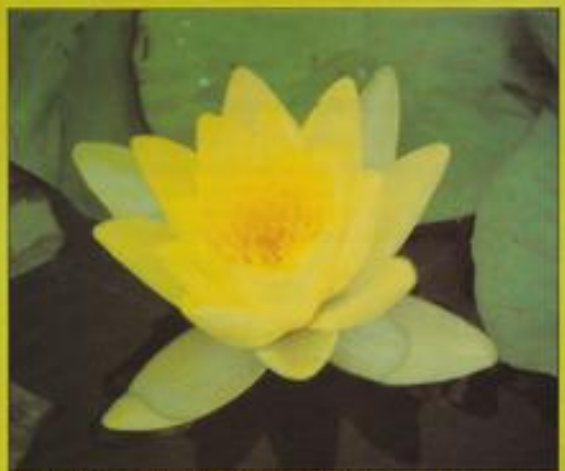
The group of plants popularly referred to as waterlilies are embraced by the genus *Nymphaea*. This comprises some forty species of which seven are reliably hardy in the British Isles. These have yielded a wide range of cultivars in various colours and with diverse habits of growth. All the hardy species belong to the sub-group of the Nymphaeas referred to as *Chamaenymphaea*—a division of *Castalia* which is characterised by floating blossoms with short anthers and petaloid stamens. *Castalia* is a division of the main group *Syncarpiae* which, together with the *Apocarpiae* comprises the genus *Nymphaea*.

Nymphaea alba is probably the most important hardy species; a handsome plant with pure white cup-shaped blossoms which float amongst bright green orbicular leaves. The petals are broadly ovate the sepals lanceolate and greenish-brown with white interiors and the stamens bright yellow. The form most usually encountered in the wild is *Nymphaea alba subsp. alba* in which the fruits are obovoid (egg-shaped with a narrow base). In the less common *N. alba subsp. occidentalis*, which is distributed throughout Scandinavia and northern areas of the British Isles, the fruits are globose, but this has little bearing upon their decorative merit. Both are equally valuable for large expanses of deep water, spreading quickly by stout creeping rhizomes. They are not plants for the smaller pool, although they have played an important part in the development of hardy hybrid waterlilies.

Older botanical literature often divides the species up further and creates several species out of what most present day

***N. odorata* is a good Lily for large ponds**

'Froebelli' was developed from the Swedish red Lily *N. alba var rubra*



***Nymphaea marliacea* 'Chromatella' is one of the most popular of the yellow Lilies**

botanists agree is one variable species. The only distinct form that most agree upon is the Swedish red waterlily, *Nymphaea alba* var. *rubra*. This extraordinary plant has typical *N. alba* blossoms, pale pink in bud, but which open to deep plum red. As far as anyone knows this only occurs in a few lakes in Sweden and is rigorously protected. Although unlikely ever to be found in the catalogue of an aquatic plants grower, it is worth mentioning as probably the single most important component in the waterlily breeding programme of French hybridist Latour Marliac, infusing the hitherto unknown red colouring into his hybrids. The only cultivar that can be directly attributed to the Swedish red waterlily is 'Froebeli', allegedly a seedling selected by the Swiss nurseryman Froebel. However, this is rather confusing, for unlike other *N. alba* forms, 'Froebeli' is of modest growth and fragrant. No matter what its origins, it is one of the best red waterlilies for the smaller garden pond.

Tulip-shaped blossoms

Nymphaea 'Hermine' is believed to be a selection from *N. alba* as well. Introduced by Marliac in 1910, this has tulip-shaped blossoms and dark green leaves. Of restrained growth, this can be grown in about 45 cm. of water. So too can *N.* 'Moorei', a hybrid resulting from the union of *N. alba* and *N. mexicana* which was raised at Adelaide Botanic Gardens early this century. It received an Award of Merit from the Royal Horticultural Society in 1909, and justifiably so, for it is one of the best yellow varieties for the smaller pool.

Nymphaea alba has had an influence on many of the hardy waterlily cultivars, for it was one of the few Nymphaeas available to early hybridisers. Although records were not maintained of breeding programmes in the days of Marliac and his contemporaries, it is believed that *N. alba* played an important part in the development of many, especially the *N.X marliacea* hybrids. Amongst these, the soft canary yellow *N. marliacea* 'Chromatella' with its handsome dark olive-green leaves splashed with maroon is probably the most familiar. *Nymphaea m.* 'Flammea' has similar foliage, but fiery red flowers, while both *N.m.* 'Carnea' and *N.m.* 'Albida' produce plain green leaves which set off their pink and white blossoms to perfection.

The *laydekeri* hybrids require fairly shallow water, the wine red *N. laydekeri* 'Purpurata' and crimson *N.l.* 'Fulgens' being amongst my favourites. *Nymphaea l.* 'Lilacea' has carmine flowers which age to deep plum, while *N.l.* 'Alba' has pure white blooms with a strong fragrance somewhat reminiscent of a freshly opened packet of tea. All are of unknown parentage, but provide us with some of the finest waterlilies for the smaller pool.

Nymphaea candida is equally at home in shallow water, prospering in as little as 30 cm. and producing handsome small, scentless, cup-shaped flowers with golden stamens and crimson stigmas. Several forms are known to botanists, amongst them the strange star-like *N. candida* var. *stenzelii* which hails from the Soviet Union. Cultivars derived directly from *N. candida* are comparitively rare but several have strong connections. *Nymphaea* 'Candidissima' for example is believed to be the result of a union between *N. alba* and *N. candida*. A robust plant with scentless, creamy-white, waxy flowers, it has rounded foliage with typically overlapping lobes. Together with its sister, the white, rose-flushed cultivar 'Delicata' it is ideal for the smaller water garden.

For those who only have sinks or barrels in which to grow aquatics, *N. tetragona* and its progeny are ideal. This is the smallest waterlily of all with small dark green leaves with purplish undersides and tiny fragrant white blossoms no more than 5 cm. across. Of the many varieties that have been grown, *N. tetragona* var. *leibergii* is the most frequently encountered. This is the North American form and has plain green leaves and white blossoms with conspicuous longitudinal purplish lines down the petals.

Cultivars derived from *N. tetragona* are difficult to sort out, but the waterlily sold by nurserymen under the name *N. pygmaea* var. *alba* is probably a free-flowering selection of *N. tetragona* rather than a hybrid. *Nymphaea t.* 'Joanne Pring' is a similar proposition, for this was developed from a pink mutation which occurred at the Missouri Botanical Gardens, St. Louis. It is a charming deep pink cultivar with blossoms up to 5 cm. across which contain two distinct rings of stamens. It has plain green leaves and is one of the finest pygmy kinds.

Pygmaea hybrids

Most of the waterlillies known as *pygmaea* hybrids have a proportion of *N. tetragona* in their make-up, together with *N. mexicana*. This is almost certainly true of the lovely free-flowering *N. pygmaea* 'Helvola', a soft yellow cultivar with dark olive leaves splashed and stained with maroon. Not so the American introduction 'Dorothy Lamour' which is often attributed to this class. This is the result of a union between *N. tetragona* and *N. marliacea* 'Chromatella', a fine plant with fragrant, rounded yellow blossoms and floating foliage of olive-green with bold crimson splashes. This cannot be confused with any other cultivar, for it has characteristic sagittate (arrow-shaped) submerged foliage, something not seen in any other hardy waterlily.

Nymphaea fennica is said by some botanists to be merely a geographical form of the tiny *N. tetragona*, but modern research indicates that it is a true species and probably the rarest of the hardy kinds. Only being known from cool shallows in Finland, this interesting little lily has distinctive white stellate (star-shaped) flowers with incurving petals that are often flushed with pink. It has plain green leaves, and can be readily distinguished from all the other pygmy sorts by its erect rhizome which is densely clothed in fine black roots.

Nymphaea odorata is a better waterlily for the larger pool. A native of North America, it is very hardy and one of the nicest fragrant white waterlilies. *Nymphaea odorata* and its innumerable varieties and cultivars have very distinctive circular leaves, green when mature, but purplish when young. Nurserymen usually sell *N. odorata* as *N. odorata alba* to distinguish it from the Cape Cod waterlily *N. odorata* var. *rosea*. This is the pink form of the species and has the strange habit of allowing the sepals of the flower to remain spread wide open long after the flower has closed. It has plain green leaves which are entirely bronze in their juvenile state.

Planting season

The planting season for waterlilies extends from April through until August, the months of May and June being the best. Although some pool owners plant them directly into soil on the pool floor, waterlilies are much better grown in baskets of good clean garden soil where greater control can be exercised over their welfare. When collecting soil prior to planting, remove all old leaves or weeds that are likely to decompose and foul the water. Also avoid soil from the vegetable garden or any other area that has recently been dressed with artificial fertiliser as this will encourage the proliferation of water-discolouring algae.

Plant waterlily roots as if they were any other pot grown subject, firming them in well and covering the surface of the basket with about 1 cm. of pea gravel. This will prevent inquisitive fish from stirring up the soil and dirtying the water. In any event it is a useful precaution to water the basket thoroughly with clear water through a watering can with a fine rose. This drives out all the air and reduces the chances of soil and organic debris escaping into the water.

It is prudent to remove the adult leaves from waterlilies before planting. This deprives them of an aid to buoyancy and enables them to become established so much quicker. Retaining old leaves often results in the plants being lifted right out of the containers, when they are lowered into the pool.

Coldwater jottings

Stephen J. Smith

Spectacular Black Oranda

One of my favourite characteristics of Fancy Goldfish is the hood growth found with Orandas and Lionheads.

In addition, the rich matt-black of the Moor never fails to impress me. So I was most interested to hear of the existence in Britain of a new goldfish strain which combines both of these special characteristics: the Black Oranda.

The first of these spectacular fish were imported into this country two years ago by Kent-based coldwater specialist Gary Lewis, and he has since had several fine-quality spawnings.

This particular Oranda strain has the soot-black colouring of the Moor and shows no signs of coloured patches or streaks.

As with Moors the undersides of the fish do appear lighter—either brassy or white—but according to Gary, spawnings have never thrown any of the 'telescope eye' characteristics of the Moor—thought by many people to be a dominant feature of black goldfish.

The hood of the Black Oranda is of exceptional quality while the body is perfectly round. Finnage is flowing and broad, as with the Veiltail, and again this is a surprising characteristic as many goldfish specialists have been disappointed that imported Fancy varieties usually display only Fantail-type finnage.

Gary has this year also imported a type of goldfish called a Hamanishiki, which has a pearlscale body, coloured red and white, 'veiled' finnage and a bubble **over** the eyes!

As regular readers to 'Coldwater Jottings' will know, I am none too keen on some of the more bizarre mutations.

The Hamanishiki sounds to me to be yet another example of irresponsible breeders cashing in on genetic 'rejects.' I do hope that this particular strain does not find popularity—I am sure it will not be welcomed by serious goldfish keepers.

The Black Oranda, on the other hand, is a valid example of how, through selective and responsible breeding, new and exciting variations of traditional strains can be developed without impairing the natural functions of the fish.

New book

I understand that a new book may well be published some time during the year, by the late Frank Orme, my mentor and former columnist of 'Coldwater Jottings.'

Frank's new book is to be called 'Landscaped Rock and Water Gardens' and judging by his previous works should be a definite addition to the library of every coldwater enthusiast.

I look forward with anticipation to reviewing the book in the future.

Frank Orme's work within the hobby is well-known throughout Britain and the rest of the world. His most well-known book, 'Fancy Goldfish Culture' has become something of a 'Bible' for the new enthusiast who wants to get more out of keeping goldfish.

I have found that I am constantly referring to its thorough chapters, dealing succinctly with everything from types of goldfish to breeding and rearing; constructing ponds or fish-houses; and identifying and treating diseases.

Another extremely informative title from the pen of Frank Orme is 'Cyclopaedia of Coldwater Fish and Pond Life.'

This deals with the broad spectrum of coldwater fish, ponds and natural pond life, from Daphnia and bloodworm to newts and toads.

Organised in alphabetical order this is again an easy reference for the fishkeeper's library.

Aimed more for the novice fishkeeper, 'Goldfish and Koi' is a budget-priced mini-book also from Frank Orme.

Written concisely yet carrying vital information, the book deals in simple terms with the pond and the aquarium; maintenance, feeding and remedies; and specific chapters explaining the different types of goldfish and Koi available.

Fancy Goldfish Culture by Frank W. Orme. Published by Nimrod at £8·50.

Cyclopaedia of Coldwater Fish and Pond Life by Frank W. Orme. Published by Nimrod at £8·50.

Goldfish and Koi by Frank W. Orme. Published by Nimrod at £1·50.

Overseas correspondence

I have been extremely encouraged by the response to my appeal for information about the coldwater hobby from overseas readers.

I was particularly pleased to receive an extremely informative letter from Sam Seong Kim of Macao, China. He explains that there are up to 266 types of goldfish available, roughly classified into four main categories: Gold Carp; Literal-species; Dragon-eye, and Egg-fish.

The first category has the carp tail and streamlined body; with normal eyes and are fast swimming.

Literal-species are called 'Man-yu' in China and were obtained from the Gold Carp by selective breeding. The eyes are normal, but the fish have open tails as in the Fantail and Oranda types with which we are familiar.

The Dragon-eye Goldfish are mutants, having telescopic eyes and open finnage, long and well-developed, such as the Moor.

Egg-fish are described as having normal eyes but with an egg-like body. As with the Lionhead, Bubble-eye, and Pom-pon, for example, there is no dorsal fin and the caudal fin is short.

This young Chocolate Oranda is from the Chinese Literal-species, called 'Man-yu', according to Sam Seong Kim

What's your opinion? by B. Whiteside, B.A., A.C.P.

The letters from you have been flowing in this month.

Mr. T. A. Jones lives at 12 Menin Avenue, Warrington, Cheshire, and writes as follows: "I am not, as so many of your contributors do, going to start this letter by saying, 'Although I've been reading *Aquarist & Pondkeeper* for many years, this is the first time I've put pen to paper'. The fact is, I'm a refugee from your rival magazine, and appear here before you, cap in hand, to beg forgiveness for past time spent ignoring your excellent publication.

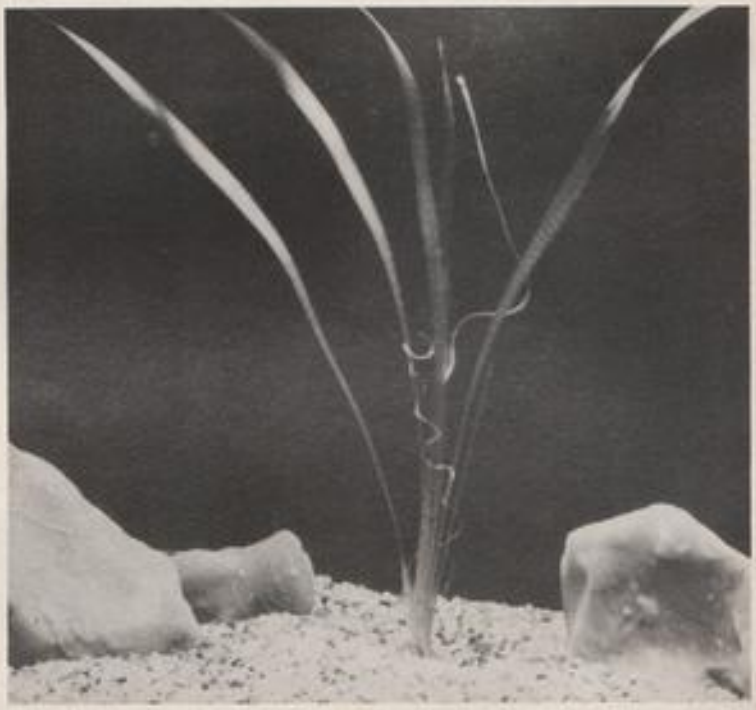
"I must also apologise for not being fully able to voice an experienced opinion on the six points raised at the end of your January 1986 article. However, I shall try. (*a*) Undergravel filters. I have been keeping fish for just over a year now, my first tank being a 24 in. × 12 in. × 15 in. model with a U/G filter powered by a Rena 101 pump. This set-up worked fine, i.e. the water was always crystal clear and the fish—a typical novice's community selection of Guppies, Platies and the obligatory *Corydoras* Catfish—all seemed happy; however, there always remained a nagging doubt in my mind and a constant drone in my ears. The doubts stemmed from the dire warnings, usually underlined in bold print, in various books of the extreme consequences should the air pump fail. The thought of a seething mass of deadly bacteria slowly creeping out of the gravel and attacking my new-found friends sent me off to the pet shop, to return with an Eheim 2007 internal power filter with which, over the next few weeks, I slowly replaced my U/G filter.

"An amazing transformation then occurred. Plants, which I had believed one bought and threw away after a few months when they had gone brown, actually began to grow and then multiply, until eventually I had to cut them back to see the fish. That was a year ago. Now the 24 in. tank has gone and been replaced by a 30-gallon, triangular and 20-gallon, rectangular tank, both filtered by Eheim 2009s. With hindsight I suppose I did not give the U/G filter a fair chance. A power-head would have solved the noise problem, for example, and improved overall efficiency, and I can see other advantages of using the so-called 'natural', i.e. biological system. However, the fact remains, and to my mind the largest disadvantage of U/G filters is that much of the dirt remains in the bottom of the tank, so lulling the inexperienced aquarist into a false sense of security, i.e. the water looks clean so everything must be OK—until one day . . . .

"(*b*) Feeding aquarium plants. I have used plant food in my tanks but as no appreciable difference was noted I stopped after a few weeks. Generally I have little trouble growing plants and am always amazed when I read of people using layers of peat, etc. to promote good plant growth. Having said that, I do tend to choose only 'easy' plants for my tanks, e.g. *Vallisneria*, *Elodea densa*, *Ludwigia* and a selection of dwarf *Cryptocoryne*. Lighting is one 25 watt Gro-Lux in the 34 in. rectangular tank, and a mixture of one 15 watt Sun-Glo and one 25 watt Gro-Lux in the 30 gallon triangular tank, both on for 11 hours per day. (*c*) Golden Barbs and Black Widows. Unfortunately I have not kept either but must say how pleased I was to see you using the common English names for them so that I, for one, knew what you were talking about. . . .

"May I ask the following questions: (1) Does anybody out there have any information about sexing, breeding, feeding and generally looking after *Hoplosternum thoracatum* catfish? I own three which were bred in this country but for which I have no other details. (2) How big do Blue Acaras generally become? The demon books claim sizes from 3½-8 in. (3) How on earth do trout manage to get into the tarns of Lakeland some 2,000 ft. above sea level? Do they really travel on the feet of birds as Julian Pettifer and others would have us believe?"

Glad you like the new *Aquarist*, Mr. Jones. The magazine has been on the market for over 60 years and every so often we modify and up-date it to make it fit the contemporary scene. We aim to produce a magazine that appeals to the young as well as the experienced aquarist. We aim to inform, educate, entertain and amuse our readers—without talking down to them. (Incidentally, my name is not Barry, Mr. Jones. I



***Vallisneria spiralis*—in bloom**

disclose it once every few years and let readers guess it for the remainder of the time. 'Barry' seems to be the most popular guess.)

My thanks to The British Koi-Keepers' Society for the latest issue of their magazine (why not give your excellent magazine a name, gentlemen); and to the Anabantoid Association of Great Britain for the latest issue of their magazine, *Labyrinth*—even without staples. Both magazines make interesting reading.

Recently I was searching for a piece of equipment for a young aquarist friend when I uncovered a Plantastics *Aponogeton* species plastic aquarium plant. It's obviously the one Dr. Neville Carrington of Interpet sent me several years ago. It's now in my Angel tank, together with the Plantastics Amazon Sword Plant he sent me more recently. Both plants look real—and I still can't get any live plants to thrive in the Angel aquarium. The latter houses six quite large Angels. A couple of months ago I moved four Angels from the Angel tank to a 30 in. × 15 in. × 15 in. tank containing four Gouramis. The latter tank was crowded with growing plants and, interestingly enough, the plants continue to flourish despite the arrival of the Angels. Of my 10 quite large Angels, eight are marbled and two younger ones 'ordinary' striped ones. The latter have grown quickly of late and are now almost as big as the much older marbled ones. They are also much more attractive. This is another example of the 'old' type of fish being at least as attractive as man-made modern strains or varieties.

Earlier this week I had a visit from former pupil Robert Robinson, now 19, whom I featured in *Meet the Aquarist* some years ago when he was a young teenager. Robert is fixing up his tanks at present so I gave him some spare plants. Five of my six tanks were like over-grown jungles and I was pleased at the opportunity to get rid of some plants. Robert was somewhat amused when I took a fresh, black, polythene dustbin liner for the plants that I was to give him. He was amazed at the beautiful plant growth in five of my six tanks but obviously wondered if there were many fish in them. He was equally amazed when I took the lids and cover-glasses off the five tanks and began to lift handfuls of plants into his dustbin liner. Even I was amazed at some of the hundreds of plants that I put into the bag. Most were Java Fern, Indian Fern and Java Moss. The most impressive was a massive Java Fern growth that grew from a long, branched rhizome. The plant (plants) was at least a foot long and the side shoot almost as long. Broken up it would have provided dozens of separate plants; left intact it would have fully planted an 18 in. × 10 in. × 10 in. tank, or made a delightful 'hedge' at the back of a larger tank. It was removed from one of my 18 in. tanks, leaving half the tank bare.

Tilapia mariae—Tiger or Zebra Cichlid

At the beginning of this year I was lucky enough to be one of two or three teachers to be seconded, one day per week from January until the end of the school year, as a Part-time Field Officer in Video Production Techniques, by my employing Education and Library Board. One of the perks—as well as the expertise I'm gaining, the day away from school each week, and the weekly access to lots of lovely, expensive audio, video and computer equipment — is the neat, little Panasonic Portapack (portable video cassette recorder) and Panasonic colour camera, plus accessories, that I have on loan for the six months. I've already produced one video film for the school in which I teach, and I'm working on a few others. I hope to make one or two on some aspects of aquarium keeping, i.e. our hobby. Have you or any of your friends made or seen any video films about fishkeeping? If so, please drop me a line. I may also make one about a local trout hatchery and a fish farm. I'll let you know of my progress. Such films might be useful for aquarium club evenings.

Mr. Alex Neilson lives at 18 Windsor Street, Menstrie, Clacks., Scotland. He says: "I am writing to ask if you could, in your article, draw attention to the abuse of goldfish as prizes. We must encourage our children to respect goldfish, not think of them as a cheap toy.

"There have been occasions when people have taken their 'prize' onto show-ground machines such as roller coasters with fatal results to the fish. My worst encounter came 18 months ago when I was supervising an outing for a mentally-handicapped group in Hamilton, Strathclyde. The stall-men were virtually forcing them to take goldfish instead of other prizes—such as games, etc.—which were more popular, and obviously cost more.

"I'd be most grateful if you would do some type of feature on this serious problem. I'm sure that most of the people who win goldfish do care about them; but the way in which they obtain these fish is most unsatisfactory as many of these fish die within days of being won."

I appreciate your feelings, Mr. Neilson. The subject is one that I have raised myself on a number of occasions in this column over the years. What one can do to stop goldfish being given as prizes is another matter.

My thanks to Dr. Chris Andrews, now working at the Aquarium at London Zoo, for the open invitation to drop in and take some photographs. I hope to take up the kind offer by Easter. Readers may recall the article and photographs I published in *Aquarist* after my previous visit some years ago. It'll be interesting to observe what changes have been made and to learn what changes are planned.

Shown above is one of Robert Robinson's very large *Tilapia* as it was several years ago. It's now much larger—as is its partner. Recently Robert decided to sell them; or swop them; or give them away. I suspect he'll have to eat them—as, I think, happens to *Tilapia* species in some countries. There's obviously not a big demand for very large, rather rough cichlids. The picture on page 31 shows a *Vallisneria* plant. This species is frequently recommended as the easiest plant for beginners. It's supposed to grow apace, forming a hedge of runners across the tank. Unfortunately, those that I've tried—with the exception of some in a coldwater tank about 1950—have not read the books and won't last long in my tanks. Fortunately, it doesn't bother me too much because I tend to stick to those species that grow well in my aquaria. Are they as easy as many books suggest; or virtually impossible to grow? Obviously the answer will depend upon the conditions in your particular tank: in some they will thrive, in others fade.

Don't forget to drop me a line if you know of any video films about the hobby. Goodbye until next time.

Your questions answered

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Every query receives a personal answer and, in addition, we will publish a selection of the most interesting questions and responses each month. *Please indicate clearly on the top left hand corner of your envelope the name of the expert to whom your query should be directed.* All letters must be accompanied by a S.A.E. and addressed to:
Your Questions Answered, The Aquarist & Pondkeeper, Buckley Press Ltd. 58 Fleet Street, London, EC4Y 1JU

TROPICAL
Dr. David Ford

COLDWATER
Arthur Boarder

PLANTS
Barry James

KOI
Roger Cleaver

MARINE
Graham Cox

DISCUS
Eberhard Schulze

Coldwater

Tropical fishes for coldwater water tanks

I have a tank of Goldfish and now wish to set up a tank for foreign fishes. Are there any tropicals which I could keep without having to use artificial tank heating? The tank will be in a room which is centrally heated and the temperature never goes below 60°F.

There are many tropicals which could be kept under your conditions. Many of the more easily obtainable ones would be suitable. A few well known ones are: Paradise Fish; Guppies; varieties of Platy; White Cloud Mountain Minnows; several Barbs and some Gouramis. It is very probable that such fishes kept under the proposed conditions would live twice as long in a temperature of 60°-65°F., than they would at a temperature of 75°-80°F. They may not breed as freely but, after all, you may not wish to get so many youngsters that you could not house them. During a severe winter or an anticipated very cold night, you could leave the overhead light on all night. If this was a filament lamp it would give off quite a fair amount of warmth. It should be realised that most tropicals have to put up with very hot days and very cold nights. Many tropicals would be healthier if a time adjustment could be inserted in the heating arrangement so that the heat is cut off during the night.

The Paradise Fish is usually sold as a tropical species but can survive without any trouble in coldwater aquaria

Tropical

'Hole in the Head'

I seem to have a persistent problem with one Cichlid, namely an Oscar.

The fish in question is approximately 4 years old and over the last three months has been plagued with 'Hole in the Head Disease'.

On first noticing the condition, I managed, after great effort, to obtain an antibiotic (Tetramisin?) from a veterinary surgeon. This was added to the water and the fish seemed completely cured within 14 days.

Unfortunately the 'Hole in the Head Disease' returned after a month but again I managed to obtain further antibiotics. This second treatment included the addition of 0·5% salt to the water to stimulate rapid healing of the holes.

The second treatment seemed to be working, but after 22 days the condition of the fish ceased to improve and now it seems listless and is not eating very well, if at all.

'Hole in the Head' is a complex disease and certainly involves some bacterial attack on the fish's skin. The antibiotic you obtained (probably Terramycin or related compound) will have killed off these bacteria, but the holes are slow to heal (in some cases they never do). This leaves the fish open to repeated infection when the course of antibiotics has finished. Repeated treatment can cause other problems as the broad spectrum antibiotics kill friendly as well as harmful bacteria. Digestive problems can occur (your fish is not eating well). Even worse, resistant strains of the harmful bacteria develop so repeat treatments won't halt the disease.

It is better to use a drug that is specific for the bacteria that start the 'holes' and so avoid side effects. The drug of choice is Flagyl, again available from your local vet. The material is best made up to the concentration recommended by your vet and used as a fresh solution every other day for a total immersion time of one week. This is because the drug breaks down in water after about 48 hours. (If your local vet knows nothing about fish, ask him to contact the Veterinary Investigation Centre or Institute of Aquaculture at Stirling—he should also have details in Waltham Symposium No 3 and Children's and Exotic Pets from BSAVA).

Once started, 'Hole in the Head' is difficult to control and cure. The best method is prevention and note that Cichlids kept in very clean water and fed sterile foods do not develop the disease.

Discus

Getting it right

I intend setting up a Discus tank on the following lines: 48 in. × 15 in. × 18 in. all-glass tank with undergravel filtration powered by a Hagen Aquaclear powerhead; will one be enough? I intend having plastic plants. Will you tell me what lighting to use? I will use a 300 watt heater; is that OK? Do you know anyone who makes realistic looking plastic Straight Vallis? Will the following flake foods be OK: Growth flakes, Tetra Ruby, Tetra Cichlids? What about F/D bloodworms, frozen liver and beef heart and live brine shrimps? Do frozen foods need defrosting before use?

I intend keeping 8 mixed Discus; 4 Brown, 1 Turquoise, 1 Royal Blue, 1 Red and 1 Green, a small shoal of Cardinal Tetras and a small shoal of 5 Clown Loaches.

I will do a 25% water change every fortnight. The water in my area is hard. I will add Sodium bi-phosphate and let it stand. Will bogwood change the pH of the water? Temperature 80-84°F. I will use Aquasafe and Blackwater Tonic to condition the water; do these change the pH and GH of the water? Some gravels are not suitable; how can I test them?

I have two Discus books; one is the Handbook of Discus by Wattley, the other is by Silva and Kotlar. Is it worth getting the other books on the market? I have just received a mail order catalogue and on page 17 are two products specially for Discus, CQD—a Discus aid, and DisciAmin—a vitamin. Are they worth buying?

How often do you think I should strip my tank right down, take filter plates out etc.

Your 48 in. × 15 in. × 18 in. tank will hold approx. 200 litres of water and I would have thought that one 200 watt heater should be enough. Using a 300 watt heater will, if the thermostat gets stuck, produce more heat than there will be natural heat-loss and the result will be overheating of the water and the loss of all your fish. If you aim for a pH of around 6·5 and a GH of 4 to 10° you will not go far wrong. In your proposed aquarium with U/G filter I feel that 25% water changes every two weeks will not be good enough, neither would a temperature of only 80°F. Aquasafe and Blackwater tonic are water conditioners often used but will neither change the pH nor GH of the water. The light will only be needed for you to be able to see the fish and you can operate it any way you like. If, however, you were to grow 'real' plants, then your aquarium will need at least 12 to 14 hours of light depending on the type of plants used. Bogwood need not be painted with polyurethene varnish if it was bought in an aquarium shop and if it is of the 'black' variety. Some of the 'lighter' types are not really suitable since they often will grow a fungus on them and these pieces ought to be varnished. Bogwood, like peat, will release into the water many substances which are beneficial to the fish.

Whether the addition of Sodium bi-phosphate to your water will do anything else but make a 'bad' water even worse could only be determined if one had an analysis of both the raw water and the treated water.

To test gravel for its suitability one keeps a small quantity in a glass of pure water and measures the water after a few days. Changes of the water in either hardness or pH values will tell you whether the gravel (or rocks for that matter) is suitable.

Baby Discus fish can often be made to take flake foods as well as F/D foods; frozen liver easily goes off in water and should be fed very sparingly; the same applies to beef heart. Frozen foods need not be de-frosted before they are put into the aquarium. As there are very few books about dealing with Discus fish and some even give you no real information which makes such a publication almost worthless in my eyes, it is certainly worth your while to obtain all the others.

CQD and DisciAmin are two preparations specially for Discus fish and no keeper of these fish should be without them. CQD is one of the best remedies about and has saved many a fish which had already 'a fin in the big ocean in the sky'. DisciAmin is a vitamin complex containing also many of the necessary amino acids.

If you were to forget the idea to install an undergravel filter in your aquarium but filter it with an outside filter, either air or powered operated, you would not only keep your fish in a healthier environment but the need for stripping the tank right down would only happen very rarely, and this would depend on your general maintenance.

As far as the fish are concerned, do not go for such a mixture; you will find that certain fish will look much nicer and you will never be happy with the rest. Start your Discus keeping initially by getting eight Brown Discus. They may not be the most colourful ones but they will at least be all the same, and once you have got some experience you can always get yourself something more spectacular.

P.S. What is wrong with real plants? If chosen properly they will grow beautifully in a Discus fish aquarium, are one of the best purifiers of the water and will give the tank that something special.

Plants

Problems with algae

I am experiencing problems with a green cotton-wool-type growth on the leaves of my Anubias barteri *in my fish tank.*

At first, there was a fairly heavy algal growth on the leaves. I added two Otocinclus *to the tank, and they soon cleared the algae.*

The algae were then replaced by dark green spots on the Anubias *leaves from which this growth appeared. It is not really affecting the other plants, i.e. Amazon Sword, Vallis and Crypts, other than when I physically remove it from the* Anubias *leaves and the odd piece escapes. All of the plants appear to be flourishing. The* Anubias *has grown two new leaves since I set up the tank three months ago and these are not yet affected by the growth.*

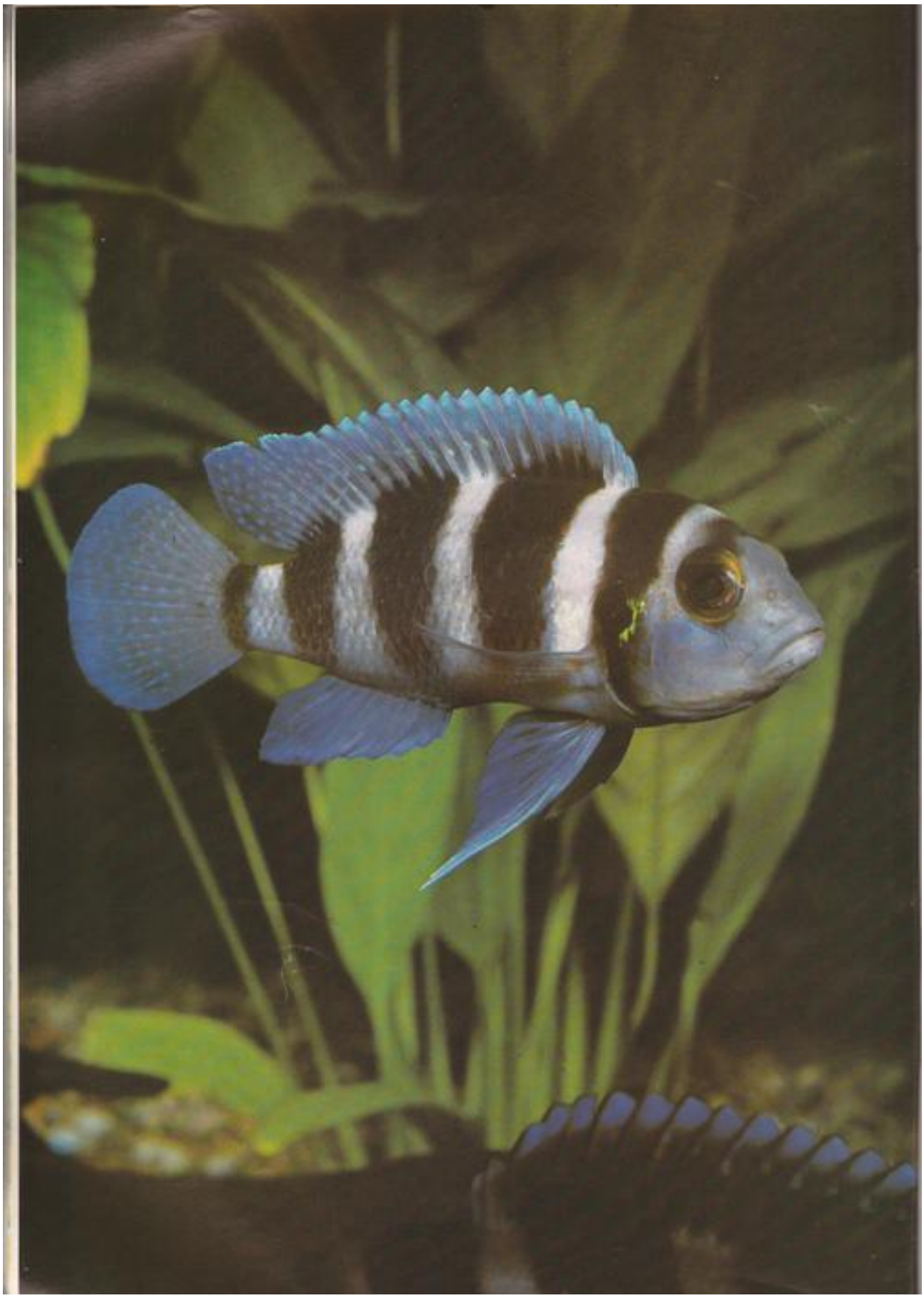
The Anubias *is the centre piece and has grown, consequently, coming quite close to the lights. I realise that the light must be the cause of the problem but do not know what to do without affecting the other plants.*

I have read that sometimes the only cure for this type of growth is to strip the tank and start again; I would like to avoid this. Maybe I could remove some of the Anubias *leaves?*

I look forward to your comments.

I do not favour chemical treatment. The set-up is as follows: the tank is 30in. × 15 in. × 12 in, placed in an alcove, and receives very little natural light. Set up three months ago, it has peat plates underneath 3 in.-4 in. of gravel. Heating and filtration: 2113 Thermo-filter with Mechanical, Carbon and Wool as the media. Lighting is 1 × 18 watt North Light at rear of hood and 1 × 15 watt Gro-Lux at the front. The Gro-Lux comes on at 1 p.m. the North Light at 1.15 p.m. The North Light goes off at 10.45 p.m. and the Gro-Lux at 11 p.m. I stagger the lighting to help avoid too much shock to the fish with a flickering Sunrise/Sunset.

First of all I am surprised that you are getting any green algal growth as your lighting is well under the recommended levels for aquaria. You can remove some of the affected leaves of the *Anubias* but avoid damaging the growing point. Although you do not favour adding Algae Killers to your aquarium I fear that this is the only long-term solution. I use Hobby Algenkiller without any adverse effects on the plants or fish. If you wish to try another tack, smothering the surface with *Lemna* (Duckweed) species for a while may well do the trick. Stripping the tank down is no guarantee that the problem will not reappear.



Spotlight

LAMPROLOGUS TRETOCEPHALUS

Ian Sellick focusses on one of the most challenging and beautiful species of Cichlid from Lake Tanganyika

EVERY group of cichlids includes at least one that presents the aquarist with a considerable challenge. If your enthusiasm is for South American cichlids, the Discus might qualify, or *Cremicara*. If your particular affiliation is for Tanganyikan species, then *Lamprologus tretocephalus* would be the species most serious aquarists would like to keep and breed.

In practice, actually keeping this beautiful species presents no greater problems than other Tanganyikan *Lamprologus*, but getting them to spawn, and actually rear the young, is an entirely different matter. As with other Tanganyikan denizens, centuries of living in a stable environment have rendered *Lamprologus tretocephalus* rather intolerant of water conditions other than those found in nature. It prefers hard water, with a dissolved solids content of some 400 parts per million the aim, and this water must be alkaline. If pH 9 can be achieved this is ideal; 8 is acceptable. The other physiological criteria are that nitrogenous waste should be absent from the aquarium, especially ammonia, which is extremely toxic in the alkaline medium. This requires an amount of chemical juggling by the aquarist. Do not add salt, the surfeit of sodium chloride is *not* what is required. Instead, the addition of magnesium salts, and calcium by the use of crushed cockle shell is to be preferred. Good biological filtration is essential to help the management of the nitrogen cycle, and use of a specific ammonia removing zeolite is to be recommended.

Sedentary, solitary fish

Lamprologus tretocephalus are sendentary, solitary fish—each will pick a cave in the rockwork which must be a part of the decor of their tank, and use it as a base. They do require a fair bit of space. Unfortunately, they are rather expensive still, due to the difficulties in reproducing them, so the usual maxim of obtaining 6-10 juveniles and growing them up together in, perhaps, a 4 foot tank may be a little difficult, both in terms of finding that many young, and being able to afford them when you do.

The species is not that easy to sex, although adult males tend to be a little larger, and the colours perhaps a little more contrasty—the whites crisper and the blacks deeper. Males are also more likely to have a blue sheen to the gill covers. Sexing can also be performed by direct examination of the genital papillae, although if you are buying adults, I can't think of many shops that will allow you to net their fish, upend them and examine them prior to purchase!

Preparing for spawning

Once installed in your rock-filled tank with suitable water, any pair that is present will studiously ignore each other. When ready to spawn, the female will go dusky and perhaps do a little housework by removing some gravel from her cave. Spawning occurs in the female's territory, the male merely visiting to fertilise the eggs. He may thus be free to spawn with other females (polygamy). The eggs may number 200-300, and are white. They hatch in 72 hours giving rise to minute fry that are too small to take brine shrimp when free-swimming. The fry are light-sensitive and move towards darkness and downwards if possible; they are capable of finding their way into coarse gravel, and you need to be a little bit careful about undergravel filters. The fry for the first few days should be offered infusoria, finely ground flake food (ready prepared, or use a mortar and pestle), and sieved egg yolk. Female parental care is largely confined to the defence of the territory and less with actual care of the fry. The fry will reach about an inch in 3 months, but with continued monitoring of water quality and good feeding, may be sexually mature by their 12th month.

Because spawns have been few and far between, there are relatively few details of actual brood care. Often those aquarists who have managed to spawn them have removed the eggs from the female in order to ensure the survival of at least a proportion of the progeny. If you are successful in getting them to spawn and follow this route, use water from the parental tank for the young and keep changing it over from the main tank, especially when the fry hatch and are free-swimming to eliminate the possible build-up of waste. Eliminating bacteria from the water by using a micron-rated filter (such as Technical Aquatic Product's Filter Capsule) may also help to reduce pollution. It is a sensible precaution to keep the eggs and fry as dark as possible in view of their reported photophobia, otherwise they may waste all their energy trying to get away from the light source and could end up in a heap in the darkest corner of the tank.

Lamprologus tretocephalus was discovered by Dr. W. A. Cunnington at Kigoma, and was described by Boulenger in 1899. In the wild, it feeds mostly on aquatic insect larvae, and bivalves, which it is able to crush with a set of fairly heavily developed pharyngeal teeth. In this respect it is not so efficient as the similar species *Lamprologus sexfasciatus*, which feeds on snails, but otherwise shares the same type of habitat. *Lamprologus tretocephalus* can be distinguished by the fact that it has only three stripes under the dorsal fin, whereas *sexfasciatus* has four. Juveniles may also occasionally be confused with young of *Cyphotilapia frontosa*, a related mouthbrooding species that is, however, deeper in the body.

Sought after Tanganyikan resident

Lamprologus tretocephalus is a beautiful fish, available since about 1972, and still one of the most sought after Tanganyikan residents, and will remain so, even if we manage to propagate them in considerable numbers—they are not that aggressive generally towards other fish from the Lake so long as territories are observed, and with their striking coloration, make a superb addition to the cichlid community.

A. VAN DEN NIEUWENHUIZEN

Company profile

Ashford Aquatics

"We must be about the only shop in the country without proper drains!". Allan Matson, the proprietor of Ashford Aquatics wasn't kidding either. The Vermeulen Heathrow Garden Centre site receives its water supply from Ashford Aquatics' own bore-hole which Allan had drilled close to the shop.

From the bore-hole, the supply for the 132 freshwater tropical tanks is pumped into a 450-gallon header tank situated in the roof space where it is stored, heated and aerated before being passed down into the tanks.

The 30, 36 in. tanks and 16 ponds (100-400 gals.) that make up the extensive coldwater department also receive their water from the well (unheated, but aerated). The latter have a throughput of about 100 gallons an hour, and are spotlessly clean. The 23 tropical marine tanks have their own supply, of course.

The original shop, which was first opened to the public in 1977, still does a roaring trade seven days a week

With such large volumes of water going through the numerous aquaria and ponds, Allan's opening statement seemed a bit odd. But, he's quite right. Instead of traditional drains, the freshwater tropical and coldwater sections have a system of interlinked pipes underneath that channel the surplus water into a second well, which, in turn, supplies the Garden Centre with part of its own water requirements.

A second unusual feature of the Ashford Aquatics set-up is an ingenious and beautifully simple idea that Allan had concerning his pond pump, lighting and fountain display. What he has done is install a range of pumps, lights and spray units in a pond and wired them up to a panel of switches, each neatly labelled with the relevant piece of equipment that it operates.

If a customer wants to see a particular component in action, then all s(he) has to do is throw a switch and, Hey Presto!, you have an instant moving display to base your decision on. This simple idea has proved such a resounding success that Allan is about to install a similar system for internal aquarium power filters. They do say that the simple ideas are the best, don't they?

Visitors to the Heathrow premises are also treated to the magnificent sight of a 24-inch Pacu (appropriately called Tiny!) in a large display tank, a Nurse Shark in a 400-gallon corner tank and a coldwater display in an impressive all-glass 11 ft. × 32 in. × 24 in. aquarium.

On the dry goods front, the policy of holding as comprehensive a range of products as possible is admirably reflected at every turn. The impression we got, both at the Garden Centre site and at the original shop in Ashford itself, is that it would be extremely difficult not to find something to meet your needs at Ashford Aquatics.

Pumps, filters, heaters, foods, remedies, nets, lighting and (it seems) virtually anything else you care to mention from any of the major manufacturers are neatly and accessibly displayed, while tanks by Sea-Bray, Style and Ruxley are stacked in every available space.

In addition to other company's products, Ashford Aquatics have their own brand of pond filters and cover nets.

There are six models in the present filter range, capable of handling ponds from 400 to 3,000 gallons. Instead of using pea gravel or foam, Ashford biological filters contain ¾ in. lime-free sea-washed shingle and come complete with all the necessary pipework.

Accessibility is a key factor in the overall Ashford scheme of things. Allan has, therefore, installed ramps, instead of steps, for the benefit of wheelchair-bound fishkeepers. In the case of the Ashford shop, Allan and his son, Bob, visited Ashford Hospital and measured the overall sizes of a range of wheelchairs to allow them to provide aisles of an appropriate width. As a result (and despite initial impressions), it is quite possible for someone in a wheelchair to get round the aquatic section of the pet shop with ease to enjoy the 28 tropical marine and 52 freshwater tanks, as well as a very comprehensive cross-section of dry goods.

The Ashford shop first opened its doors in 1977. As demand grew, it became obvious that larger premises were required, but, rather than abandon the original location, the decision was taken to expand by obtaining a second shop. This was achieved in January 1983 with the opening of the Vermeulen Heathrow Garden Centre which now attracts customers, literally, from all over the country.

Despite the expansion experienced by Ashford, the company remains, as it was always intended, a family business run by Allan Matson, his wife, Eileen, who 'does everything including the books', and their son, Bob, who manages both the shops.

Ashford Aquatics are open seven days a week (except Christmas Day and Boxing Day). Opening hours for the Garden Centre shop are 9.30 a.m.-5.30 p.m. The Ashford shop opens from 9.30 a.m.-5.30 p.m. (Mon.-Sat.) and from 10.00 a.m.-2.00 p.m. (Sundays). For further details, contact Allan or Bob at either of the following: **129 Convent Road, Ashford, Middx. Tel: (Ashford) 44122** or **Vermeulen Heathrow Garden Centre, Horton Road, Stanwell, Middx. Tel: (Staines) 63830.**

This extremely useful and simple panel (left) allows customers to the Heathrow site to test out various pieces of pond equipment

News

Plastic Bark from John Allan

Aquarium backgrounds come in all shapes, patterns and sizes. Those that are designed for in-tank use often suffer from a major drawback in that they allow fish to swim behind them, hiding from view and sometimes becoming irretrievably trapped.

John Allan Plastic Bark overcomes this problem both effectively and simply. It comes as solid, flat-backed sheets which can be stuck on to the back of the aquarium with a blob of sealant, leaving no gaps whatsoever between sheet and glass.

There are four sizes to choose from at the moment (but all can be cut to fit tanks of different dimensions).

Size (Inches)	Recommended Retail Price (Inc. VAT) £
24 × 15	7·11
36 × 15	10·61
48 × 15	14·23
48 × 18	14·66

Each pack comes in 12-inch lengths. Individual pieces are lettered to allow them to be installed in sequence, thus ensuring a perfect pattern match.

For further details of the above product, contact **John Allan Aquariums Ltd., Eastern Way Industrial Estate, Bury St. Edmunds, Suffolk, IP32 7AB. Tel: (0284) 5051-2-3.**

New pond pumps from Ever-flo

An extended range of pond pumps and filters has been announced by Ever-flo of Petworth, Sussex.

The range now includes three pumps, with the 'Maxi-flo' (700 gallons per hour), and the 'Mini-flo' (250 g.p.h.) introduced to complement the established 450 g.p.h.

standard Ever-flo model. All carry a two-year guarantee.

Two pre-filters and a biological filter have also been added to the range.

The three pumps now available all feature a unique magnetic drive, the impeller being driven by a circular magnet fixed to the motor shaft, thus avoiding troublesome mechanical seals.

A corrosion and abrasion resistant finish is provided by an outer casing of aluminium casting, Alocromed and electrostatically sprayed with a Duraguard polyester coating.

Ever-flo pumps can be installed in minutes, are economic to run and need minimal maintenance.

Full details are available from **Ever-flo Products Ltd., Unit 5, Petworth Industrial Estate, Hampers Common, Petworth, West Sussex GU28 9NN. Tel: (0798) 43555.**

Fish Delight from H. A. Keins & Co.

H. A. Keins & Co. have recently launched Fish Delight, a grain food designed for aquarium use. Containing 48% protein, 12% oils, vitamin C, etc., it is aimed at ensuring rapid growth and healthy fish.

Fish Delight has been used for years by fish breeders in many countries. The company says that this, added to its own extensive tests, shows that fish never tire of the food.

In order to keep prices low for the benefit of hobbyists, Fish Delight is packed in inexpensive tubs. The company is also attempting to maintain its prices down by keeping overheads as low as possible.

Fish Delight is available for distribution through retailers or direct from **M. Miller, 1 Riverside Road, London N15 6DA.**

Free samples are available on receipt of a S.A.E. from the same address.

Recommended prices are: one 80g. tub, £1·10; two 80g. tubs, £2·10; one 800g. canister, £6·50; two 800g. canisters, £12·30; three 800g. canisters, £18·00. These prices include V.A.T., postage and packing.

Niagara Filterfall from Cyprio

The Filterfall combines a biological pond filter within a waterfall unit, thus providing a simple package that completely disguises the pond filter. Manufactured in stone effect glass fibre, the **Niagara Filterfall** is suitable for ponds up to 500 gals. capacity and can take a maximum flow of 250 g.p.h.

The filtration unit is modelled on the **Biofloc 500,** an upward-flow filter using a combination of Cyprio open-cell foam and Flocor plastic media.

The package will sell at £74·50, including delivery. (Available initially only direct from the manufacturers).

Full details available from **Cyprio Ltd., 133 Eastgate, Deeping St. James, Peterborough. Tel: (0778) 344502.**

Help for migrating toads

Co-ordinating this year's effort to put up signs and 'help a toad across the road,' the Fauna & Flora Preservation Society is giving advice to local authorities and voluntary conservation organisations who rescue toads as they cross roads to reach their breeding ponds during the 1 March-31 May migration period.

Funding is still required for co-ordinating the nationwide campaign, which last year is estimated to have saved 50,000 toads, as well as hundreds of frogs and newts.

For further information or Car Sticker (50p), please contact **Tom Langton at the FFPS, c/o London Zoo, Regent's Park, NW1 4RY. Tel: 01-387 9656 or 01-387 9670.** Donations to the above address.

The 'Aquarian' Fishkeeping Exhibition 1986

In 1984, Thomas's, manufacturers of 'Aquarian' fish foods and remedies, ran the first major fishkeeping show in the south for many years. The show, held at Kempton Park, was very successful and was repeated in 1985.

This year, because of the superb facilities available, the show has been transferred to Sandown Park in Esher, and will take place on Saturday 7th and Sunday 8th June.

A focal point of the show will be the dazzling displays of beautiful fish created and exhibited by the country's top aquarists and leading aquatic societies. The final judging will take place under the supervision of the Association of Aquarists.

There will be a Learning Maze, a play area for children (featuring a giant inflatable), the finals of a nationwide competition and special show offers.

News from the societies

The fully kitted out cabinet aquarium installed at the East Lancashire Hospice by B.A.W.S. members

Blackburn Aquarist & Waterlife Society

The sponsored walk carried out last year by members of B.A.W.S. raised sufficient funds to purchase a 4 ft. cabinet aquarium for the East Lancashire Hospice. The aquarium was supplied at cost price by local retailer 'Aquascope', while some decor was donated by Simlawood.

Plans are already underway for further sponsored events aimed at raising funds for similar aquaria to be installed in local rest homes, old people's homes, etc. The B.A.W.S. Community Tanks Project will also be extended in the near future (aquaria are already being maintained in hospitals and schools in the area). For further details, contact Mr. S. Whittaker, 33 Hope Street, Great Harwood, Blackburn, Lancs., BB6 7LY.

Bracknell Aquarist Society

Change of address: Meetings (on the 2nd and 4th Tuesdays of every month) are now held at The Station Hotel, South Ascot, Berks. Contact Mr. Tony Cockett, 15 The Larches, Warfield Park, Bracknell, Berks.

Haringey Aquarist's Society

Change of venue: Meetings of the above society are now held on the 1st and 3rd Thursday of every month at Crouch Hill Recreation Centre, Crouch Hill, London, N19. For fuller details, contact Adrian Dempsey, 135 Rathcoole Gardens, Hornsey, London, N8 9PH. Tel: 01-348 6039.

Doncaster & District Aquarist Society

Until further notice, all correspondence for the above society should be addressed to Harry Ackroyd, 15 Hall Flat Lane, Balby, Doncaster, DN4 8QA.

Wanted: Club Badges and History

'I am currently contemplating setting up a Fish/General Pet Shop. Having done the fish showing circuit, I am now in the process of collecting historical details and badges of as many aquatic societies as possible. Should a shop arise, I would like to display these for the benefit of customers. If not, then all the details will be made available to my local society, Edinburgh A.S. J. P. Turnbull, 17 Buckstone Court, Edinburgh EH10 6UL.

Diary dates

Bridlington and District Aquarist Society

The 13th Annual Open Show will be held on **Sunday 25th May** at the Hilderthorpe Junior School, Shaftesbury Road, Bridlington, East Yorkshire. Further details available from Mr. M. Jordan (Show Manager), 12 Greenfield Road, Bridlington. Tel: (0262) 674109.

The Goldfish Society of Great Britain

The Society will be meeting at the Y.W.C.A., Great Russell Street, London WC (next to the T.U.C.) at 2.30 p.m. on **17th May, 19th July,** and **15th November.** The Next Open Show will be on **Saturday 3rd October 1986** at St. Pauls Church Hall, Chigwell Road, Woodford Bridge, Essex. Details later from G.S.G.B., 64 Ox Lane, Harpenden, Herts. AL5 4PJ.

Workington & District Aquarist Society

The **Workington & District Aquarist Society** Open Show will be held on **Sunday 15th June** at the Carnegie Arts Centre, Finkle Street, Workington, Cumbria. Further details from Mr. R. Hadfield, 25 Queen Street, Workington, Cumbria. Tel: (0900) 61326.

Newton Aycliffe & District Aquarist Society

For full information on the N.A.D.A.S. 3rd Open Show to be held on **8th June** at Elmfield Community Centre, Newton Aycliffe, County Durham, ring (0325) 320391 or (0325) 316755.

Bournemouth Aquarists Society

The B.A.S. Open Show will take place on **Sunday 11th May** at Kinson Community Centre, Pelhams Park, Kinson, Bournemouth. Full details available from Jack Jeffery (Show Secretary), 13a Woodland Avenue, Bournemouth BH5 2DJ.

Lakeland Aquarist Society

The L.A.S. Open Show is scheduled for **Sunday 18th May.** Venue: Bryce Institute, Burneside, Kendal. Contact H. Jones, 10 Burton Road, Kendal. Tel: (0539) 26058.

Redcar Fishkeepers Society

The R.F.S. annual Open Show will be held at Redcar Racecourse on **Sunday 1st June** starting at 1.00 p.m. Full details from Steven Ives (Secretary), 21 Hurst Park, Redcar, Cleveland.

Swindon Aquarist Society

The above society will be holding their Open Show on **8th June.** For full details, please contact the Secretary, M. K. A. Fellows, 10 Loxley Walk, Park South, Swindon, Wilts.

I & E Aquarist Society

The society's Open Show will take place on **Sunday 4th May** at Monk's Dyke School, Monk's Dyke Road, Louth, Lincs. Contact Mrs. E. Bloomfield, 5 Oak Close, Louth, Lincs. LN11 8SQ.

Central Midlands Cichlid Group

The next auction of fish and aquatic equipment will be held at the Peace Memorial Hall, Pinfold Lane, Penkridge, Stafford, on **Sunday 18th May.** Further details from Roger Hall. Tel: Penkridge 3944 or Cannock 73196, or from Steve Wain. Tel: Rugeley 77958.

South Park Aquatic (Study) Society

The S.P.A.S.S. Open Show and Fish Auction for Coldwater Fish, Amphibians and Aquatic Plants will be held at the Wimbledon Community Centre, St. George's Road, London SW19 on **Saturday 14th June.** Benching to be completed by 12 noon. Full details from E. Franklin (Show Secretary), 105 Hassocks Road, Streatham, London SW16. Tel: 01-679 2680.

Blackburn Aquarist & Waterlife Society

The B.A.W.S. Open Show is scheduled to take place on **Sunday 8th June** at the West End Youth Club, Clayton Street, Blackburn. Contact Mr. I. Jepson (Show Secretary). Tel: Blackburn 62290.

Stretford and District Aquarist Society

The society's Open Show will be held on **Sunday 4th May** at Hartford Community Centre, Canterbury Road, Davyhulme, Manchester. Details from D. Brightmore, 4 Malvern Grove, Salford 6, Manchester. Tel: (061) 707 4300.